



Defining and Measuring Job Vacancies in a Dynamic Perspective

What is the best definition for job vacancies, what is the best method to measure job vacancies, and what further research is needed to gain a better insight into job vacancies in a dynamic perspective?

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Rotterdam, 2015

Defining and Measuring Job Vacancies in a Dynamic Perspective
Definiëren en meten van vacatures in dynamisch perspectief

Proefschrift

ter verkrijging van de graad van doctor aan de
Erasmus Universiteit Rotterdam
op gezag van de
rector magnificus

prof.dr. H.A.P. Pols

en volgens besluit van het College voor Promoties.
De openbare verdediging zal plaatsvinden op

vrijdag 9 oktober 2015 om 9:30 uur

door

Peter August Donker van Heel

geboren te Breda

Promotiecommissie:

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Acknowledgment

One simple question – How do you define and measure job vacancies? – led to multiple new questions requiring an answer. Here I wish to express my gratitude to prof. dr. K.G. (Kea) Tijdens for her kind, personal support and her unlimited patience while helping me find the answers to this one simple question and the ensuing new questions. Thank you.

I have been able to exchange views with many people on the subject of my research, learning something from all. It was felt as a great honour that Eivind Hoffmann (Norway) and Ante Farm (Sweden) – two of the foremost job vacancy experts in Europe – were prepared to discuss views with me in person. The elaborate job vacancy concept described in this publication owes much to their contributions. My former colleague Bart Dekker and Karin Pilgram (UWV, the Netherlands) have taught me much about the measuring of job vacancies. My former colleague Martin van der Ende helped me enormously in regards to the European study. The members of the committee – prof. dr. B.F.M. Bakker, prof. dr. P.H.M. van Hoesel and prof. dr. W. Salverda – are much thanked for their comments on the manuscript. My brother Koen Donker van Heel is thanked for his help during the past years with translations and corrections. My (former) colleagues Ria Groenendijk, Natascha van Zelst-Ghazi and Elizabeth van Groll are thanked for helping me with the lay-out. I also wish to thank my previous employer Ecorys and my current employer Panteia for allowing me to do this research alongside my regular work. And last but not least: Dorothee, Simon and Felix, thank you for your unconditional support.

Asking this one simple question has also led to many new questions that still require an answer, as well as to several recommendations for further research. It is hoped that researchers and policymakers will address these questions in the near future. I, for one, would be very happy to think along with them.

Peter Donker van Heel

Abbreviations

ABU:	Organisation of Temporary Work Agencies in the Netherlands
ADS:	Job advertisements
BLS:	Bureau of Labor Statistics (United States)
CATI:	Computer Assisted Telephonic Interviewing
CBS:	Centraal Bureau voor de Statistiek (Statistics Netherlands), see: SN
CWI:	former Public Employment Services Netherlands
EC:	European Commission
EU:	European Union
GDP:	Gross Domestic Product
HWAI:	Help Wanted Advertisement Index
HWOL:	Help Wanted Online
ILO:	International Labour Office
IMF:	International Monetary Fund
ISCED:	International coding system for education
ISCO:	International coding system for occupations
JF:	Job finders
JOLTS:	Job Openings and Labour Turnover Survey (of the BLS)
JVD:	Statistics of Job vacancies (database Peter Donker van Heel)
JVD-EU:	Statistics of Job vacancies Europe (sub-database JVD)
JVD-NL:	Statistics Job Vacancies Netherlands (sub-database JVD)
JVE:	Experts Job Vacancies (database Peter Donker van Heel)
JVOR:	Job Vacancy Onsite Registration
JVS:	Job Vacancy Studies (database Peter Donker van Heel)
JVS-A:	Academic Job vacancy Studies (sub-database JVS)
JVS-E:	Empirical Job Vacancy Studies (sub-database JVS)
JVS-E-I:	Measurement Instruments Job Vacancies (sub-database JVS-E)
JVS-E-S:	Secondary Analyses Job Vacancy Studies (sub-database JVS-E)
LFS:	Labour Force Survey
MEI:	Monsterboard Employment Index
NACE:	International coding system for economic activities
NBER:	National Bureau of Economic Research (United States)
NICB:	National Industrial Conference Board (United States)
NSA:	System of National Accounts
NSO:	National Statistical Office
OECD:	Organisation for Economic Cooperation and Development
ORS:	Online recruitment services
PES:	Public employment services
Q1-Q4:	First quarter, second quarter, thirds quarter, fourth quarter of the year
SN:	Statistics Netherlands (Centraal Bureau voor de Statistiek), see: CBS
TWA:	Temporary work agencies
U:	Unemployment (stock)
UN:	United Nations
UVP:	Unemployment-job vacancies of public employment services
UWV:	Public Employment Services and Social Insurance Netherlands
V:	Job vacancies (stock)

Summary

1. Research question and working method

Policymakers and researchers are in great need of reliable job vacancy data and statistics, but the academic literature dealing with job vacancies is scarce. This certainly holds true for the literature on defining and measuring job vacancies. During my almost thirty-year career as a labour market researcher I have observed that important policy decisions sometimes have to be made on the basis of fragile job vacancy information (see also Hoffmann, 1992). This aroused my interest in research into the quality of job vacancy data. My research centred on the question of what is actually the best way to define and measure job vacancies. In this respect it seemed useful to also devise a programme for further research in the hope that this will contribute to the improvement of the quality of job vacancy data and, as a result, to optimised labour market policies.

My specific interest is studying job vacancies in a dynamic perspective, meaning the study of job vacancy flows and not just the stock of open job vacancies. The current definitions and statistics mainly apply to open job vacancies, which is a static approach. Of course an open job vacancy did occur at one point in time, only to disappear at another point in time. Job vacancies that occur in a specific period are referred to as the inflow of job vacancies and job vacancies that disappear in a specific period are called the outflow of job vacancies. The need for job vacancy flow figures was made clear from important academic publications dealing with job vacancies (Holt and David, 1966; Ferber and Ford, 1966; Boschan, 1966; Myers and Creamer, 1967; Sharir, 1971; Pissarides, 1979; Frumermann, 1979; Verhage et al., 1997; Fenwick, 1994; Wegerif, 1994; Mortensen and Pissarides, 1994; Davis and Haltiwanger, 1998; Hoffmann, 2000; Theeuwes, 2003; Farm, 2004). A general and precise operational definition is required to measure job vacancy flows. Apart from this, the measuring instruments need to be subjected to a critical analysis.

Why is it important to study job vacancies in a dynamic perspective? Stock figures are important for the purpose of placement (job mediation), but labour market policy, education planning and advice on profession and study choice mostly require flow figures (Frumermann, 1979). Flow figures reflect reality better than stock figures. The economy and the labour market are always moving. The flows in the economy and the labour market are connected: 'they feed each other'. Companies and individuals are linked to each other in a dynamic context (Theeuwes, 2003). According to Frumermann (1979) the measuring of job vacancies flows may lead to a whole new perspective on the concept and the definition of job vacancies. The image conjured up by Frumermann has become the overarching perspective for this dissertation.

The central research question is the following:

How can we define and measure job vacancies in a dynamic perspective, and what further research is needed to gain a better insight into job vacancies?

The basis of my research is three databases that I developed. The first database holds 537 job vacancy studies from 35 countries, labelled by me with various codes (JVS). The second database contains job vacancy statistics from 27 European countries (JVD). The third database includes 268 experts on and users of job vacancy information from 14 different countries with whom I had face to face talks (Chapter 1). The study of the literature has led to both a general definition and an operational definition of job vacancies (Chapter 2). The next step is research into methods to measure job vacancies, centring on an assessment of 154 unique measuring instruments from 28 European countries (27 EU-countries plus Norway) and based on the operational definition and general methodological criteria. This part of the research results in a proposal for an optimal measuring

method (Chapter 3). An analysis of job vacancy statistics in Europe lays bare a number of important lacunas in job vacancy measurements (Chapter 4). The case study of the Netherlands compares job vacancy statistics, leading to several new research questions (Chapter 5). Chapter 6 – the final chapter – contains recommendations for further research in the domain of job vacancies.

2. The definition of job vacancies

Research question: Which job vacancy concepts can be distinguished and what could be a general and operational definition of job vacancies?

My conclusion on the basis of the study of the literature is that two job vacancy concepts should be distinguished: the concept of *unmet demand* and the *job matching* concept. The first concept is about an approach at the macro level, producing a static image of open job vacancies (stock figures). In this case, the definition of job vacancies is subjected to strict requirements. This concept establishes a job vacancy on the basis of the question of whether production takes place or not, departing from the existence of a specific job position. The second concept is an approach at the micro level, resulting in a dynamic image (stock and flow figures). This concept sets hardly any requirements for the definition of job vacancies. In the concept of job matching the key point is the searching behaviour of companies and job seekers, placing the focus firmly on the final match. The definition of job vacancies according to the concept of *unmet demand* is mirrored against the definition of unemployment. A definition according to the concept of *job matching* can be mirrored against a definition of jobseekers (see also Verhage et al., 1997). In the literature, research and policymaking, these concepts are mixed up, leading to some confusion. The first concept is used, for example, for measurements at the micro level, whereas in my perspective this leads to serious problems of measurement in view of the current specifications and research methods.

The definition of job vacancies used in Europe by Eurostat and the European Commission can be traced back to the literature on job vacancies in the United States between 1960 and 1980. This definition fits entirely within the concept of *unmet demand*:

A job vacancy shall mean a paid post that is newly created, unoccupied, or about to become vacant, (a) for which the employer is taking active steps and is prepared to take further steps to find a suitable candidate from outside the enterprise concerned and (b) which the employer intends to fill either immediately or within a specific period of time (Eurostat, 2008).

This definition of job vacancies has a number of shortcomings: a) the measurements based on this definition underestimate the number of job opportunities for people seeking employment; b) it does not meet the perception of companies, jobseekers and labour market intermediaries dealing with job vacancies; c) it is not a solid basis for job vacancy measurements; d) it is a snapshot in time, whereas the labour market is very dynamic; and e) it is not synchronous with other definitions that are used internationally, and more specifically, with the definition of a job.

Job vacancies from the perspective of the *job matching* concept do not suit this definition. For this reason I have tried to devise a general and operational definition that will accommodate both job vacancy concepts. This is possible by starting from the internationally accepted definition of a job according to the *System of National Accounts (SNA 1993)* of the United Nations, and the *European System of Accounts (ESA 1995)* of the European Commission and Eurostat:

A job is an explicit or implicit contract between a person and a resident institutional unit to perform work for compensation for a defined period or until further notice (United Nations, 1993).

A job is defined as an explicit or implicit contract (relating to the provision of labour input, not to supplying output of a good or service) between a person and a resident institutional unit to perform work (activities which contribute to the production of goods or services within the production boundary) in return for compensation (including mixed income of self-employed persons) for a defined period or until further notice (Eurostat, 1995).

A direct relationship between job vacancies and jobs exists. The moment a job vacancy occurs there is a potential job, and as long as the job vacancy has not been filled this will remain this way. Ultimately, the job vacancy will become a job. The definition of jobs is therefore a starting point for my own definition of job vacancies.

A job vacancy is an opportunity for an explicit or implicit contract between a person and a resident institutional unit to perform work for compensation.

The core notion behind my own definition is that it views a job vacancy as a potential employment contract. This is supported by the literature. Although both job vacancy concepts show differences, there are also clear similarities. Both concepts include a potential employment contract.

The literature on employment dynamics offers good starting points for the study of job vacancy flows, even if they seldom mention the term 'job vacancy'. Establishing a relationship with this literature is possible through the notion of the filled job vacancy. A filled job vacancy not only equals a person that is hired – or *hire* – but it is also the equivalent of a job finder (Sharir, 1971; Franz and Smolny, 1994; Verhage et al., 1997), which is an observation that I can support. A *hire* is a match on the labour market (Blanchard and Diamond, 1997), in other words, an employment contract made (Schettkatt, 1996). A job finder again matches what is referred to with the notion *accession* (Davis and Haltiwanger, 1995 and 1998). The concepts presented by the latter two authors, viz. job creation and job destruction, can be related to the concept of *unmet demand*, but not to the concept of *job matching*.

On the basis of the literature in JVS I demonstrate that job vacancies in a dynamic perspective can be made measurable by using six criteria relating to content: the recruitment area, the search activity, the occupation of a position, the availability of work, the availability of an employment contract, and the status (inflow, open, outflow, of which filled or withdrawn). If no explicit choice is made for one of these criteria it is unclear what is being measured. Then there are five data criteria: delineation of the population, selection of characteristics (economic sector, profession, education, etc.), level of detail, frequency and time dimension (retrospective, current state of affairs, prospective). Taken together, these eleven criteria form the operational definition of job vacancies.

Both job vacancy concepts fit entirely within the general and operational definition in terms of contracts. In my view it is even possible to place the concept of *unmet demand* in a dynamic perspective, and to measure it as such, within the confines of this general and operational definition. In this manner I hope to meet the challenge set by Frummermann (1979).

3. Methods to measure job vacancies

This chapter contains an assessment of the measuring methods for job vacancies.

Research question: Which measuring methods provide a sound measurement of the number of job vacancies according to the operational definition and methodological criteria?

As a specific combination of the type of data collection (survey or register), the type of respondent (company or job finder) and the type of source (national statistical organisations/research institutes or labour market intermediaries like public employment services, temporary work agencies, job ads and online recruitment services). The combination of these three dimensions results in the classification of eight different types of measuring methods (table S1).

Table S1. Number of unique instruments to measure job vacancies in 28 countries (Norway included) classified according to measuring method (n=154)

Type of respondent	Type of data collection				Total
	Survey		Register		
	Source is national statistical organisation or research institute	Source is labour market intermediary	Source is national statistical organisation or research institute	Source is labour market intermediary	
Companies	76 (49%)	1 (1%)	1 (1%)	40 (26%)	118 (77%)
Job finders	27 (18%)	2 (1%)	7 (5%)	0 (0%)	36 (23%)
Subtotal	103 (67%)	3 (2%)	8 (5%)	40 (26%)	154 (100%)
Total	106 (69%)		48 (31%)		154 (100%)

Source: JVS-E-I

A measuring instrument is defined here as the collection of primary job vacancy data in a specific country according to a specific method, meaning a specific combination of type of data collection, type of respondent and type of source. I have been able to trace 154 unique measuring instruments in 28 European countries (27 EU-countries and Norway). The most popular instrument is the survey among employers by a national statistical organisation (49% of all instruments), followed by job vacancy registers of labour market intermediaries (26% of all instruments).

These 154 measuring instruments were evaluated using the operational definition, supplemented by a number of methodological criteria. They were assessed using 18 assessment criteria: six content and five data criteria (Chapter 2) and seven methodological — or method-related — criteria (representativeness, validity, reliability, sensitivity to human mistakes, costs, response burden and timeliness), which I arrived at based on the literature and expert talks. Each of the 154 instruments has been rated per assessment criterion. The aggregated results lead to a quantitative and a qualitative assessment of eight methods to measure job vacancies.

The analysis of three characteristics of measuring instruments shows that measurements via companies are more suitable than measurements via job finders, measurements via registers are more suitable than measurements via surveys and measurements via intermediaries are more suitable than measurements via national statistical organisations and research institutes.

The combination of the type of respondent, the type of data collection and the type of source determines the ultimate value of a measuring method. The registration of job vacancies from companies by intermediaries shows the highest total quality score, but this instrument does have considerable disadvantages, such as a limited and selective coverage of job vacancies in a specific country. Also, this instrument does not allow the measurement of job vacancies according to the concept of unmet demand. The company survey by national statistical organisations and research institutes likewise shows a relatively high score; however, this instrument also has some downsides, mostly as far as methodology is concerned (limitations in delineation of population due to limitations in the quality of sample frameworks, limitations in reliability, sensitivity to human mistakes, response burden and limited timeliness).

None of the eight methods is suitable for measuring job vacancies according to the total set of 18 criteria. The top score is 10 out of 18. For this reason I have designed a method that will meet all the assessment criteria, called JVOR (*Job Vacancy Onsite Registration*). This is a design of a registration tool – an automated application – that employers can use. This tool records specific events during the entire recruitment process, including date and time if so required. This will allow an exact and continuous measurement of job vacancy flows at company level according to both the concepts of *unmet demand* and *job matching*. As far as I can determine, this tool does not yet exist. The next challenge will be to build this tool and to implement it with a representative set of employers.

4. Job vacancy measurements in Europe

This chapter deals with the analysis of job vacancy statistics in Europe. It aims to identify the lacunas in job vacancy measurements. The operational definition forms the point of departure for the analysis, meaning that it does not only include measurements of open job vacancies, but also measurements of job vacancy flows.

Research question: Which starting points can be found for further research to obtain a better insight into the job vacancy market in Europe, on the basis of an analysis of job vacancy measurements in 27 European countries?

In the 27 European countries (Norway is excluded), out of 154 measuring instruments 124 measure the total number of job vacancies at the national level. The remaining 30 measuring instruments have been discarded because they cover a specific region or sector. To obtain a framework for the analyses I made an inventory of seven different types of job vacancy analyses, based on the 423 studies of the JVS-E. The main input is the existing statistics of the European Commission and Eurostat. This analysis results in the following starting points for further research:

- a. The most popular source is the *Job Vacancy Statistics* provided by countries to Eurostat. These are just open job vacancies defined according to the concept of *unmet demand* and – apart from some exceptions – measured through a company survey. The literature shows that surveys render it almost impossible to measure whether the job is occupied or not, meaning that there may be doubts about the validity of the measurements. In any case, the *Job Vacancy Statistics* (substantially) underestimates the real recruitment needs of employers and of the job opportunities for jobseekers, by excluding job vacancies for occupied jobs and excluding job vacancies without active recruitment. A comparison between the number of open job vacancies (*Job Vacancy Statistics*) and the number of unemployed people (*Labour Force Survey*) may in that case become misleading.
- b. As per the beginning of 2012 there are no comparable statistics on the number of open job vacancies in five out of 27 countries: Denmark, France, Ireland, Italy and Malta. This is not an unknown fact, but it should be taken into account.

- c. Europe has insufficient information on job vacancy flows (inflow of job vacancies, stock of job vacancies and outflow of job vacancies, either filled or withdrawn). The *Labour Force Survey* does, however, provide very useful information on job finders, which is the equivalent of persons hired and filled job vacancies.
- d. The information on open job vacancies and filled job vacancies at the public employment services cannot be compared between countries because of differences in administrative processes. Information on the inflow of registered job vacancies at public employment services lends itself to a comparison between countries, but is not always available for all countries in Europe (per quarter and per annum).
- e. The number of job vacancies at temporary work agencies in some countries (the Netherlands and Belgium) equals the total number of job vacancies with all other employers taken together. In spite of this, the job vacancies at temporary work agencies are not or are hardly ever measured. Information on assignments of temporary work agencies is lacking for almost all European countries.
- f. There is reason to doubt the validity and reliability of statistics that are based on online job vacancies. This is mainly due to the unclear market coverage and insufficient insight into the degree of double counts. The methodology behind these statistics is unknown.
- g. The number of withdrawn job vacancies – an important indicator for bottlenecks at the demand side of the labour market – is probably substantial (possible one-sixth of the outflow), but there is almost no data available.
- h. With job vacancy-related indicators the outcome converges to a specific value, naturally taking into account the differences between countries and the differences in time. The following rules of thumb may be applied, albeit with care: the number of open job vacancies is approximately one quarter of the job vacancy outflow; the number of withdrawn job vacancies is approximately one-sixth of the outflow; the job vacancy duration is approximately three months; the share of the open job vacancies is approximately two percent of employment; the number of filled job vacancies (job finders) is approximately one quarter of the total employment; the number of unemployed people is approximately ten times higher than the number of open job vacancies (according to the *Job Vacancy Statistics*); the penetration by the public employment services on the job vacancy market is approximately ten percent; the coverage of the public employment services on the job vacancy market is approximately one-third; the job vacancy filling rate of the public employment services is approximately one quarter and the share of public employment services in the total number of filled job vacancies is approximately one-twelfth.

5. Case study: the Netherlands

The case study of the Netherlands is all about the comparison of job vacancy statistics in order to find starting points for further research. When it comes to the measurement of job vacancies the Netherlands is leading in Europe, as was seen in the study on job vacancy statistics (Chapter 4).

Research question: What is the state of affairs in the Netherlands in regards to the measurement of job vacancy stocks and flows, and what are the starting points for further research as a result of this analysis?

I have identified 52 different measuring instruments in the Netherlands. These were compared with each other, including the measuring instruments that aim at a specific region or sector. The main focus was on the 11 instruments with a national coverage.

It is difficult to acquire a clear picture of the total job vacancy market in the Netherlands on the basis of the existing instruments. Starting from an analysis of the data on open job vacancies, the inflow of job vacancies and filled job vacancies I demonstrate that the various measuring methods – which all aim to measure the same – generally lead to different outcomes for the numbers of job vacancies. The *Vacature-enquête* by the CBS presents substantially lower outcomes for the inflow and the number of filled job vacancies than the UWV study *Vacatures in Nederland*. The labour market intermediaries especially present much lower figures, because they only operate in sections of the total market. It is clear that the existing job vacancy measurements underestimate

the job opportunities for jobseekers in the Netherlands, because the job vacancies at the temporary work agencies are hardly ever taken into account.

The case study shows that public employment services, temporary work agencies and online recruitment services are not representative of the total job vacancy market and that the use of the data involved for policymaking should be very carefully done. It was also seen that the job vacancy studies with a national coverage are unsuitable for users in sectors and regions. The results of national measurements are insufficiently tailored to sectors and regions and insufficiently detailed, as may be concluded from the many scores of labour market and job vacancy studies in the Netherlands that are done by social partners (employers and employees organisations) and regional collaborations. One final conclusion is that exogenous factors may have a large impact on the outcomes of job vacancy measurements, leading to a deviation from the trend in job vacancy time series. This study shows that this occurs when there are changes in the manner of registering job vacancies, changes in the structure of surveys, a change of definition or a change of research organisation. Budget cuts have also had a large impact on job vacancy measurements: specific measurements have been entirely terminated or become limited in frequency or scope.

6. Suggestions for further job vacancy research

Research question: What further research is needed to gain a better insight into job vacancies?

This research has resulted in 36 recommendations in four categories: I) the concept and definition of job vacancies; II) the measuring of job vacancies; III) job vacancy analyses and IV) coordination and use of job vacancy information. The recommendations for further research are listed in the table below.

Table S2. Recommendations for further job vacancy research

Category	Recommendation
The concept and definition of job vacancies (I)	1. Test the proposed general definition of job vacancies.
	2. Test the proposed operational definition of job vacancies.
	3. Define the characteristics of job vacancies.
	4. Study job vacancies in non-Western cultures and economies.
	5. Study atypical job vacancies.
	6. Study latent job vacancies.
	7. Study ghost job vacancies.
The measuring of job vacancies (II)	8. Improve the <i>Job Vacancy Statistics</i> in specific European countries.
	9. Measure open job vacancies also for positions that are occupied.
	10. Supplement the <i>Labour Force Survey</i> with job finder research among the unemployed.
	11. Develop a company survey at the European level to measure job vacancy flows.
	12. Use a standard questionnaire to measure job vacancy flows.
	13. Investigate the possibilities for national registers of new employment contracts.
	14. Improve the quality of the data of job vacancy registers at the public employment services.
	15. Collect data on open and filled job vacancies (assignments) at temporary work agencies.
	16. Publish about the methodology of job vacancy statistics of online job vacancy sites.
	17. Use the employee salary registers of companies as a source for job vacancy research.
	18. Develop an instrument for the registration of job vacancies on a company level (JVOR).
	19. Measure <i>unmet demand</i> as a subset of all job vacancies.
	20. Invest in time series of data on job vacancy flows.
Job vacancy analyses (III)	21. Develop comparable job vacancy analyses for public employment services.
	22. Study the effects of difficult to fill job vacancies.
	23. Study withdrawn job vacancies as a possible indicator of bottlenecks at the demand side of the labour market.
	24. Use the stock-flow ratio as an indicator of job vacancy duration.
	25. Use job mobility rate (flow) as a prominent indicator for labour market dynamics and rely not only on the job vacancy rate (stock).
	26. Use data on job vacancy flows on the total job vacancy market for the analysis of mismatches on the labour market.
	27. Study the substitution of job vacancies by other forms of met demand.
	28. Study the match of job vacancies with the ultimate job and person hired.
	29. Investigate to what extent a combination of job vacancy data of intermediaries can be used as an 'early indicator' of developments in the economy and the labour market.
	30. Link registers and surveys with job vacancy information.
	31. Invest in explanatory job vacancy research.
	32. Study the recruitment motives of employers and the factors involved.
	33. Study the influence of institutions as the context of job vacancy developments.
Coordination and use of job vacancy information (IV)	34. Improve the quality of job vacancy information through coordination.
	35. Use job vacancy information for policy purposes.
	36. Study the functionality of various types of job vacancy analyses.

1. Introduction

1.1 The use of job vacancy information

Job vacancy information is important for economic policy, wage policy, employment and labour market policy, social security policy, immigration policy, (vocational) education and training, career guidance and career advice, collective bargaining by social partners (employers and employees organisations), matching of supply and demand by labour market intermediaries, assessment of the effectiveness and budgeting of public employment services, inter-sector and geographic mobility of workers, recruitment and manpower planning by companies and the making of social plans in connection with business closure (Palm, 1966; Joint Economic Committee, 1966; Frumermann, 1979; Verhage, et al, 1997).

At the international level, a need for job vacancy information is perceived within organisations such as the United Nations, the ILO, the OECD and the European Commission. The internationally operating intermediaries such as public employment services, temporary work agencies and the umbrella organisations EURES, Ciett and Eurociett, and on-line recruitment services are also interested in job vacancy information, as are social partners that are active at the international level. In Europe, Eurostat plays a leading role in the effort to achieve common frameworks for the statistics of countries, in particular the *Job Vacancy Statistics*.

At the national level, job vacancy information is used for political and strategic policy-making in addition to its more common use in the exchange of labour. Both public and private players benefit from having reliable job vacancy statistics and underlying data on which to base their policy decisions. Information on the total number of job vacancies is required by the relevant ministries: Economic Affairs (economic policy), Social Affairs (labour market and social security policy) and Education (planning of vocational education). Public employment services at a national level use these data for strategy purposes to, for example, gauge the balance between job vacancies and job seekers (for example target sectors and target groups), open and to close locations of public employment services, allocate personnel, differentiate in services for companies and job seekers, or set targets. Also, employers' and employees' organisations operating at a national level use job vacancy information for policy purposes.

Job vacancy information at the sectoral level is especially important for social partners, but also for national and regional authorities. At the sectoral level, the data on job vacancies are used for planning vocational education. Job training organisations also use the information as a basis for decisions about existing and new training programmes. This is often an analysis of the mismatch between demand (job vacancies) and supply (unemployed, school leavers) according to occupation and education. Bottleneck analyses are also important at the sectoral level (difficult to fill job vacancies). Social partners and especially the branch organisations use this information to prevent bottlenecks in the supply of employees, enabling them to fill the job vacancies in their sector in the best possible way.

At the regional level, job vacancy information is used by intermediaries for tactical policy-making, such as dealing with management issues, rather than political and strategic issues. This is often where the translation of national policy frameworks takes place, starting from the region and sector specific level, drilling down to more detailed analyses. For intermediaries like public employment services, temporary work agencies and online recruitment services, job vacancy information is both everyday information and a strategic asset. This type of organisation needs to know as much as possible about its own relative position on the job vacancy market, especially in relation to the various competing recruitment channels. Reliable data on labour demand and supply enable labour market intermediaries to plan their policies and help them to decide on new investments such as whether or not to

open a new local branch office. Public employment services and temporary work agencies also use job vacancy information to improve their own image, to lobby, to defend their own position and for social dialogue.

At the local level, job vacancy information tends to be used for operational or executive decisions. This concerns not only the individual companies and job seekers, but also the daily work of service providers such as intermediaries and consultants from public employment services and temporary work agencies in their efforts to find a match between the demand from companies and the supply of job seekers. Individual companies are looking for staff, whereas individual job seekers are looking for job vacancies. For this group of information users, it is vital that the job vacancy information is highly detailed. Ideally, job vacancy statistics should be available at any given moment and be as up to date as possible. Furthermore, individual job seekers want to know which suitable job vacancies are open to them as expressed in lists of all individual job vacancies.

A considerable need for comparable, unambiguous, reliable and valid job vacancy information exists, specifically a common need for micro level data on job vacancies (Burdett and Cunningham, 1994). Based on 29 years of experience as a labour market researcher I am convinced that this need is still apparent.

1.2 Research objective

This thesis addresses defining and measuring job vacancies, which includes a review of job vacancy concepts, the development of both a general and an operational definition of job vacancies, an inventory of types of job vacancy analyses and an analysis of results of job vacancy measurements. The aim of the research is to find improved ways to measure job vacancies. I have also formulated suggestions for further research.

Despite the social importance of job vacancy information, relatively little attention has been paid to the phenomenon of job vacancies, in particular to the measurement thereof. The job vacancy concept is not concisely and clearly described in literature, the quality of job vacancy data is often inadequate and the knowledge of how to measure the job vacancies is incomplete.

The academic literature dealing with the demand side of the labour market and specifically job vacancies is relatively scarce. For the period between 1965 and 1993, Manser counted 1,885 publications in the professional journals dealing with supply and demand on the labour market. The survey by Manser demonstrates that 77 percent of the articles addressed labour supply against 23 percent for labour demand. Between 1984 and 1993, the ratio is even more pronounced: 93 versus 7 percent in 659 articles in specialist professional journals (Manser, 1998). The bottlenecks on the demand side have been studied considerably less often than those on the supply side (Hoffmann, 1992, 1999; Hamermesh, 1996; Holt and Leonard, 1996, Verhage et al, 1997). Similarly, much less is published on job vacancies than on unemployment.

One important reason that job vacancies are studied less in-depth than unemployment could be the fact that unemployment is felt in a more direct way in society than the problems caused by open job vacancies (Hoffmann, 1999). The effects of unemployment are more visible than the consequences of job vacancies that are difficult to fill. It is also easier to quantify the societal cost of unemployment benefits than the cost involved in recruitment bottlenecks. These are probably some of the factors behind the relatively little interest in studying and measuring job vacancies. Measuring the number of job vacancies does not face as much political pressure as measuring unemployment. Job vacancy data are generally seen as a given fact in economic analyses (Hoffmann, 1992; Topel, 1998), which is also my own experience as a labour market researcher in the past 29 years.

Far reaching policy decisions are often based on fragile job vacancy data (Hoffmann, 1992). The use of limited or unclear job vacancy information could result in an erroneous picture in which no suitable job opportunities for the

unemployed exist. It also could lead to the wrong conclusions about the functioning of the labour market such as flexibility and mismatches. It could result in misleading policy decisions about the regulation of the labour market, educational and schooling requirements, market position and the effectiveness of public employment services. I want to reduce these potential risks by examining whether the quality of job vacancy data can be improved. To achieve this I want to acquire more knowledge concerning the definition and measurement of job vacancies.

First of all, more knowledge is required about the description of what exactly a job vacancy is. There is currently confusion. Policymakers and researchers use various descriptions to explain the same phenomenon and it is explained in different ways. Definitions such as job vacancy, unmet demand, demand for labour, effective demand, job vacancies filled, hired persons, job openings and job opportunities intermingle with each other. I am not setting out to describe all these definitions, but with this study I would like to define job vacancies more clearly and in such a manner that it is more suited to use in measurements.

More knowledge is required on how job vacancies are measured. Large differences in the results of the measurements of the number of job vacancies exist, even though the various measurements are designed to measure exactly the same thing. This often results in a discussion on the reliability of certain figures, which does not always promote effective labour market policy. The differences in results should at least be explained through deviations in measuring methods. The strengths and weaknesses of the various measuring methods must become more transparent. To my knowledge, a systematic comparison of the various methods of measuring job vacancies does not exist. I have set out to fill this void. Through this study, I aim to draw attention to the needs to be critical when using the available job vacancy figures and to pay more attention to the methodology.

A specific point of interest is job vacancy flows, both the definition and the measurements. The dynamics of the job vacancy market are better demonstrated by providing an overview of the job vacancies that appear (inflow) and disappear (outflow) during a certain period. The definition of job vacancies that has been accepted internationally (EU, US) is based on job vacancies that are available at a certain moment in time (stocks). Most data on job vacancies concerns stock data and not flow data. However, this static approach does not only lead to an underestimation of the new demand for labour and the number of job opportunities, but it also gives a limited impression of how the labour market actually works. The economy and the labour market are not standing still, but they are continuously on the move. Stock figures may be important for the purpose of mediation, but economic and labour market research and policy stands to benefit more from flow figures (Frumermann, 1979). According to Frumermann, the measurement of flow figures could lead to an entirely new perspective on the concept and definition of job vacancies. To my knowledge, nobody has yet taken on the challenge of defining job vacancies in a dynamic perspective. To eliminate this omission I am specifically interested in studying job vacancy flows. Therefore, I went looking for the beginning and end of a job vacancy. My study is not about the causes and effects of job vacancies.

Taking the above into consideration, the goal of my research is to develop an elaboration of the term job vacancy in a dynamic perspective (i.e. including job vacancy flows), resulting in a review of existing methods for measuring job vacancies, a review of existing job vacancy statistics and an underpinned inventory of the required follow-up research.

1.3 Research questions

Against this background and research objectives I have formulated the following central research question:

How can we define and measure job vacancies in a dynamic perspective and what further research is needed to gain a better insight into job vacancies?

This central research question is divided into the following research questions:

1. Which job vacancy concepts can be distinguished and what could be a general and an operational definition of job vacancies? (Chapter 2).
2. Which measuring methods provide a sound measurement of the number of job vacancies according to the operational definition and methodological criteria? (Chapter 3).
3. Which starting points can be found for further research, to obtain a better insight into the job vacancy market in Europe, on the basis of an analysis of job vacancy measurements in 27 European countries? (Chapter 4).
4. What is the state of affairs in the Netherlands in regards to the measurement of job vacancy stocks and flows, and what are the starting points for further research as a result of this analysis? (Chapter 5).
5. What further research is needed to gain a better insight into job vacancies? (Chapter 6).

The aim of this dissertation was to do research that may be of use worldwide. However, in view of the large cultural and institutional differences between and within countries, a global empirical research on this subject is not feasible. This was made explicitly clear to me by the staff of the ILO's research department during an interview. For this reason, the empirical part of my research is limited to Europe and to some extent also the US. However, a comparison between Europe and the US would require further study, perhaps as part of a subsequent, separate research project. It is hoped that the final product of my study will be of use to researchers and policymakers worldwide who are working on job vacancy research or policies based on job vacancy statistics.

1.4 Research design and sources

The study has been divided into the following steps:

1. Study of existing concepts and definitions of job vacancies.
2. Study of existing methods to measure job vacancies.
3. Study of existing job vacancy statistics. This step has been divided into two sections, a study of job vacancy statistics in Europe and a study of job vacancy statistics in the Netherlands (case study).
4. Conclusions with regard to gaps in the existing knowledge and suggestions for further research.

The research is based on several databases I built. Only publicly available documents and statistics have been used in my study. The databases used in this study are the following:

- a. Job vacancy studies (JVS): 537 titles.
- b. Job vacancy data (JVD).
- c. Job vacancy experts (JVE): 268 experts.
- d. Personal knowledge and experience, including the performance of 166 job vacancy studies and the development of 35 measuring instruments.

a) Job vacancy studies (JVS)

The database JVS (books, articles) consists of 114 academic studies about job vacancies and job vacancy measurement (JVS-A) and 423 empirical studies (JVS-E), 537 titles in total (annex 1).

Academic studies job vacancies (JVS-A)

The first part of JVS is the academic literature about job vacancy concepts and methods of measurement (JVS-A), with 114 titles. The literature published in the 1960s and 1970s, principally in the US, can be considered as the fundamental literature. The concept of job vacancies as developed in this period has not changed and is still in use as the basis for job vacancy statistics in Europe and the US. This probably explains why relatively little has been published on the job vacancy concept since this era.

Empirical job vacancy studies (JVS-E)

The second part of JVS consists of 423 empirical job vacancy studies, including all the studies I could find until January 2012 and covering 35 mostly European countries (JVS-E). The studies include the vast majority of job vacancy studies in Europe. The 423 studies include 237 Dutch job vacancy studies that were used for the Netherlands case study (Chapter 5). Dutch studies are therefore overrepresented. Besides the 237 Dutch studies, there are 186 studies for all other countries: 96 studies covering Europe (top down) and more or less international comparable), 90 country specific job vacancy studies (bottom up), including one about the US. Many of the European studies have been found through the *European Vacancy and Recruitment Report 2012* (European Commission, 2012c). Together, the studies in JVS-E provide a fairly complete picture of job vacancy research at the national level that is available in Europe as per January 2012. Within JVS-E a distinction is made between primary data collection and instruments (JVS-E-I) and analyses of job vacancies without data collection or secondary analyses (JVS-E-S).

All 423 empirical studies (JVS-E) have been coded by me, using my long experience as a labour market researcher (see d). For some of the research other experienced researchers were consulted and part of the research was done by me, mostly in teams. My assessment was reinforced by the expert talks (see c). The final assessment is, however, mine alone. The coding by myself was deemed necessary in order to provide this dissertation with form, structure and content. The coding was an iterative process in which new variables and improvements came to light, leading to adaptations of the main text, and vice versa. In short, the coding itself turned out to be an important part of the research¹.

Instruments for data collection of job vacancies (JVS-E-I)

I define a measurement instrument as collection of primary job vacancy data in a specific country, according to a specific method, i.e. a specific combination of source, respondent and way of data collection (Section 3.2). In 423 empirical studies (JVS-E) I detected 154 different instruments (JVS-E-I). The 154 instruments originate from 28 countries: Austria (6), Belgium (8), Bulgaria (2), Cyprus (3), Czech Republic (4), Denmark (3), Estonia (3), Finland (3), France (4), Germany (8), Greece (3), Hungary (4), Ireland (4), Italy (4), Latvia (3), Lithuania (3), Luxembourg (2), Malta (1), Netherlands (52), Norway (1), Poland (3), Portugal (3), Romania (4), Slovakia (3), Slovenia (3), Spain (6), Sweden (5) and United Kingdom (6). Of the 154 instruments, 124 have a national scope, 22 a sector scope, five a regional scope and three a local scope.

Analyses of job vacancies without data collection (JVS-E-S)

The other 269 studies of the JVS-E refer to analyses of job vacancies without data collection (JVS-E-S). It relates generally to secondary analysis of job vacancy data and in some cases to qualitative job vacancy studies. In general these secondary studies refer to one or more of the instruments of JVS-E-I. A small section of JVS-E-S consists of 30 instruments from older years; in JVS-E-I only instruments from the most recent measurement have been implemented.

¹ The quality of the assessment could improve by having an expert panel give ratings (scores), but this should be for a different research. One will have to take into account that the coding requires very much work. The study of the texts and the coding took months or years. Annex 7 presents the codebook that was used for coding. Annex 8 lists the codes for each of the 423 empirical studies (JVS-E).

b) Job vacancy data (JVD)

The actual job vacancy data have been stored in spreadsheets. My data actually consists of statistics, so no primary data. JVD includes job vacancy statistics of Europe (JVD-EU) and job vacancy statistics of the Netherlands (JVD-NL).

Job Vacancy Data Europe (JVD-EU)

The JVD-EU is a spreadsheet with job vacancy statistics that are comparable in Europe. I call this type of information top down information: the sources are comparable between all countries because they are based on a common methodology. The most important sources are the *Job Vacancy Statistics*, the *Labour Force Survey (LFS)* and the *National Accounts (NA)*, all statistics presented online by Eurostat. In addition job vacancy data of registers of public employment services has been used. This data has been published in the *European Vacancy and Recruitment Report* (European Commission, 2012c), the *European Mobility Bulletin* (European Commission, 2012a) and the *European Vacancy Monitor Bulletin* (European Commission, 2010; 2011a, 2011b; 2011c; 2012b). Additional information from labour market intermediaries such as Eurociett, Randstad, Manpower and Monsterboard was also analysed for a number of countries. The job vacancy statistics are stored in a spreadsheet by source with breakdowns by 27 countries. Generally the JVD-EU concerns time series from 2007 to 2011 with an interval of a quarter.

Job Vacancy Data Netherlands (JVD-NL)

The JVD-NL is a spreadsheet with job vacancy statistics from several organisations in the Netherlands. Data provided by the Statistics Netherlands (SN) are used of the *Job Vacancy Statistics (Vacature-enquête)* (1990-2010), the *Survey Economic Structure (Structuur-enquête)* (1990-2010) and the *Labour Force Survey (Enquête Beroepsbevolking)* (2007-2010). In addition, the register of the public employment services (UWV) (2007-2011) and results of *Job Vacancies in the Netherlands (Vacatures in Nederland)* of UWV WERKbedrijf (1998-2011) are included. From the latter source, a sub-file was made which includes information on background characteristics of job vacancies (sector, occupation, education, type of contract), hard to fill job vacancies, recruitment and filling channels. Of the Institute of Strategic Labour Studies (OSA) the data of the *Panel Demand for Labour (Vraagpanel)* (1995-2008) is used.

c) Personal Expert-to-Expert Talks (JVE)

Between 1986 and 2012, I conducted personal talks with 268 experts about job vacancies (JVE). During the expert-to-expert talks a number of issues were addressed, viz. the use of job vacancy information (268), the job vacancy concept (8), operationalization of the concept of job vacancies (268), measuring job vacancies (179), measuring job vacancies in the European context (32) and measuring job vacancies in the Netherlands (218). Some of these were talks with experts in guidance committees of research projects. I participated in these talks, which generally comprised various intense discussions on the content and methodology of a research project. The minimum duration of a talk was one to two hours.

More than half of the expert-to-expert talks (144) took place since the beginning of this PhD project. With many experts more than one talk was held, sometimes even ten or more. In total I held talks with 268 experts, viz. 176 users of job vacancy information and 92 labour market researchers and statisticians of 14 countries, with an emphasis on the Netherlands (85%). During country visits I had talks with experts in Austria (1), Belgium (1), Dutch Antilles (5), France (1), Germany (4), Lithuania (4), Netherlands (227), Poland (1), Romania (1), Sweden (1) and The UK (2). Apart from that I had the opportunity to have thorough talks with experts from Ireland (1), Morocco (2), Norway (1) and Portugal (1). In addition, I had talks with experts in the EU context (10) and experts in the ILO context (5). Representatives of the public employment services form the largest group of respondents (72). A rather large group of researchers worked for private research bureaus (39). Most respondents provided a picture of a country as a whole (121). Several respondents focused on a specific sector (65). The dozens of extensive expert interviews I held with consultants of public and private employment services — mostly about

registration and registers of job vacancies — and dozens of personal interviews with employers are not included in JVE (see annex 2 for additional statistics).

d) Personal knowledge and experience

In this study I make use of my personal knowledge and experience as a labour market researcher at private research institutes for the past 29 years. In that period I have developed a relatively extensive network of experts with specific knowledge in the field of job vacancies (JVE). I have gained access to ‘grey sources’ such as policy documents, notes on the use of job vacancy information and review of methodologies. I carried out 166 job vacancy studies, almost always in co-operation with other labour market researchers (also added to JVE). In most of these studies I was project leader, responsible for the research design, the development of the instruments, the choice of the analysis and the quality of the final result. Most of this research concerns job vacancy studies for public and private clients, e.g. the *European Vacancy Monitor* for the European Commission (2010-2012), *Job Vacancies in the Netherlands* for the UWV (2006-2010) and job vacancy studies in various sectors for social partners. I was involved in the development of 35 of the 154 measurement instruments (JVS-E-I).

1.5 Results of this study

The result of my study is both a general definition and an operational definition of job vacancies that link existing concepts with one another, a review of existing measuring methods, a proposal for an optimal measuring method, a review of available job vacancy statistics, including an assessment framework, an inventory of existing job vacancy analyses and an overview of topics that I think should be looked into in more depth to be able to measure job vacancies more effectively.

1.6 Content of the report

Chapter 2 reviews the job vacancy concepts and the various definitions mentioned in the literature. In all, there appear to be two different job vacancy concepts showing both differences and similarities. In this chapter a new general definition of job vacancies is proposed that is in full sync with the two job vacancy concepts. This part is based on academic literature (JVS-A) and supported with information from personal expert-to-expert talks (JVE). Chapter 2 also discusses the operationalization of the concept of job vacancies. It focuses on specific requirements to exactly measure job vacancies. The definition criteria follow from the academic literature (JVS-A), empirical job vacancy studies (JVS-E) and personal expert-to-expert talks (JVE). Chapter 3 presents a review of the measurement methodology, including the advantages and disadvantages of the various methods. This assessment is strongly based on empirical job vacancy studies (JVS-E) and in particular the measurement instruments used (database JVS-E-I with 154 different instruments), supplemented with personal expert interviews (JVE). Chapter 4 comprises a review of job vacancy statistics across Europe. This empirical research has led to a deeper insight into the possibilities for application of the various sources and the corresponding methods of collecting data. This chapter is mainly based on statistics from EU countries (JVD-EU) and empirical job vacancy studies (JVS-E). Chapter 5 gives the results of a case study, the results of job vacancy measurements in the Netherlands. The Netherlands has a strong tradition in job vacancy measurement, which is why it was chosen. This chapter is mainly based on statistics from the Netherlands (JVD-NL) and empirical job vacancy studies (JVS-E). In chapter 6, recommendations for further research are made.

Table 1.1 indicates which research components are applicable to the various chapters. At the beginning of each chapter the design and the implementation is briefly described.

Table 1.1 Sources per research question

Research question	Sources Academic Literature Job Vacancies (JVS-A) n=114	Empirical Job Vacancy Studies (JVS-E) n=423	Job Vacancy Data Europe (JVD-EU)	Job Vacancy Data Netherlands (JVD-NL)	Personal Expert-to-Expert Talks (JVE) n=268	Personal knowledge and experience
Chapter 2 (job vacancy concepts)	x	x			x	x
Chapter 3 (measuring methods)	x	x			x	x
Chapter 4 (job vacancy statistics in Europe)		x	x			x
Chapter 5 (job vacancy statistics in the Netherlands)		x		x		x
Chapter 6 (recommendations for further research)	x	x	x	x	x	x

2. Reviewing job vacancy concepts: towards a general and an operational definition

2.1 Introduction

This chapter looks at the following research question:

Which job vacancy concepts can be distinguished and what could be a general and an operational definition of job vacancies?

A single concept of job vacancies is not available. Based on the academic literature (JVS-A), my conclusion is that two different concepts of job vacancies exist: the concept of unmet demand and the concept of job matching. In this chapter I will elaborate on these two job vacancy concepts and show the differences and similarities. I will propose both a general and an operational definition of job vacancies that fit the different approaches.

I have used academic studies (JVS-A) as the basis for the analysis. For the operational definition in section 2.9, use has also been made of empirical job vacancy studies (JVS-E) and expert-to-experts talks (JVE). I have held discussions with a number of experts about the draft version of this chapter. The content of this chapter is, of course, my responsibility.

2.2 The concept of unmet demand

Unmet demand as a framework for job vacancies

During the first half of the 20th century the job vacancy concept received little to no attention from either academics or policy makers. During this period the focus was on unemployment, which had to do with bad societal conditions of the population. Poverty was a more important issue than the problems connected with (unfilled) job vacancies, like recruitments costs, skills shortages, workload and overtime. William Henry Beveridge (1879-1963), the British politician and labour economist, elucidated the connections between labour demand and supply. Although he did mention the job vacancy as such, it received no separate place in his theory (Beveridge, 1944).

In their study on 'excess demand,' Dow and Dicks-Mireaux (1958) compared both unemployment statistics and job vacancy statistics. The job vacancy statistics used in the research were from the United Kingdom and covered the period 1946 to 1956. The aim of their analysis was to present a quantitative indication of bottlenecks in the labour market. In their publication, the authors did not specifically define 'job vacancies', but rather used the terms 'unsatisfied labour demand' and 'satisfied labour demand'. The 'unsatisfied labour demand' was defined as the number of persons companies would like to recruit, but for various reasons had not succeeded in doing so. The 'satisfied labour demand' is the number of persons actually recruited and working.

In Dow and Dicks-Mireaux (1958) mismatch in the labour market or 'maladjustment' is expressed in the ratio of the absolute number of job vacancies and the absolute number of unemployed persons. Therefore, 'excess demand' indicates which factor is dominant, demand or supply, and is established by comparing job vacancies, unemployment and any maladjustment. If the demand exceeds the supply, this is termed 'positive excess demand' (supply shortage). In the reverse case we have a 'negative excess demand' (demand shortage). Hansen (1970) took this analysis a stage further, establishing a relationship between job vacancies, unemployment and excess demand on the one hand, and wage developments on the other. The concept of the 'unsatisfied labour demand' or 'unmet demand' forms the basis of the current notion of the job vacancy.

Consideration of a definition and the measurement of job vacancies received significant attention in the United States between 1961 and 1966. The Gordon Committee, appointed by President Kennedy in 1961, showed the flaws in the job vacancy statistics used in the United States in that period (President's Committee, 1962). High unemployment caused a widespread interest in information about unfilled job vacancies. Job vacancies registered at public employment services and job advertisements represented only a part of the labour market and were considered less adequate. There was no measurement which presented a representative picture of the total number of unfilled job vacancies in the US and there was almost no experience with job vacancy surveys. As a result, the Bureau of Labor Statistics (BLS) set up a National Statistical Program on Job Vacancies aimed at the development of valid and reliable job vacancy statistics. In the same period the most important economic advisory body of the US government held hearings about the description of the concept of job vacancies (Joint Economic Committee, 1962, 1966). At the same time the National Industrial Conference Board (NICB), a prominent private entrepreneurial organisation in the US, entered the discussion and conducted a research programme to address the problem (Myers, 1965a, 1965b, 1966; Myers and Creamer, 1967). In 1966 the National Bureau of Economic Research (NBER, 1966) organised a congress on defining and measuring job vacancies. As a consequence of this deliberation, the following definition emerged:

A current job vacancy is an existing employment opportunity in an establishment for some worker from outside a firm for a job that is unoccupied and immediately available for occupancy by a 'new' worker for whom a firm is actively searching or recruiting (Joint Economic Committee, 1966).

All these US initiatives were completed in a relatively short period of time and laid the foundation for the concept and the definition of a job vacancy that are commonly used in the industrialised countries today. In the US, this definition has not changed since. The Job Openings and Labour Turnover Survey in the US (JOLTS) defines job openings —the term is not job vacancies — as all positions that are open (not filled) on the last business day of the month:

A job is 'open' only if it meets all three of the following conditions: (a) a specific position exists and there is work available for that position. The position can be full-time or part-time, and it can be permanent, short-term, or seasonal, and (b) the job could start within 30 days, whether or not the establishment finds a suitable candidate during that time, and (c) there is active recruiting for workers from outside the establishment location that has the opening (Bureau of Labor Statistics, 2003).

Eivind Hoffmann, then working at the statistics bureau of the International Labour Office (ILO), is one of the most prominent authors in the field of the definition of job vacancies. At the beginning of the nineties he noted that there was no standard definition of the term, which led him to devise his own definition. His definition parallels the definition of an unemployed person and shows a strong correspondence to the definitions that were developed in the United States:

A job vacancy can be said to exist when: (a) a (prospective) employer has made an effort during a recent period to find someone, from outside the establishment, to engage to provide labour services for (at least) a specified minimum amount of time within the reference period; and (b) the employer would have engaged a suitable candidate if (s)he had been available. A job vacancy also exists if (b) is satisfied and the employer either is in the process of selecting someone among possibly suitable outside candidates or is waiting for such a candidate to accept a job offer or to start working (Hoffmann, 1992).

A vacant post can be said to exist if an employer before or during the reference period has taken concrete steps to find a suitable person to carry out a specific set of tasks and would have taken on (entered into a job contract with) such a person if she/he had been available during the reference period (Hoffmann, 1997).

A job vacancy exists for the specified reference period, when a prospective employer: (a) has made efforts in the recent past to find someone to carry out some work on his or her behalf for pay or profit, and (b) would have hired or engaged a person with the required characteristics to do the work, if a suitable candidate had been available, and (c) would not have dismissed anyone just because another person has been hired or engaged to do the work (Hoffmann, 1999).

At the end of the 20th century, a globally accepted definition of job vacancies did not exist (Hoffmann, 1992; Verhage et al, 1997; Christine, 1999). The United Nations and the ILO do not have their own definitions of a job vacancy, though the European Commission and Eurostat do have a definition that is used as the basis for all member states supplying statistics for use at the level of the European Union. The definition used by the European Commission is very close to the definition developed in the United States and is still in use there:

A job vacancy shall mean a paid post that is newly created, unoccupied, or about to become vacant, (a) for which the employer is taking active steps and is prepared to take further steps to find a suitable candidate from outside the enterprise concerned and (b) which the employer intends to fill either immediately or within a specific period of time (Eurostat, 2008).

Characteristic of the formal definition of job vacancies accepted by the European Commission is that the job must be unoccupied and immediately available and the employer must recruit actively. To create a clear distinction with other concepts of job vacancies I will call this approach the concept of unmet demand (see also Verhage et al., 1997). In the following section I will analyse this concept further.

The definition of job vacancies mirrored against the definition of unemployment

Within the concept of unmet demand the definitions of labour demand and labour supply need to be 'mirrored' as far as possible, in what is labelled here the 'mirror principle'.² In effect this means that the definition of job vacancies is mirrored against the definition of unemployment. For this to work, it requires that the job vacancy is open to external candidates, the position involved is not occupied (an unemployed person is not allowed to have a position), the position is immediately available (an unemployed person also has to be immediately available for a position), and the employer is actively recruiting personnel (an unemployed person must be actively looking for work). I will address the separate criteria in the next section.

To my knowledge, the first reference dealing with the mirror principle is contained in a publication of the hearings of the Gordon Committee in the United States. There, experts of the Bureau of Labor Statistics advocated the notion to mirror the definition of a job vacancy against the definition of unemployment (President's Committee, 1962). The Joint Economic Committee (1966) and the NIBC (Myers and Creamer, 1967) followed suit. International comparative research by the BLS in 1963 demonstrated that at that at the time, none of the 23 investigated countries³ applied the mirror principle (Shelton and Neef, 1966), which suggests that the mirror principle is likely to have been first developed in the United States. For later contributors to the debate such as important authors Hoffmann (1992, 1997) and Farm (2003), the mirror principle is seen as a given fact and the principle has been generally accepted in the United States (Bureau of Labor Statistics, 2003) and later by national statistical organisations in Europe (Eurostat, 2008).

² Hoffmann (1992) uses the term correspondence, so that one could also call it the correspondence principle.

³ Australia, Austria, Belgium, Canada, Denmark, Finland, France, West Germany, Great Britain, Greece, Ireland, Israel, Italy, Japan, Luxembourg, the Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland and Turkey.

However, despite this tacit acceptance of the mirror principle, virtually no explicit arguments for applying it can be found in literature. The main argument in favour of the mirror principle is that both definitions are in harmony with each other and therefore the analysis of demand and supply is based on data with a comparable reach. According to Hoffmann (1992) this means the variables 'job vacancies' and 'unemployment' have corresponding ranges. The idea behind it is that job vacancies representing unmet demand can be summed up with met demand, without overlap, the same being the case with unemployed and employed.

However, the mirror principle does come with a number of caveats attached. Firstly, equating the definition of job vacancies and unemployment to such a degree may obscure some of the intrinsic differences between demand and supply from the wider labour market perspective. The fact that the demand for labour and the supply of labour develop mostly independently from each other has been recognised for some time (Beveridge, 1912). The key drivers behind the supply of labour are very different from the drivers behind the demand for labour. The size and the nature of the working population and its fundamental effect on the supply of labour are mainly determined by demographic factors, coupled with the development of personal competencies that help shape the nature of the supply. However, the demand for labour is mostly determined by economic and technological factors. These fundamental differences go a long way to help explain why the nature and the size of any bottlenecks in demand or supply may differ from each other significantly.

A second cautionary note comes from a study by Myers and Creamer (1967). They found that the recruitment activities of companies differ from the search activities of the unemployed. Differences exist in the way they go about these activities and in the intensity with which they are carried out. Intermediaries such as public employment services can help to reduce the friction between supply and demand, but the use of these services differs between the unemployed and employers. Most unemployed use the public employment services but only some companies do. The differences in the outcomes of the search process can be reflected in the difference in the job vacancy duration⁴ and the unemployment duration (Van Ours and Ridder, 1992).

A third cautionary note comes from Frumermann (1979), who demonstrated that the mirror principle is partly a political issue. It is common knowledge that political interests and interference often influences definitions and so may help determine the outcome and the use of any statistics so affected. In the labour market context several examples are known.⁵ The definition of job vacancy can, therefore, also be dependent on a process of political negotiation. In a historical description of the United States job vacancy statistics, Frumermann (1979) showed that employment relationships exert a large influence on the definition of job vacancies. For example, the trade unions in the United States feared that companies would misinterpret large numbers of job vacancies in order to minimise the unemployment problem. In a situation with both high numbers of job vacancies and high unemployment — which may be due to a mismatch in skills supply and demand — the contention would be that the incidence of unemployment would have to be ascribed to the unemployed themselves on the basis that there was sufficient work available. Companies have a stake in low unemployment rates and high job vacancy rates, presumably because it keeps wage pressure low. However, with the trade unions the reverse is the case. Therefore, if one side stands to benefit most from a low number of job vacancies, whereas the other party wants a high number, the result is often a compromise, and the mirror principle provides the tool. Within the confines of the existing employment relationships a type of exchange of interests between the employers and the employees takes place when defining the notion of a job vacancy, and more specifically when defining the mirror principle.

⁴ The job vacancy duration is defined as the period of time a job vacancy has been open. As counterpart of unemployment duration, the job vacancy duration is important in the analysis of the labour market (Holt and David, 1966; Sharir, 1971; Salverda, 1992; Wegerif, 1994). See section 2.5.

⁵ A well-known example from the Netherlands is the change in the definition of unemployment at the end of the 1980s when the number of unemployed persons became unacceptably high from a political point of view. The debate was all about the 'pollution' of the records kept at the public employment services. The government decided that from then on, unemployment would be measured by a survey of the national statistical organisation, rather than by the register of the public employment services. This also led to a change in the definition and to a lower number of unemployed.

However, on balance, the cautionary notes are not convincing enough to abandon the mirror principle and the constant search for comparability of demand and supply in the labour market is an important reason to attempt to mirror the definition of a job vacancy as much as possible against the definition of unemployment. The question is what is to be mirrored with job vacancies: unemployed or job seekers? This issue will be dealt with in section 2.3.

Production as the central point of departure

In the unmet demand concept production is the central point of departure. As long as the job is occupied no job vacancy exists and as long as nobody is taking care of necessary production we have unmet demand (even if somebody already has been hired, but has not started working yet). If the employer does not have the required production capacity this is interpreted as a situation of unmet demand. Various ways to deliver effective production through internal measures exist. For example, by decreasing production to bring it into line with the available resources, by having the current employees do overtime, by changing part-time contracts into (nearly) full-time contracts or by increasing productivity of the current employees through a different organisation of the production process (Tijdens, 1998). An external solution would be to hire someone and add this person to the payroll of the employer, occupying either a permanent or a temporary position. Other external solutions are hiring temporary agency workers, subcontracting or outsourcing. From the perspective of unmet demand, a job vacancy is defined in such a way that it is limited to recruiting someone for the employer's own payroll. Under this definition, a job vacancy has to meet this criterion in order to qualify as a job vacancy. However, the starting point for all this is production and this has some consequences for the definition of job vacancies, as explored below. For instance under this definition, the job vacancy only ends when production is resumed, not the moment the employment contract is signed.

Only unoccupied positions

Authors adhering to the tradition of unmet demand tend to hold the view that no job vacancy exists if the position in question is still occupied (President's Committee, 1962; Joint Economic Committee, 1966; Hoffmann, 1992, 1997; Farm, 2003). This is consistent with the definition of unemployment, in which a person is not unemployed if they have a job. The intrinsic argument not to include job vacancies for occupied positions is that this may lead to double counting. If the aim is to get an impression of the total demand (employment), it is not realistic to simply add open job vacancies for occupied positions to the number of occupied positions. The number of job vacancies for unoccupied positions will always be smaller than the number of job vacancies for occupied and unoccupied positions combined.

Nevertheless, application of the occupation criterion does involve an important validation problem. It is easier to distinguish working from non-working job seekers, than job vacancies for occupied positions from job vacancies for unoccupied positions. When the occupation criterion is applied in literature, it is mostly assumed that it is possible to precisely identify which specific position is involved and which employee is being replaced. However, research has shown that companies are unable (or virtually unable) to tell the difference between the recruitment for occupied positions and the recruitment for unoccupied positions (Meyers, 1965; Meyers and Creamer, 1967). It was observed that in this respect the mirror principle does not apply: 'Companies can hire many persons and then allocate them between jobs that were filled or unfilled while recruiting was in progress, while a person is either working or not' (Myers and Creamer, 1967). Similar remarks were made by Frumermann (1979).

Only if the position is available immediately

The literature also states that there can only be a job vacancy if the position is immediately available ('immediate start'). This has a parallel in the definition of unemployment where it states that a person is only eligible for unemployment benefits if he or she is immediately available for work (President's Committee, 1962; Joint Economic Committee, 1966; Hoffmann, 1992, 1997; Farm, 2003). The number of job vacancies for directly available positions is always smaller than the number of job vacancies for directly and not directly available positions together. In the United States open job vacancies are required to have a term of availability. A position has to be available within the next 30 days (Bureau of Labor Statistics, 2003). However, Eurostat focuses on job

vacancies that are available immediately or in the near future (Eurostat, 2008). It is not specified what is meant by 'the near future'.

Myers and Creamer (1967) pointed out that job vacancies with a future starting date (which in the United States at the time accounted for one fifth of the total of open job vacancies) must be clearly distinguished from those forming a stock of job openings at a certain point in time. Job vacancies with a future starting date are mostly connected with regularly recurring work in the future (in the Northern hemisphere recruitment for teachers starts months before the beginning of the education year in September), or with an expected increase in production in the future. Here, the issue is whether the employer, at a certain point in time, really intends to conclude an agreement with the job seeker at the moment the job seeker is requested to do so. A future demand for personnel is not the same as creating a stock for later use. In the latter case recruitment does actually take place, but the job is not immediately available, nor is it always certain that a job will become available. In general, therefore, the literature tends to agree to disregard recruitment for future stock of job vacancies. This leaves two options to consider: the direct start of work and a certain start after a period of elapsed time.

In the concept of unmet demand, the availability of a position is related to the start of the work (production) and not the start of the labour contract. The date of the agreement tends to predate the date on which the work actually starts, or it coincides with that date. In the latter case the assumption that the start of the work automatically means that an agreement is in place. However, both aspects should be differentiated from each other (Myers and Creamer, 1967; Burdet and Cunningham, 1994) because the beginning and ending of a job vacancy are determined by this choice (Section 3.10).

However, it is not always easy to determine the availability of job vacancies and, at the same time, it can be difficult to distinguish when an employer is creating a stock. This is largely because on occasion companies may report more job vacancies than they can actually fill, especially in times of labour scarcity, though the exact numbers involved are difficult to determine (Myers, 1965b; Shelton and Neef, 1966).

Only active searching

Holt and David (1966) distinguished three groups of job vacancies: (1) recall job vacancies, these being job vacancies only for specific employees that have worked with the employer before, (2) job vacancies that involve an active search for new employees, and (3) job vacancies that do not involve an active search but which are available if a suitable candidate comes forward.

In most instances, the literature finds that a job vacancy can only be referred to as an actual job vacancy when the employer actively searches for candidates (group 2). This is consistent with the definition of unemployment according to which someone is not unemployed if he or she is not really actively searching for work. The number of job vacancies that do not involve active searching is always smaller than the number of job vacancies that involves both active and not active searching.

In the definition of unmet demand, it is not clear whether recall job vacancies should be excluded in the definition. According to one source, around one-third to one-half of all the job vacancies in United States industry involves recruitment on the basis of recall (Joseph, 1966). However, it has not been possible to trace more recent sources dealing with recall job vacancies and so it cannot be said if this significant finding still holds true. Recall job vacancies differ from other job vacancies principally because the position is only available to a named individual former employee. A number of authors have proposed assigning this group of job vacancies as a separate category. According to Palm (1966) recall job vacancies would have to be included to get a picture of the total demand for labour. Some authors see recall job vacancies as a separate category, referring to them as a type of 'restricted demand' (Myers and Creamer, 1967). Others argue that recall is not of interest from the perspective of mediation or training, because no mediation and training are needed (President's Committee, 1962). Frumermann (1979) stated that if the recall job vacancies have to be left out of the equation, the unemployed who are waiting

for such a position should also not be considered as unemployed, because otherwise the symmetry would no longer be obtained. Whether this group of job vacancies is included or not depends on the measurement aim. Again, both aims are legitimate, requiring a definition complying with both measurement objectives.

Some authors argue that the searching criterion should not be used at all, because it is difficult to differentiate between active and passive search to the extent that the smallest possible activity by companies is sufficient to comply with this criterion (Myers, 1965; Ferber and Ford, 1966). Indeed, the literature provides no clear demarcation, instead only giving examples of what is understood by active search, such as placing an advertisement, using intermediaries or announcing a job vacancy on a poster (Frumermann, 1979; Hoffmann, 1992; Verhage et al, 1997; Farm, 2003). Eurostat does not use a limited list of activities. The Bureau of Labor Statistics in the United States defines active recruitment as follows:

Active recruiting means the establishment is taking steps to fill a position. It may include advertising in newspapers, on television, or on radio, posting Internet notices, posting 'help wanted' signs, networking with colleagues or making 'word of mouth' announcements, accepting applications, interviewing candidates, contacting employment agencies; or soliciting employees at job fairs, state or local employment offices, or similar sources (Bureau of Labor Statistics, 2003).

However, it is not absolutely clear which criteria should be applied to the recruitment methods in terms of what should or should not be included. For example, the list of actions in the definition of the Bureau of Labor Statistics is not exhaustive and may also be time-dependent. A more recent trend is that an increasing number of job vacancies are announced on companies' corporate websites, for example. Also, companies use job vacancy and CV sites on the Internet to both post and select potential candidates for vacancies. This clearly indicates that the range of recruitment activities used by companies is continually changing, which poses new challenges for any definition of what constitutes a real job vacancy (Section 5.5).

2.3 The concept of job matching

Job matching as a framework for job vacancies

Apart from unmet demand I note another approach to job vacancies. My recommendation would be to call this the job matching concept. Under this term, a job vacancy is viewed as a potential match on the labour market between demand (an employer) and supply (a job seeker) and therefore as a potential labour contract. Under this scenario the searching behaviour of companies and job seekers is the point of departure. The core of this concept involves the search for new employees by companies and the search for work by job seekers, resulting in matches on the labour market and consequently in employment contracts. Furthermore, it is about companies' recruitment and the chance of finding a suitable candidate, as well as the chance of finding a job for job seekers and specific groups of job seekers (such as the disadvantaged groups on the labour market, for example long-term unemployed, certain age groups, and those with lower educational level). This essentially broad view of job vacancies is represented by Holt and David (1966), Shelton and Neef (1966), Ferber and Ford (1966), Wingard (1966), Myers and Creamer (1967), Frumermann (1979), Levitan (1979), Burdett and Cunningham (1994, 1998) and Verhage et al (1997).

Holt and David (1966) were the first to fit the job vacancy concept into a theory of the functioning of the labour market. In their view, the labour market should be seen as a dynamic system with demand flows (job vacancies) and supply flows (job seekers). The authors did not, however, come up with an elaborate definition of job vacancies, so no limiting conditions applied to the job vacancy concept that has been used. The essence of their vision is one predicated on the dynamics of the labour market and the 'flow approach' (Section 2.5). They also stated that job vacancies for which no active recruitment is done still have to be regarded as job vacancies, and so these are lumped together with those where active recruitment is done.

Burdett and Cunningham (1994) looked at the entire job vacancy process at company level, reconstructing the way in which a job vacancy first emerges and then ends. They provided their own definition of job vacancies:

A firm will be said to have a job vacancy if it is willing to allocate resources to obtain a positive arrival rate of candidates for the job. Occupied jobs are included (Burdett and Cunningham, 1994).

Particularly important in their view was the idea that job vacancies for occupied positions should be included. Some years later they refined their definition as follows:

The definition of a job vacancy commonly used states that a firm has a job vacancy if it is looking for a worker to fill an existing opening. An alternative definition, and perhaps one more appropriate, is used. That is, a firm is defined to have a job vacancy if it is looking to fill future openings (Burdett and Cunningham, 1998).

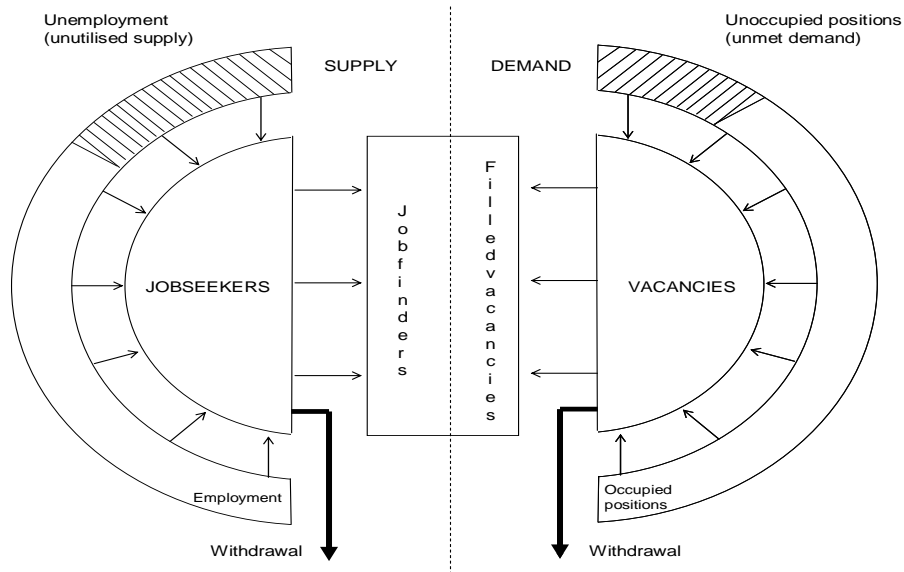
Under the concept of job matching, job vacancies are not, or are hardly ever, defined or delineated. Labour market intermediaries, individual companies and job seekers have no specific criteria to define what a job vacancy is. Each individual employer has own ideas about what constitutes a real job vacancy (Myers and Creamer, 1967) and for an individual job seeker, in principle any job opportunity represents a job vacancy.

Labour market intermediaries such as public employment services, temporary work agencies and on-line recruitment services, play an important role in the design of the matching concept. They follow the broad view of job vacancies as job opportunities. For these intermediaries the recruitment behaviour of companies and the search behaviour of job seekers is the starting point of their own activities. If an employer is searching for new employees on the external labour market using whatever forms of recruitment method, then this clearly represents a job opportunity for a job seeker. The intermediaries do not tend to resort to the application of any definitions or criteria to determine whether something may or may not be called a job vacancy. This also explains why job vacancy information of public employment services does not fit the definition of unmet demand.

Mirroring against job seekers

The challenge is to arrive at a definition of job vacancies that is empirically sound, starting from the perspective of job matching, in which case the mirror principle provides a first step. Although the mirror principle has found general acceptance, views differ when it comes to mirroring the definition of job vacancies against unemployed or job seekers. The original point of view was that the definition of job vacancies should be mirrored against the definition of unemployment. Myers and Creamer (1967) showed that the notion of job vacancies obtains a broader meaning if it is mirrored against all job seekers and not only the unemployed. On the basis of their employer-based research, they concluded that companies not only recruit for unoccupied positions, but also for occupied positions. In their opinion job vacancies, for unoccupied and occupied positions, are congruent with job seekers. Verhagen et al (1997) developed a similar concept in which job vacancies are distinguished from unmet demand, with the latter only applicable to unoccupied positions. Note that job finders are the equivalent of hires and job vacancies filled (figure 2.1). This shows that measurements of unmet demand always lead to lower figures than measurements of job vacancies according to the concept of job matching.

Figure 2.1 Mirroring job vacancies against job seekers



Source: Verhage et al, 1997.

Occupied and unoccupied

For job vacancies in the job matching approach, it is largely irrelevant whether the position is occupied or not. Various authors have taken the stance that the position has to be unoccupied to be a job vacancy (Myers and Creamer, 1967; Frumermann, 1979; Burdett and Cunningham, 1994, 1998; Verhage et al, 1997). Prior recruitment is sometimes necessary. This also means that for a specific period of time overlap can take place and double wages have to be paid. If the occupation criterion is applied in this case a job vacancy would not be (or not have been) there because the job was effectively occupied all the time. According to a strict application of the definition of unmet demand, no job vacancy would be there if someone cancels his contract with the employer (signalling the end of old contract), but is immediately succeeded by a new employee from outside (signalling the beginning of new contract), even if the employer has been actively searching for an external candidate during a longer period of time. However, it is clear this approach would effectively hide part of the recruitment process and any recruitment bottlenecks from view.

Whether a position is occupied or not is of lesser importance from the perspective of job seekers and labour market intermediaries (President's Committee, 1962). Job seekers are looking for job opportunities and so are the intermediaries. Unemployed persons react to job vacancy offers, which can be for both occupied and unoccupied jobs; they don't know. They even apply for jobs — e.g. by sending in their CV — if no formal job announcement has been made. Public employment services establish their own position on the labour market on this basis, accepting all job vacancies reported by companies. Therefore the application of the occupation criterion depends on the concept of job vacancies being involved.

Passive and active recruitment

For job vacancies in the job matching concept, it is irrelevant whether the companies are actively recruiting or not. Job vacancies that do not involve active recruitment still potentially offer job opportunities to job seekers and many job openings are filled without any active recruitment. This happens when the initiative comes from the job seeker (Holt and David, 1966; Frumermann, 1979; Walsh, 1982; Farm, 2009). If a job seeker applies for an announced position then there has obviously been active recruitment. But an employer can also contract a job seeker who has speculatively sent an unsolicited application for a job vacancy that hasn't been announced externally. In the job matching concept, if the applicant is hired, there has been a job vacancy albeit for a very

short duration. The job vacancy has been filled instantaneously (Farm, 2005 and 2009). In any case, the employer was, to some extent, known to job seekers, because otherwise an unsolicited application would not have been possible. In other words, a spontaneous application can result in a job match and consequently an employment contract, even if the employer hasn't actively recruited. In that case there has not been active recruitment, but there has been a latent job opportunity. A job opportunity becomes manifest the moment external recruitment starts. Therefore, a latent job opportunity is a job vacancy that does not involve active recruitment, but still could lead to an employment contract.

The concept of effective demand means that the employer has to be prepared and able to make available specific means, in this case for an adequate compensation for the new employee (Beveridge, 1944). This decision can be made afterwards. In measurements this is always an uncertain factor when attempting to ascribe a quantitative value to it, because sometimes line management may indicate that a job vacancy is available, which is then not acknowledged by the board of directors and vice versa (Joint Economic Committee, 1966).

Not all job vacancies will eventually be filled (Farm, 2009). Companies can also stop recruiting and cancel any job vacancies they may have, effectively indicating that no longer a job vacancy exists. In this case the job vacancy is withdrawn. Similarly, unemployed persons are not included in the active labour force if they have stopped looking for work, for example if they have become discouraged (Levitan, 1979). Various reasons for cancellation of a job vacancy by an employer exist. For example, the business may close down, or there appeared to be no suitable supply of labour and this constitutes a case of discouragement. If an employer cancels a job vacancy, this may mean that an internal solution that required the extra labour in the first place may have been found. Furthermore, if an employer stops recruiting and cancels the job vacancy, the job opportunity disappears.

Current and future work

For job vacancies within the job matching concept it is irrelevant whether the work will take place in the future irrespective of how far into the future since these job vacancies offer job opportunities to job seekers at some point in time. However, authors disagree on whether job vacancies that will only become available in the future should also be included at all. Holt and David (1966) pointed out that companies do, to some extent, anticipate future labour requirements. For example, they anticipate the need to replace the expected loss of personnel resigning, retiring, being promoted, or because of the termination of temporary contracts (known as replacement demand). An increase in production may also be anticipated leading to expansion demand for labour. For this reason, according to Holt and David (1966), job vacancies can legitimately have a starting date that lies in the future ('future starting date'). Job vacancies with a future starting date should not prevent intermediaries such as public employment services from recording these job vacancies as open job vacancies. They are, in fact, future or potential job vacancies that offer opportunities to job seekers — at a point of time in the future and as such, have to be treated as real job vacancies, not just symbolic recruitment.

2.4 The concepts of unmet demand and job matching compared

The concepts of unmet demand and the concept of job matching obviously have very different characteristics, but also specific similarities. In this section both concepts have been compared with each other in order to delineate both concepts.

Macro or micro

The unmet demand approach is a *macro* approach, in the sense that the concept fits within a model to analyse the national economy, as was explained in the previous section. By contrast, the job matching concept is a *micro* approach based on the search behaviour of individuals (companies and employees). The unmet demand approach is a tool for analysis, whereas the job matching concept is connected to employment mediation.

Demand side or supply side of the labour market

In the case of unmet demand, the point of departure is the demand side of the labour market (companies) whereas the job matching approach focuses on the transactions between the demand side (companies) and the supply side (job seekers). In the latter, the role of intermediaries forms an important area of attention.

Production or recruitment

A clear distinction in the context of unmet demand is the central role played by production. This essentially means that in this concept a job vacancy only becomes apparent when insufficient labour is available to meet the necessary production requirements (and the employer actively starts recruiting). Similarly, a job vacancy only ends the moment the new employee has actually started the work and production has been commenced. This means that in the unmet demand concept we still have a job vacancy between the period the contract has been signed and production has been started. In the concept of job matching, the key point is the searching behaviour of companies and job seekers, placing the focus firmly on the final match. The job vacancy arises the moment a decision has been made within a labour organisation that resources are available to start an employment relation with a new employee and the job vacancy ends the moment an employment contract has been signed. This distinction has important implications for the definition of the beginning and the ending of a job vacancy (Section 3.10).

Economic policy or labour market policy

Both concepts play a role in economic and labour market policy. However, the concept of unmet demand is closer to economic and employment policy and the matching concept is linked more to labour market policy, including unemployment policy, educational policy and social security. The mismatch between demand and supply in the labour market can be partly explained on the basis of a comparison of unmet demand and the unemployed, but this gives only a (selective) part of the whole picture. The approach of job vacancies as job opportunities compared with all job seekers gives a broader and more accurate representation of the labour market.

Analysis or empiricism

In the case of unmet demand, it is important to understand that this is fundamentally an analytical approach. The perspective of unmet demand pays less attention to the way in which job vacancy data have been collected. In comparison, the perspective of job matching focuses on empiricism, the collection of job vacancy data through registration (by public employment services) and surveys of companies to determine job vacancy numbers. In this tradition the level of detail of the job vacancy data is important.

Mirroring against the unemployed or job seekers

In the approach of unmet demand, the definition of job vacancies is mirrored against the definition of unemployment. This means that a job vacancy relates to an unoccupied position, that active recruitment is done and that the position is almost immediately available. In the approach of job matching, however, the mirroring of job vacancies is done in relation to all job seekers and not only unemployed persons. In this case the criteria pose fewer limitations and also allow the concept of the job vacancy to be much wider.

Unoccupied or occupied

Following on from the previous point, the strict starting point in the case of unmet demand is to only include job vacancies for unoccupied positions, whereas the job matching approach also allows the inclusion of job vacancies for occupied positions. Rationally, companies want to see this entire group of job vacancies filled as well, and in reality they do represent job opportunities for job seekers. This is an essential distinctive characteristic between both perspectives.

Active or passive search

The active search by companies is typical for the unmet demand approach, whereas in the job matching case it is less relevant, mainly because job seekers and intermediaries also look for job vacancies in companies that are

not explicitly recruiting. In the end, the aim of the employer, job seeker and intermediary is the same — achieving the final match. Consequently, on the basis of a study of the literature the conclusion is reached that in the job matching tradition a recall job vacancy would have to be included as a job vacancy. In the unmet demand concept it is more a matter of choice.

Directly available or not

From the unmet demand perspective it is important that job vacancies are directly available, just as with the definition of unemployment. From the job matching perspective, direct availability is not strictly relevant, or in any case, much less so. Furthermore, the former refers to the availability of work and the latter to the availability of a contract. This results in a difference for the beginning and the end of a job vacancy.

Different results of measurements

In summary, I found clear differences in the two concepts and definitions in the literature. The definition of job vacancies is strongly associated with its principal aim, which will vary. The definition of unemployment likewise depends on the aim, which may be an assessment of the current economic situation, or a count of the number of unemployed persons (Joint Economic Committee, 1966). An operational definition of job vacancies must be suitable for both analysis and employment mediation at the same time. For the purpose of analysis in the unmet demand concept, the definition of a job vacancy has to fit with the definition of unemployment, meaning that the definition becomes stricter. By contrast, employment mediation allows a less strict definition to be used (Wingard, 1966; Frummermann, 1979).

The consequence is that the number of job vacancies measured according to unmet demand definitions is considerably lower than the number of job vacancies measured according to job matching definitions. This can be largely attributed to the limitations in the definitions of unmet demand when defining job vacancies and specifically to the fact that certain segments are not taken into account. A comparison is, however, feasible because the results of measurements according to the first tradition form a subset of the results according to the second tradition. *Job Vacancy Statistics* in Sweden is one of the best examples of this.

2.5 Job vacancies as a dynamic concept: stocks and flows

The labour market flow model

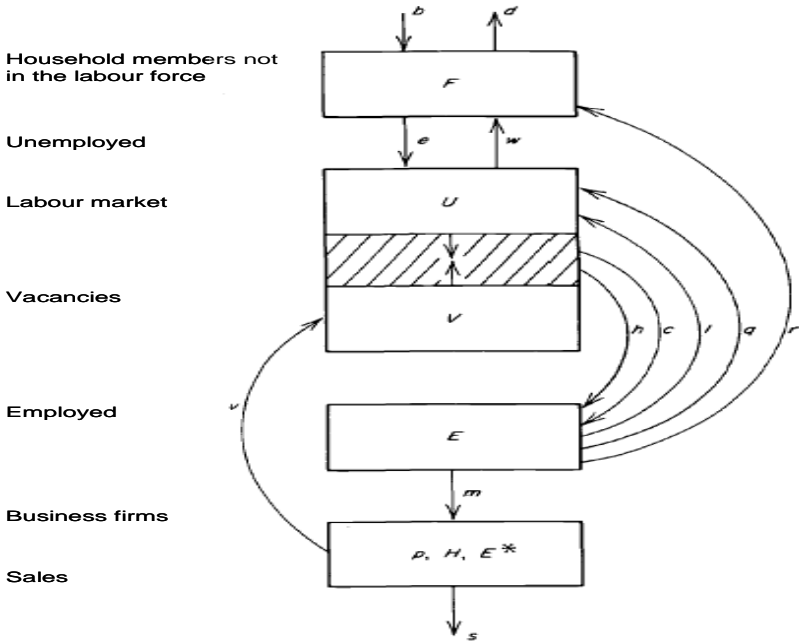
The notion of labour flows can be applied to labour market to illustrate labour demand and supply. Holt and David (1966) were the first to present a labour market flow model, including the flows on the demand side and the supply side. According to the authors, the labour market can be seen as a dynamic system. The labour market is not standing still, but constantly on the move. It is a complex process that includes interactions between large numbers of participants. Hiring an employee is the result of a search process, in which a non-standard employee and a non-standard job are matched in one way or another on the basis of criteria such as wages and competencies.

Holt and David made an explicit distinction between stocks and flows on the labour market and the interaction between them. Stocks and flows influence each other, so that the labour market tends to achieve equilibrium. In figure 2.2, the flow model by Holt and David shows that the stock of job vacancies (V) is determined by the difference between the new hires (h) plus recall vacancies (c) and the flow of net new job vacancies (v) created by companies.

In other words, it is entirely appropriate to consider the labour market as a dynamic system that includes constant new transactions between employers and employees. New employment contracts are concluded and existing employment contracts are terminated. On the supply side we see a constant inflow of new job seekers such as school leavers and immigrants, whereas others leave the labour market due to such factors as retirements,

deaths, illness, et cetera (outflow). The dynamics on the demand side of the labour market are expressed in job vacancy flows, providing a constant new supply of job vacancies (inflow) that are filled or cancelled (outflow).

Figure 2.2 Labour market flow model; original diagram



F = number of family members not in work force; b = births; d = deaths; e = entries to work force; w = withdrawals from work force; U = number of unemployed workers; V = number of job vacancies; v = net new job vacancies; h = new hires; c = recall vacancies; l = layoffs plus terminations and other separations; q = quits; r = retirements; f = number of filled vacancies; E = desired number of employees; m = man-hours; p = production of finished goods; H = finished goods inventory; s = sales of finished goods.*

Source: Holt and David, 1966

What are job vacancy flows?

A stock is a quantity measured at a given point in time, whereas a flow is a quantity measured per unit of time (Mankiw, 2013). Likewise, the stock of job vacancies is measured at a given point in time, whereas a flow of job vacancies is measured per unit of time. A job vacancy has a beginning and an end. Therefore, a moment exists when the job vacancy arises (inflow) and a final moment when the job vacancy ends (outflow). In the period in-between the job vacancy is open. An open job vacancy is a job vacancy that has arisen, but has not yet ended. A job vacancy can end in one of two manners: the job is filled, or the job is not filled. In the latter case the job vacancy has been withdrawn by the employer. I define the inflow of job vacancies as being all job vacancies that arise in a certain period and the outflow of job vacancies as all job vacancies that end in a certain period. The outflow consists of filled and withdrawn job vacancies in a certain period. Open job vacancies are all job vacancies that are open at a certain moment in time.

The period between the job vacancy arising and the job vacancy ending is called the job vacancy duration. This can be either complete or uncomplete job vacancy duration. When describing complete job vacancy duration, the job vacancy is no longer open and it concerns the time that has passed between the job vacancy arising and the job vacancy ending. In the case of an uncomplete job vacancy duration the job vacancy is still open and it

concerns the time between the job vacancy arising and the moment that the job vacancy is still open. The average job vacancy duration is the average period during which a number of job vacancies is open, which can also encompass a complete and an uncomplete job vacancy duration. Usually the average job vacancy duration is described as just that: job vacancy duration.

Why job vacancy flows?

The need for flow figures emerges in the academic literature. A number of authors has advocated a dynamic approach to the use of flow figures of job vacancies (Holt and David, 1966; Ferber and Ford, 1966; Boschan, 1966; Myers and Creamer, 1967; Sharir, 1971; Pissarides, 1979; Verhage et al, 1997; Fenwick, 1994; Wegerif, 1994; Mortensen and Pissarides, 1994; Davis and Haltiwanger, 1998; Hoffmann, 2000; Theeuwes, 2003; Farm, 2004). The reason for using flow figures is that they reflect reality better than stocks, because the economy and the labour market are not standing still, but are continuously on the move. But even more important to mention is that the flows in the economy and the labour market are connected: 'they feed each other' (Theeuwes, 2003). Companies and individuals are interrelated in a dynamic context. Stock figures may be important for the purpose of mediation, but economic and labour market research and policy stands to benefit more from flow figures (Frumermann, 1979). In his view, flow figures have an added value for economic and labour market research because they can contribute to labour market policy, educational programme planning and career choice counselling. According to Frumermann, the measurement of flow figures could lead to an entirely new perspective on the concept and definition of job vacancies.

The collective view of the authors mentioned above and the users of job vacancy information I interviewed underlines that job vacancy flows present a better image of labour market dynamics than stocks of job vacancies. Flow figure analyses provide a clearer picture of the relationship between unemployment and job vacancies. Flow data research offers more possibilities for analyses of labour market dynamics than research that is solely based on stock figures, especially if these analyses also take other variables into account. This implies that the stock figures and flow figures when analysed together, can lead to a clearer image of the functioning of the labour market, of the relations between demand and supply and the flexibility of the labour market, as well as to a better explanation for the mismatches on the labour market. It will also lead to an improved perspective on the chance of unemployed persons finding jobs. The number of job opportunities for the unemployed will be underestimated if only the stock of job vacancies is assessed. If the labour market becomes more flexible (more temporary jobs) the difference between stocks and flows increases in number. The results of job vacancy analyses will certainly be different if flow figures are used with a tendency to show a better picture of the functioning of the labour market than would be derived from using only stock figures.

However, despite the obvious advantages, the existing definitions of job vacancies are dependent on stock figures and not flow figures. For example, the original job vacancy literature tends to deal with open job vacancies, not job vacancy flows (Dow and Dicks-Mireaux, 1958; Joint Economic Committee, 1962). Open job vacancies were seen as an indicator for shortages, and were the result of a poorly functioning labour market and so analysis of the shortage issue was mostly confined to an analysis of the status quo. Since then, nothing has fundamentally changed – stock figures still predominate.

The lack of job vacancy flow data of course may be due to the inherent difficulties in measuring job vacancy flows against the stock of job vacancies. Another reason why the job vacancy concept has not been viewed from a dynamic perspective can be partly attributed to the definition of unemployment. The definition of job vacancies is mirrored against the definition of unemployment. Unemployment almost invariably has been (and still is) considered a static phenomenon. Therefore, if the definition of the job vacancy is mirrored against the notion of unemployment, this automatically leads to a static concept.

The static approach is illustrated by the fact that Eurostat uses a definition based on the concept of job vacancy stocks (European Commission, 2008). Furthermore, if international organisations publish job vacancy data, they

tend to always be stock figures. Those countries contributing data to Eurostat mostly measure stock figures and the same is evident in the comparison between countries (Verhage et al, 1997). The *European Vacancy Monitor* (European Commission, 2010; 2011a; 2011b; 2011c, 2012a; 2012b; 2012c) provides information on job finders because information about job vacancy flows is still lacking for almost all European countries (Section 4.3).

Unmet demand only applies to open job vacancies (stocks), whereas the characteristic of the job matching tradition is that it also addresses job vacancy flows. In the public employment service, for example, it is possible to precisely follow how many job vacancies are registered during a specific period (inflow) and how many are deleted from the records (outflow). In many cases it is also known how many of the outflow of job vacancies are accounted for by those filled and those withdrawn before being filled. The introduction of automated job vacancy registration systems has done much to promote the use of job vacancy flow statistics within these organisations figures (Pissarides, 1979).

The relationship between stock of job vacancies, job vacancy flows and employment (jobs)

Despite the differences in size and composition, a relationship exists between open job vacancies and job vacancy flows since the former is the resultant of the latter. This is largely based on the expectation that each open job vacancy has flowed in and will eventually flow out. Based on this relationship, it is possible to make a comparison between stocks and flows over a longer period of time. The starting stock plus inflow, minus outflow, is the final stock for a specific period, which is called the flow equation. The open job vacancies at $t(0)$ plus the inflow of new job vacancies during a specific period, minus the outflow in the same period, results in a new stock at $t(1)$. The outflow consists of hires and cancelled job vacancies. The flow equation for job vacancies is as follows:

$$\text{starting stock} + \text{inflow} - \text{outflow} = \text{final stock}$$

$$\text{open job vacancies } (t0) + \text{inflow of job vacancies} - \text{outflow of job vacancies} = \text{open job vacancies } (t1)$$

Seen over a set period of time, the total inflow of all job vacancies will be equal to the total outflow. However, on a yearly basis the inflow and outflow of job vacancies will almost never be equal to each other. If the inflow is higher than the outflow, the number of open job vacancies will increase afterwards. Similarly, if the outflow of job vacancies is higher than the inflow, the number of open job vacancies will decrease.

The challenge is to introduce job vacancy flows in the flow equation of employment, which can be done if job vacancies are defined as jobs or contracts (Section 2.8). On a micro level (a company) and macro level (the labour market) the difference of employment between two points in time is the expansion-induced demand in a certain period. The number of hires equals the total filled demand in this period. The replacement demand can be calculated by subtracting the former from the latter:

$$\begin{aligned} & (\text{stock employment } t0 + \text{stock job vacancies } t0) + \text{inflow job vacancies} - (\text{hires} + \text{cancelled job vacancies}) \\ & = (\text{stock employment } t1 + \text{stock job vacancies } t1) \end{aligned}$$

$$\begin{aligned} & (\text{stock existing contracts } t0 + \text{stock potential contracts } t0) + \text{inflow potential contracts} - (\text{filled contracts} + \\ & \text{cancelled potential contracts}) = (\text{stock existing contracts } t1 + \text{stock potential contracts } t1) \end{aligned}$$

2.6 Job vacancies and employment dynamics

Employment dynamics

For me the question was about the extent of the relation between job vacancy flows and employment dynamics. Knowledge of the dynamics of jobs may lead to an insight into the movements of job vacancies and vice versa.

This in turn led to an investigation of the theory of employment dynamics. The main proponents of the employment dynamics theory are Davis and Haltiwanger (1995; 1999). The concept of employment dynamics essentially relates to the development of employment (demand led) and of the working population (supply led). In both cases the aim is to analyse the dynamics of employment and to measure to what extent and in what pace employment and the working population grow and fall. A considerable amount of economic literature is available on employment dynamics, and this tends to show a strong upward trend between 1990 and 2000. The interesting issue is how this concept of employment dynamics relates to the job vacancies.

The observation to be made after examination of the literature on employment dynamics is that the term 'job vacancy' is barely mentioned. And in fact, the literature on job vacancies barely mention or refer to the concepts of employment dynamics, as job creation, job destruction, worker reallocation and worker turnover (see below). Apparently the concepts of job vacancies and employment dynamics have largely developed in a mutually exclusive way. However, a connection still has to be demonstrated. I will argue that a connection exists between the job vacancy concept and employment dynamics through accessions and hires, which represent the commencement of new employment contracts. Accessions can be linked to the job vacancy concept, because accessions are the equivalents of hires. This is the key to connecting the concept of employment dynamics and job vacancies.

Job vacancies, job creation and job destruction

In the demand led approach of employment dynamics the following definitions are applied (Davis en Haltiwanger, 1995; 1999):

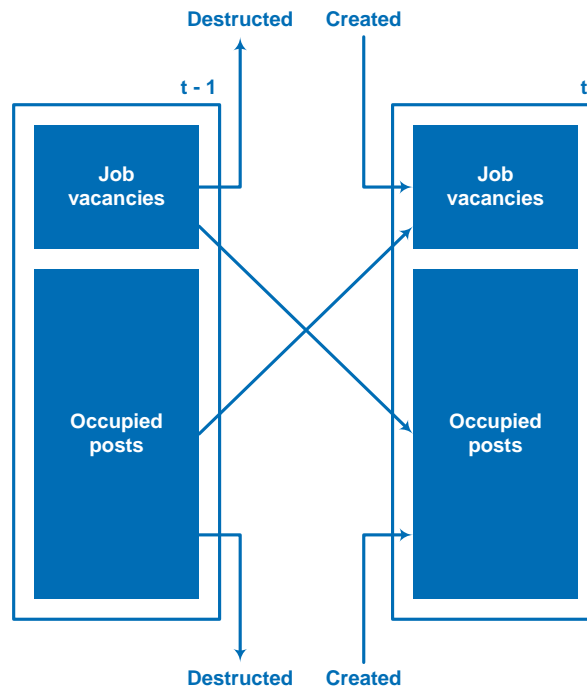
Gross job creation at time t equals employment gains summed over all establishments that expand or start up between t-1 and t.

Gross job destruction at time t equals employment losses summed over all establishments that contract or shut down between t-1 and t.

Gross job reallocation at time t equals the sum of all establishments-level employment gains and losses that occur between t-1 and t. It equals the sum of job creation and job losses.

Relevant for the job vacancy discussion is that job creation and job destruction do not represent continuous job flows, meaning that the dynamics between the two measuring points (t-1 and t) in this case are not taken into account (Meyer, 1998). Keeping in mind the Meyer's criticism, the concepts of job creation and job destruction are important for the job vacancy discussion. The unmet demand concept does not explicitly occur in the theory of employment dynamics, though the literature about the latter concept is not clear about this. On the one hand, one expects a connection with the unmet demand concept as expressed in the following statement: 'Each firm has one job that can be in one of two states, filled and producing or vacant and searching. Job creation takes place when a firm with a vacant job and a worker meet and start producing; opening a new job vacancy is not job creation, though we might refer to it as creating a job vacancy. Similarly, workers can either be unemployed and searching or employed and producing' (Mortensen and Pissarides, 1994 and 1996). This view is in line with the tradition of unmet demand in which the definition of job vacancies is mirrored against the definition of the unemployed. In this sense there can only be a job vacancy for an unoccupied position. Job creation and job destruction reflect a macro approach, in line with the concept of unmet demand.

Figure 2.3 Job creations and job destruction related to job vacancies and occupies posts



Source: Heyma, 2006.

Heyma discussed the relationship between job creation and job destruction on one hand, and job vacancies on the other. In his view, job vacancies are transitions from and towards a job and a position is either occupied or not. If the position is not occupied this is a job vacancy. There can only be a job vacancy if the position is unoccupied (Heyma, 2006). In my opinion the implicit point of departure is therefore the unmet demand concept. Heyma has made a first step toward connecting employment dynamics and job vacancies flows (figure 2.3). However this connection in this form is, in my opinion, still not clearly operationalized. In section 3.10 I have indicated how I think that the job vacancy flows can be operationalized and measured within the concept of unmet demand and thus make a connection with the concepts of job creation and job destruction. First I will take a more in-depth look at the connection of job vacancies and the concept of employment dynamics according to the supply approach.

Job vacancies, accessions and separations

In the supply oriented approach of employment dynamics one can speak of flows. In this approach two indicators apply (Davis and Haltiwanger, 1995, 1999):

Worker turnover at time t equals the number of accessions plus the number of separations that occur during the interval from t-1 and t.

Gross worker reallocation at time t equals the number of persons whose place of employment or employment status differs between t-1 and t.

Within the job matching concept the notion of accessions may be linked to job vacancies. An accession equals a job finder and therefore a hire (Sharir, 1971; Franz and Smolny, 1994; Verhage et al, 1997). This means the moment someone finds a job someone is hired. And if someone is hired a match takes place on the labour market (Blanchard and Diamond, 1997). One should, however, keep in mind that accessions might partly include job

vacancies for which no recruitment was done. This is the case when a job seeker applies directly to an employer even before any decision is made by the company to hire someone or to recruit (Section 2.3).

It is not possible to link worker turnover to unmet demand. Worker turnover concerns flow data, unmet demand concerns stock data. Also, the worker turnover concept does not meet the content criteria of unmet demand (search criterion, etcetera). It is obvious that separations have no connection with job vacancies. Separations measure the ending of a contract. However, the ending of a contract does not mean that a new job vacancy is created. Not all terminated contracts are renewed, and not all employees who have left are replaced. It is also not possible to directly connect the definition of gross worker reallocation with the definition of job vacancies. Gross worker reallocation is a stock figure, which is compatible with the unmet demand concept. But no clear connections exist between the number of persons employed at a certain moment and the number of job vacancies.

Job vacancies and hires

Accessions and separations are terms used in labour force surveys (supply oriented). In company surveys (demand oriented) the parallel terms are hires (for accessions) and quits, discharges and lay offs (for separations). Schettkat (1996) defined labour turnover as the sum of the number of hires on one side and quits and layoffs on the other, in a certain period of time. Also very important for the job vacancy discussion is that Schettkat (1996) defined hires as new contracts and quits and lay offs as closed contracts. I found some of the best examples of applications of this contract approach in the Netherlands (Milot and Kee, 2005; Bruil, Den Butter and Kee, 2010).

An official definition of hires has not (yet) been found in the European domain, but it has in the United States. The *Job Openings and Labour Turnover Survey (JOLTS)* of the Bureau of Labor Statistics in the United States defines hires as all additions to the payroll during the month, which includes newly hired and rehired employees (permanent, short-term and seasonal employees; full-time and part-time employees), on-call or intermittent employees who returned to work after having been formally separated, workers who were hired and separated during the month, transfers from other locations and employees who were recalled to a job at an establishment following a formal layoff lasting more than seven days. Hires do not include transfers or promotions within an establishment, employees returning from strikes, employees from temporary work agencies, employee leasing companies, outside contractors, or consultants working at an establishment.

The notion of hires fits very well into the job matching approach. When operationalizing the notion of hires it is not important whether the employer recruited actively, or the job vacancy is directly available or whether the job vacancy concerns a filled position. In the literature about employment dynamics it is clear that hires are defined by the start of a contract. And hires are defined as flows.

2.7 Job vacancies within the triangular employment relationship

Job vacancies within the triangular employment relationship warrant separate attention. Previously authors have pointed out the importance of job vacancies at temporary work agencies (Frumermann, 1979; Hoffmann, 1992; Donker van Heel, 1994c; Verhage et al, 1997). The obvious relevance is the growing share of temporary agency work in the labour market and the growing number of job vacancies of temporary work agencies. Another argument is the more and more accepted value of temporary agency work for job seekers as a stepping stone to the labour market (Eurociett, 2007). The question now becomes how this relationship should be interpreted and how job vacancies are to be defined within the triangular employment relationship. This includes exploration of the question of whether this is a different kind of job vacancy compared to 'regular' job vacancies. Unfortunately almost no literature is available on the triangular employment relationship and job vacancies and so the picture is formed here largely based on interviews with several experts in the field (JVE). Use has also been made of the knowledge acquired through my own studies of the temporary work agency sector (JVS).

The literature distinguishes a single standard type of employment relationship, being one that exists between two parties. According to the ILO, at least one other type of employment relationship is recognised, the triangular employment relationship. The ILO systematically compared the differences and similarities of the notion of the employment relationship in various countries, in the end analysing legal texts in 60 countries. The analysis looked for objective characteristics that helped determine the notion of the employment relationship and found that the objective facts determine whether an employment relationship exists ('primacy of fact'), not the name given to it by the parties involved. An employment relationship is a legal concept dealing with the relationship between an employee and an employer, for whom the employee is doing work under specific conditions and for a specific compensation. This is all about a contract between an employee and an employer. Whatever the definition may be, this relationship determines the rights and obligations of both employee and employer. In all this, the self-employed are excluded from the definition of the employment relationship. On the basis of this international survey, the ILO concluded that apart from the regular employment relationship, the triangular employment relationship should also be distinguished (ILO, 2006).

This form of triangular serviceprovision — the wages being paid by the intermediary — is easily traced back to temporary agency work. Posting is the same as temporary agency work (Donker van Heel and Wit, 2010). The characteristic principle of the triangular employment relationship is that three parties are involved: the employee, the lending party and the borrowing party. The lending party is a private employment service, though it should be noted that private employment services can have a broader range of services, which do not always imply a triangular labour relationship, for example, recruitment, selection, pay-rolling and HR-services. In the context of the triangular relationship, it is only focused on services where staff is temporarily seconded and so this essentially refers to temporary work agencies. The borrowing party refers to a user firm or a user company. Temporary agency workers are employed by a temporary work agency and are assigned to a user company (this does not include internal staff of the temporary work agency). The payment of the wages occurs through the lending party — the temporary work agency — who is the formal employer. The work itself and the control over the work take place at the borrowing party. Mediation and outplacement are not included into the equation.

Job vacancies for temporary agency workers should be measured at the temporary work agencies and not at the user firm. Within both concepts — unmet demand and job matching — a job vacancy occurs at the temporary work agency if an agency has a (temporary) contract for a job seeker. In general the agency will only start a search if it receives a concrete request from a borrowing party, but this is not always the case. A temporary work agency can also be willing to offer a contract to a temporary worker without there being any work directly available at a borrowing party (JVE).

Double counting may occur if the hiring party places a request with multiple temporary work agencies at the same time. In that case, these temporary work agencies — as an employer — all have a job vacancy for a single position. Furthermore, it is possible that the hiring party, apart from the request to the temporary work agency, simultaneously starts recruitment for someone that will be employed directly and appear on their own payroll. In this case, the hiring party has a job vacancy and the temporary work agency (or agencies) — as an employer — does as well, but for a single position. Double counts may even occur if various branch offices of a single temporary work agency all recruit for a single order by the same hiring party (JVE).

Individual temporary work agencies have a thorough insight into the number of job vacancies that are open at a certain moment in time. Furthermore, the job vacancy flows are equally clear, but this information is not published because of its commercial sensitivity and so publication occurs only very rarely. For this reason, at the national level the number of job vacancies at temporary work agencies is unknown, as corroborated by the interviews with representatives of the Eurociett, various national branch organisations of temporary work agencies (in the Netherlands, Belgium, France, the United Kingdom and Poland), as well as with individual temporary work agencies (JVE).

The number of assignments is used as an indicator for the number of job vacancies filled by the temporary work agencies (Donker van Heel, 1994 en 2009; Simoens et al, 1998). One assignment is equivalent to one individual executing the same occupation in the same user company, which can include renewals of contracts (definition Eurociett). A new assignment is considered to be a filled job vacancy. However, this includes the assignments of temporary workers who already have a permanent contract with the temporary work agency. In these cases, therefore, a job vacancy with the agency has already been filled.

A specific area of attention is formed by the so-called recall job vacancies. It regularly happens that a temporary work agency calls for a specific person for a new assignment from a previously known pool. Following the literature (Holt and David, 1966) this is a new assignment if the recall is for another user company or another occupation in the same user company. In some cases a new request for a temporary agency worker by the borrowing party for the same occupation applies to one specific person. Depending on the time lag, temporary work agencies define this as renewal of the existing contract or as recall. Temporary work agencies do have their own policy which also has to do with the administrative organisation; it varies from two weeks to three months (JVE).

In many cases, temporary agency workers are offered a permanent position by the hiring party, meaning that they will move to their payroll (Donker van Heel and Van der Ende, 2009). This is effectively a switch from one employer to the next, which equals a hire and a filled job vacancy. It also happens that a temporary agency worker is offered a permanent position by the temporary work agency. In that case a temporary contract is changed into a permanent contract with the same employer, meaning that this is not a filled job vacancy.

As far as can be ascertained, the job vacancy information of temporary work agencies have never before been related to employment dynamics and this appears to be an important oversight given the rather large number of assignments set off against the number of regular job vacancies observed in a number of countries (Section 4.3).

2.8 Towards a general definition of job vacancies

Similarities between the two concepts

The literature shows clear similarities between the two job vacancy concepts that encompass the following assumptions:

1. open to job seekers outside the company;
2. compatible with the (labour) law;
3. a (potential) employment relationship;
4. financial compensation;
5. a (new) labour contract.

Authors generally agree on the criterion that the job vacancy must be open to external candidates (President's Committee, 1962; Myers, 1965b, Joint Economic Committee, 1966; Myers and Creamer, 1967; Walsh, 1982; Hoffmann, 1992; Farm, 2003; Bureau of Labor Statistics, 2003; European Commission, 2008). If the employer is exclusively recruiting internally among his own personnel, this means no job vacancy is involved. In the case of exclusive internal recruitment, this specific employer does not display a demand for labour and it more represents a case of an internal allocation of labour since job seekers would not be eligible for these vacancies. This clearly distinguishes the external labour market from the internal labour market of a company.

The exception to this point of view comes from Dunlop (1966). In his view the internal and external labour market are intertwined to the extent that they must be seen as a single labour market. External job vacancies only serve as 'ports of entry' to the employer, to be followed by a process of changes of positions within the company itself

and which ultimately may lead to the creation of other internal and external job vacancies. Schettkat (1996) demonstrated that a 'job vacancy chain' also develops if an employee fills a job vacancy outside the company. Once it becomes known that the employee will leave, the company will embark on recruitment and related activities in order to fill the soon to be vacant post. These therefore represent underlying processes that may ultimately lead to the creation of internal and external job vacancies. The general view, however, is that internal job vacancies must be left out of the definition and measurements.

A job vacancy must comply with the (labour) law, and the literature is almost silent on this subject. Because it is obvious, this criterion does not have to be included explicitly in the definition of job vacancies. Naturally, the relevant law differs between countries. In the Netherlands, for example, it is legally prohibited to offer a job vacancy that specifies certain characteristics that could be deemed discriminatory, whereas in other countries there might be no legislation on this. Furthermore, in some countries the compensation specified in a job vacancy must be equal to or higher than the existing legal minimum wage, though not all countries have minimum wage legislation and in those that do there can be differences in the conditions and levels of payment. Also, the existing extra-legal arrangements (as embodied in collective agreements covering sectors or occupations) have to be followed. By definition, in cases where we have a breach of the law no job vacancy exists. If job vacancies include clear indications that they are ultimately about work that involves a breach of the law, these cannot be considered to be job vacancies. Public employment services should refuse to handle job vacancies if they suspect that a breach of the law is involved (Shelton and Neef, 1966).

No job vacancy exists if a potential employment relationship is missing, if the employment relationship does not comply with the law, does not include compensation or lacks an implicit or explicit employment contract. An employment contract does not have to be explicit, meaning laid down in writing. In a number of countries oral agreements are valid as an employment contract. No employment relationship exists in cases of self-employment, freelance work, subcontracting and outsourcing (ILO, 2006). If (formally) no implicit or explicit employment contract has been made, this is referred to as 'informal' labour which is specifically excluded from the definition (and measurements) of job vacancies.

A job vacancy is only a job vacancy if the employer offers compensation for the work done. The term compensation is not fully clarified in the literature of job vacancies. In some countries it may not necessarily take the form of money, but can be payment in kind. In the definition of employment both, in cash or in kind, are accepted. In any case the literature of job vacancies is agreed on the offer of 'compensation'. For this reason, volunteer work without any compensation cannot be taken into account, even if an implicit or explicit contract was drawn up. If the volunteer work includes a compensation offered by the employer, possibly on top of other payments received (such as unemployment benefits) then this constitutes a job vacancy.

The unit of observation in the two concepts

The unit of observation in the job matching concept is the (potential) match between demand and supply, meaning a (potential) job, or to be more specific, a (potential) employment contract. This also applies to the unmet demand concept, as is shown by the literature. 'A vacant post can be said to exist if an employer before or during the reference period has taken concrete steps to find a suitable person to carry out a specific set of tasks and would have taken on (entered into a job contract with) such a person if she/he had been available during the reference period' (Hoffmann, 1997). The unit of observation in the unmet demand concept is also a (potential) job or employment contract, as in the job matching concept. This is an important finding, because this similarity allows an umbrella definition for both concepts.

The labour contract is the common denominator and is the link between the two concepts: unmet demand and matching. Job vacancies defined within the framework of matching encompass job vacancies according to the definition of unmet demand, the latter being a subset of the first. The employer should always have the intention to conclude an employment contract in the case of active recruitment for a job vacancy that is for an unoccupied

position that is immediately available. This means that the concept of unmet demand falls entirely within the parameters of how an employment contract is defined.

If job vacancies are defined in terms of labour contracts, then this offers a number of advantages in terms of the data. Firstly, labour contracts allow better and more concrete measurements than using 'posts' or 'positions', and similar terms used in definitions of job vacancies. Secondly, it is easier to mutually compare statistics on employment, jobs and job vacancies if these are defined in the same manner, sharing the same unit of analysis (contracts). Within the overall stock of jobs (employment) at any one time, job vacancies form a distinct subset. They represent potential jobs and this is an important factor in the various analyses of the data. Thirdly, defining job vacancies in terms of contracts allows the imposition of specific standards on the quality of the job vacancy. A contract is essentially a legal concept and by viewing job vacancies as potential contracts, a direct connection is made with the legal frameworks such as those found in international and national labour law and extra-legal arrangements. This has the advantage of setting specific minimum standards — for each country and frequently for individual sectors — on certain quality aspects of employment, including the terms and conditions of employment, the working environment, employment relationships and labour content. Moreover, if job vacancies are viewed as potential employment contracts these must comply with the minimum legal quality standards set. In this respect the employment opportunities that are offered through job vacancies have to meet these quality requirements. Furthermore, on the same basis, it is safe to conclude that job vacancies not complying with the legal requirements cannot be considered to be job vacancies. Finally different types of job vacancies can be distinguished on the basis of the types of labour contracts associated with them and this provides a reason for a deepening of the analysis of the functioning of the labour market.

The link between job vacancies and jobs

Job vacancies form a subset of employment, expressed in jobs and, consequently, employment contracts. In my view this means an umbrella definition of job vacancies is in sync with the internationally accepted definition of a job. In this I suggest to follow the definition of a job according to the *System of National Accounts SNA 1993* (United Nations, 1993) and the *European System of Accounts ESA 1995* (Eurostat, 1995):

A job is an explicit or implicit contract between a person and a resident institutional unit to perform work for compensation for a defined period or until further notice (United Nations, 1993).

A job is defined as an explicit or implicit contract (relating to the provision of labour input, not to supplying output of a good or service) between a person and a resident institutional unit to perform work (activities which contribute to the production of goods or services within the production boundary) in return for compensation (including mixed income of self-employed persons) for a defined period or until further notice (Eurostat, 1995).

In the internationally accepted definition of employees the assumptions of a job vacancy are clearly recognised, and this underlines the clear relationship between employees and job vacancies: employees are persons who, by agreement, work for a resident institutional unit and receive remuneration for their labour (United Nations, 2008). However, job vacancies are not persons and therefore do not form a subset of employment in this variant. It is important that individuals may have more than one source of income from employment because they work for more than one employer or, in addition to working for one or more companies they work on their own account as self-employed. The number of jobs in the economy thus exceeds the number of persons employed to the extent that some employees have more than one job (United Nations, 2008).

Based on the internationally accepted definition of jobs I propose a new and general definition of job vacancies, which fits the existing job vacancy concepts^{6 7}:

A job vacancy is an opportunity for an explicit or implicit contract between a person and a resident institutional unit to perform work for compensation.

2.9 Operational definition of job vacancies

Content criteria

When operationalization of the notion of job vacancies is necessary, academic literature (JVS-A) shows that the following content criteria become important: the recruitment domain (internal and/or external), search activity (active and/or passive and/or recall), job vacancies for occupied and/or unoccupied jobs, the availability of work, the availability of an employment contract and the status in terms of stock or flows (inflow, outflow, filled, withdrawn). The choice depends on the specific job vacancy concept.

Hybrid forms are also possible, depending on the selection of the specific criteria. It can also happen that specific criteria are not applied in any case and here the outcome of the measurements cannot be fully retraced, so that it is not clear what exactly is measured.

Data criteria

Besides making demands of the content, users also make demands of the data itself. From the analysis of the empirical job vacancy studies (JVS-E) and especially from my interviews with 268 experts (JVE) it became clear that the following five data criteria should also be taken into account: delineation, the choice of specific characteristics, the level of detail, frequency and time perspective (retrospective, current, prospective). For an elaboration of the data criteria (see annex 3 for an elaboration). The required job vacancy information depends on the level at which policy is being determined. This was clearly corroborated from the interviews with politicians, policy advisors, employees of public employment services at all levels, employers and employees organisations (JVE), as shown in table 2.1. At a higher policy level (international and national) job vacancy information will tend to deal with delineation by nation, have fewer characteristics, have a lower frequency and be more future oriented. At a lower policy level (labour mediation) the characteristics, frequency, detailing and real time information become more important. Remarkably, the concept of unmet demand is only used by experts on the international level, including experts of the European Commission, Eurostat and National Statistical Offices. This means that the concept of unmet demand is not followed by the other experts at the national, sector, regional or local level.

⁶ The addition 'for a defined period or until further notice' seems superfluous to me, at least in the definition of job vacancies.

⁷ If employment contracts are made with self-employed people without personnel – through third parties or otherwise – these are accounted for in the general definition. If it involves the sub-contracting of self-employed people without personnel this is not an employment contract, meaning that it falls outside the definition. The reader is referred to Chapter 6, where I recommend that further research is to be done on the characteristics of hired personnel and more specifically the hiring of self-employed people (Recommendation no. 3) and the substitution of job vacancies by other forms of labour (Recommendation no. 27).

Table 2.1 Data requirements per policy level (n=268)

Data requirements per policy level (column percentages)		international	national	sectoral	regional or local	total
Content	Unmet demand	41%	1%	0%	0%	6%
Stock-flows	Flows	100%	100%	100%	100%	100%
Delineation	National	100%	100%	0%	0%	58%
Characteristics	All	53%	60%	55%	87%	63%
Detail	Individual job vacancy	85%	80%	12%	100%	68%
Frequency	Year	41%	34%	85%	9%	43%
	Quarter	38%	16%	5%	6%	15%
	Month	12%	24%	5%	13%	16%
	Week	0%	3%	0%	2%	2%
	Day	9%	20%	6%	70%	24%
Time perspective	retrospective	80%	65%	86%	26%	65%
	current/real time	10%	22%	5%	72%	25%
	prospective	10%	14%	9%	2%	10%
Total		100%	100%	100%	100%	100%
Number experts		34	122	65	47	268

Source: JVE.

The operational definition has a large influence over the results of measurements. If job vacancies are defined in the loosest possible sense (flow figures, including temporary work job vacancies, including passive recruitment and including job vacancies for occupied positions), it can be estimated that the number of job vacancies for a theoretical labour market is a factor of 30 larger than if the job vacancies are defined in the strictest possible sense (i.e. open job vacancies, excluding temporary work job vacancies, excluding passive recruitment and excluding occupied positions).⁸ However, it should be pointed out this is not a representative estimate, but merely indicative.

2.10 Conclusions

Conclusion 2.1: the fundamental literature about job vacancies was published between 1960-1980 in the US

The literature published in the United States – principally in the 1960s and 1970s – can be considered as the fundamental literature. This was the cradle of the concept of job unmet demand. The concept as developed in this period has not changed and is still in use as the basis for job vacancy statistics in Europe and the United States. This probably explains why following this era relatively little has been published on the job vacancy concept.

Conclusion 2.2: two different approaches to job vacancies must be distinguished

The foregoing study of the literature on job vacancies leads to the conclusion that two different approaches to the job vacancy concept exist, the first of which starts from the *unmet demand* of companies. Job vacancies defined according to this analytical concept have to meet strict criteria. The second approach focuses on *job matching*, indicating the match between an employer and a job seeker, resulting in an employment contract. This job vacancy concept is related to the search behaviour of companies and the operational practice of labour market intermediaries such as public employment services. Job vacancies are seen as job opportunities for job seekers. Few, if any, criteria exist to determine whether something is a job vacancy or not, making this a rather loosely

⁸ This estimate is mainly based on data from the Netherlands, supplemented by data from Belgium and Sweden. In the Netherlands the job vacancy flows are approximately a factor 4.0 larger than open job vacancies (CBS, 2011b; 2011c; 2011d). Broadly estimated, the ratio between regular job vacancies and temporary work job vacancies in Belgium and the Netherlands is 2.0 (Delmotte et al, 2001; Donker van Heel et al, 1994, 2008). For many other countries this represents a high figure because of the comparatively low levels of temporary work available. According to Swedish data, the inclusion of job vacancies for occupied positions produces a multiplier of 2.5 (Farm, 2005a). An extension of the search range with recall job vacancies alone produces a multiplier of 1.7 (Joseph, 1966). The product of these multipliers is over 30 and this does not even include an extension with job vacancies that involve only passive recruitment resulting in a multiplier of 1.4 (Farm, 2005b). However, the multipliers depend on the (institutional) conditions on the labour market.

defined concept. These two approaches, which are very different from each other, represent the main trends observed. In the literature both approaches discuss job vacancies, but in reality they are two different concepts.

Conclusion 2.3: content criteria in the defining of job vacancies

The study of the academic literature has shown that the following criteria play an important role in the definition of job vacancies in the two different approaches: a) the extent of internal and/or external recruitment by the employer, b) the extent of passive and/or active recruitment or recall, c) the extent to which a job vacancy concerns —or does not concern —an occupied job, d) the direct availability or unavailability of a contract, e) the direct availability or unavailability of work and f) the status of a job vacancy: is it an open job vacancy, a new job vacancy (inflow), a filled job vacancy or a withdrawn job vacancy (outflow)? These criteria I have termed the definition content criteria.

Conclusion 2.4: the definition of job vacancies used in Europe shows shortcomings

The definition used by the European Commission and Eurostat is very close to the definition developed in the United States and is still in current use:

A job vacancy shall mean a paid post that is newly created, unoccupied, or about to become vacant, (a) for which the employer is taking active steps and is prepared to take further steps to find a suitable candidate from outside the enterprise concerned and (b) which the employer intends to fill either immediately or within a specific period of time (Eurostat, 2008).

The definition that is currently used by Eurostat, the European Commission and the Bureau of Labor Statistics in the United States shows the following shortcomings: a) It is limited to the unmet demand concept and therefore is does not result in a full picture of job opportunities; b) It does not match the job vacancy concept of companies, job seekers and labour market intermediaries; c) It is not a solid basis for measurements; d) It only provides a snapshot of a specific point in time, whereas the job vacancy market is highly dynamic and e) It is not in sync with other definitions that are internationally acknowledged, specifically the definitions of 'jobs' and 'employment'.

Conclusion 2.5: a general definition of job vacancies matches the definition of jobs

The literature shows clear similarities between the job vacancy concepts, unmet demand and job matching. The assumptions in both concepts of job vacancies are related to new contracts between an employer and a new employee. The employment contract is the common denominator and is the link between the two concepts, unmet demand being a subset of job matching. This makes it possible to define my own general definition of a job vacancy, which fits the existing job vacancy concepts and is also connected to the internationally accepted definitions of employment and jobs:

A job vacancy is an opportunity for an explicit or implicit contract between a person and a resident institutional unit to perform work for compensation.

Conclusion 2.6: the job vacancy concept can be linked to the concept of employment dynamics

Employment dynamics is about job creation, job destruction, accessions and separations, hires and fires. Even though the actual phrase 'job vacancy' does not occur under this concept, it does address new demand for labour or more specifically, the generation of new jobs and the finding of jobs. It is possible to create a relationship between the approach of employment dynamics and the job vacancy concept. The demand led approach of employment dynamics follows the unmet demand concept of job vacancies. The supply led approach of employment dynamics offers a link with the definition of job vacancies in the matching concept: an accession is the equivalent of a filled job vacancy (or hire) in the matching concept.

Conclusion 2.7: a theory of job vacancies in dynamic perspective is a theory of employment contracts

No integral theory of job vacancies in dynamic perspective aimed at job vacancy flows exists. Academic literature is strongly focused on the concept of unmet demand and therefore has a static approach to the concept of job vacancies. Empirical literature contains many measurements of job vacancy flows, but without an underlying theory. A theory of job vacancies in dynamic perspective is, in my opinion, a theory of employment contracts. This theory also encompasses the theory of unmet demand. The development of such an integral theory does not fall in the scope of my study, but I do hope to have supplied sufficient points of departure.

Table 2.2 Criteria for the operational definition of job vacancies

type of criteria	criteria	definition values	unmet demand	job matching	
content criteria	recruitment domain	internal			
		external	X	X	
	search activity	active recruitment		X	X
		passive recruitment			X
		recall	X		X
	occupied or unoccupied job	occupied			X
		unoccupied	X		X
	availability of work	available	X		X
		not available (not started)			X
	availability of a contract	available	X		X
		not available (not concluded)			X
	stock-flow	stock	X		X
		inflow			X
		outflow			X
		filled			X
withdrawn				X	
data criteria	delineation	total national job vacancy market	X	X	
		subpopulations (sector, region)	X	X	
	characteristics	characteristics employer	X		X
		characteristics job/contract			X
		characteristics recruitment			X
		characteristics hired person			X
	detail	number of values	X		X
	frequency	interval	X		X
	time perspective	retrospective			X
		current/real time	X		X
prospective				X	

Conclusion 2.8: limited number of criteria must be applied for the operational definition of job vacancies

The study leads to the conclusion that it is necessary to develop a sharp operational definition of job vacancies, to avoid misuse of job vacancy statistics. The study also shows that it is possible to develop a common operational definition of a job vacancy that is applicable to existing job vacancy concepts. This is largely possible by applying specific content and data criteria and making choices for definition values to define clearly what is and what is not meant by a job vacancy. In the last two columns of the following table the requirements are indicated for each of the two distinct concepts of job vacancies: unmet demand and job matching. If the operational definition according to the approach of job matching is selected, it can be seen that the operational definition of unmet demand is a subset of the former.

3. Reviewing the measuring methods

3.1 Research objective and design

The aim of this part of the research is to assess and review methods to measure job vacancies. The central question is the following:

Which measuring methods provide a sound measurement of the number of job vacancies according to the operational definition and methodological criteria?

I have based the assessment of the methods used to measure job vacancies on 537 job vacancy studies (JVS) and talks with 268 experts (JVE). I followed these steps in doing the assessment:

1. Definition of measuring methods and instruments.
2. Selection of 154 measuring instruments (JVS-E-I).
3. Definition of an assessment framework.
4. Assessment and coding of 154 measuring instruments with the use of the assessment framework.
5. Quantitative analysis of 154 measuring instruments, per characteristic.
6. Quantitative analysis of 154 measuring instruments, per method.
7. Qualitative analysis of measuring methods.
8. Conclusion.
9. Design of an optimal instrument to measure job vacancies.

3.2 Defining measuring methods and instruments (step 1)

I define a method to measure job vacancies as a specific combination of a type of respondent, a type of data collection and a type of source. The type of respondent for job vacancy measurement is a representative of a company (employer) or an individual (job finder). By companies I mean labour organisations, both private and public institutions. Job finders can deliver information indicating hires (Section 2.6). Two types of data collection have been differentiated: the use of surveys and registers. The essential difference is that a survey is a sample procedure using a questionnaire, and a register is a collection of structured records based on more or less systematic administrative processes. Registration of job vacancies is related to an administrative process in connection with, for instance, mediation, social security allowance or taxes. (Job vacancy) registers may be partially based on a survey of some kind (Donker van Heel and Dekker, 1987; Bakker, 2009).⁹ The type of source determines the coverage of the measurement. Specific sources provide a representative picture of the total job vacancy market (national, sector or regional), of which the National Statistical Organisations (NSOs) and research institutes are the most important sources. Other sources relate to the job vacancy market of intermediaries only. I specifically studied public employment services (PES), temporary work agencies (TWA), job advertisements (ADS) and online recruitment services (ORS) as sources. The combination of these three dimensions leads to a breakdown into eight types of measuring instruments (see annex 4 for a description). I define an instrument to measure job vacancies as collection of primary job vacancy data in a specific country, according to a specific method, i.e. a specific combination of a type of respondent, a type of data collection and a type of source.

⁹ My database JVS-E is not capable of indicating whether and to what extent the various registers use surveys, and vice versa.

3.3 Selection of measuring instruments (step 2)

In my database JVS-E-I I have selected 154 unique measuring instruments from 28 countries (27 EU-countries plus Norway). This includes 124 instruments at a national level, including public employment services, temporary work agencies and online recruitment services, which together form a representative and fairly complete picture of all national instruments in Europe in January 2012. It also includes 30 regional, local and sector instruments (Section 1.2). Table 3.1 shows that most instruments use companies as respondents (77%) and that fewer use job finders (23%). More than two-thirds are surveys (69%) and almost one-third registers (31%). In almost three out of four cases the source is the NSO or a research institute (72%). In other cases the source is an intermediary on the labour market (28%). The most common method is the employer survey conducted by NSOs and research institutes (49%), followed by company registers of intermediaries (26%).

Table 3.1 Number of unique measuring instruments classified by type of method (n=154)

Type of respondent	Type of data collection				Total
	Survey		Register		
	Source type national statistical offices, research institutes	Source type intermediaries	Source type national statistical offices, research institutes	Source type intermediaries	
Companies	76 (49%)	1 (1%)	1 (1%)	40 (26%)	118 (77%)
Job finders	27 (18%)	2 (1%)	7 (5%)	0 (0%)	36 (23%)
Subtotal	103 (67%)	3 (2%)	8 (5%)	40 (26%)	154 (100%)
Total	106 (69%)		48 (31%)		154 (100%)

Source: JVS-E-I

3.4 Assessment framework (step 3)

The assessment of the 154 instruments is based on 18 assessment criteria, which are divided into three groups (table 3.2). The first two groups of criteria relate to the operational definition described in section 2.10, which consists of six content criteria and five data criteria. The third group of assessment criteria relate to general standards of methodology. Seven general methodological criteria – or method-related criteria – emerged in expert interviews (JVE) and in different job vacancy studies (JVS): representativeness¹⁰, validity, reliability¹¹, sensitivity to human mistakes, cost, response burden and timeliness.

Standardisation of the content criteria and the data criteria are a direct result of the operational definition (table 3.2, last column). I have standardised the methodological criteria on the basis of general methodological standards and additional desk research (JVS) and information gathered from expert interviews (JVE).

¹⁰ The criteria representativeness, validity and reliability should be sharply distinguished from one another. The first two criteria are related to systematic errors and the third term to unsystematic errors, which mainly depend on the sample size.

¹¹ The general practice is to use repeated measurement to compare the reliability and validity of the various measuring instruments. This would mean approaching the same respondents twice within a short time span to see whether the same results are achieved (Bakker, 2009). I have not – or hardly – come across such a repeated measurement, so that this criterion is not included in my database. One of the few examples is the research of Meyers and Creamer (1967), who used face to face talks with employers to check their earlier answers to a survey by telephone.

Table 3.2 Assessment framework for instruments measuring job vacancies

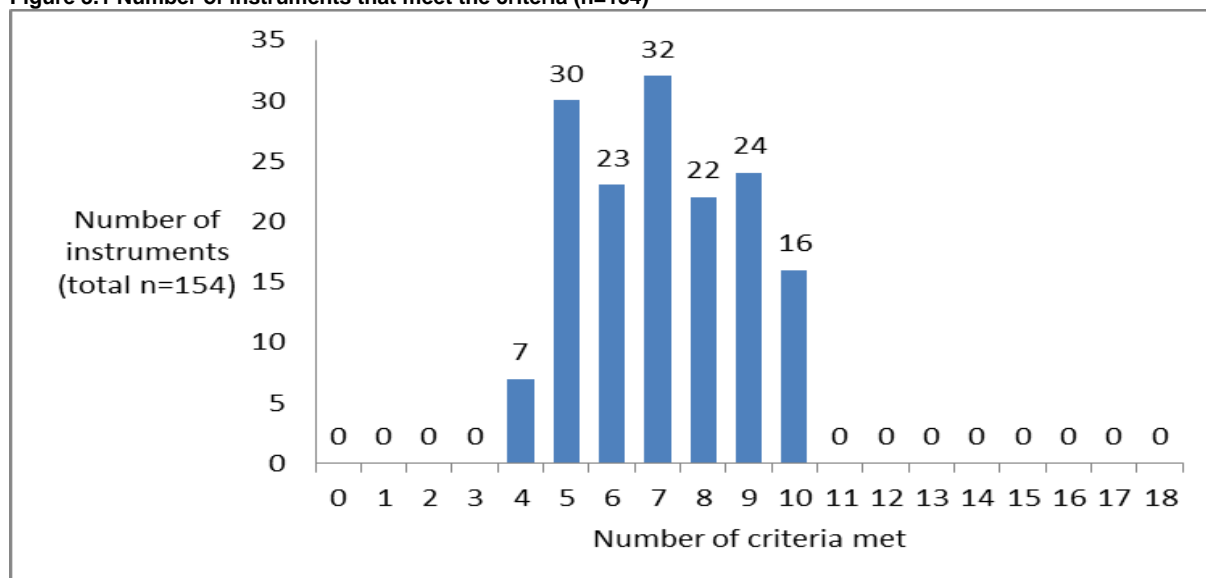
Type of criterion	Criterion	Standardisation
Content criteria	1. Recruitment domain	The distinction between internal and external job vacancies is clear.
	2. Search activity	Active recruitment is explicitly measured or is clear.
	3. Occupancy job	It is explicitly measured whether the job is occupied or not.
	4. Work available	It is explicitly measured whether work is available.
	5. Contract available	It is explicitly measured whether an employment contract is signed.
	6. Status	The inflow or outflow of job vacancies is measured.
Data criteria	7. Delineation	The coverage of the population of job vacancies is delineated by national borders.
	8. Characteristics	Characteristics of all four groups are measured (company, job finder, hard to fill job vacancies and recruitment activities).
	9. Detail	The measurement is at the level of individual job vacancies.
	10. Frequency	The results are published quarterly or more frequently.
	11. Time perspective	Current job vacancies are measured.
Methodological criteria	12. Representativeness	The population is accurately represented (no selection bias). An assessment is made whether the results of measurements according to the method in question is representative for all companies or all job finders in a country.
	13. Validity	The concept is measured as defined, i.e. in line with the operational definition of job vacancies. This excludes the measurement of job finders.
	14. Reliability	Reliability is the degree to which repeated measurements deliver the same results, meaning that the results are not dependent on random factors. Registers, excluding registers of online recruitment services are considered to deliver more reliable job vacancy information compared to surveys.
	15. Sensitivity to human mistakes (less)	Error sensitivity is the degree of susceptibility to human error. Registers, including online recruitment services, are considered to be relatively less sensitive to human mistakes.
	16. Cost (less)	The costs of measurements are indicated qualitatively. Surveys are supposed to be relatively less costly compared to registers, not only because of the investment and operating costs of the registration system, but also because of the time needed to perform the necessary analyses based on (complex) registers.
	17. Response burden (less)	Burden on respondents is the extent to which respondents spend time and effort to provide specific information. The response burden is method-related and is considered to have an effect on the response and the quality of the results. The response burden must be as low as possible. The response burden of online recruitment services and job vacancy advertisements is considered to be relatively low.
	18. Timeliness	The information is available real-time.

Source: JVS en JVE.

3.5 Assessment and coding of 154 measuring instruments (step 4)

Using the assessment framework above, I have assessed all 154 instruments and coded the results thereof. All 154 instruments were given a value per criterion. The value was 1 if the norm was met and 0 if that was not the case or if it was unclear (see annex 8). An instrument uses a minimum of 0 and a maximum of 18 criteria to measure job vacancies. The higher an instrument scores, the better it adheres to the assessment criteria and thus the better it is able to measure job vacancies. The scores for each instrument and criterion have been saved in JVS-E-I.

Figure 3.1 Number of instruments that meet the criteria (n=154)



Source: JVS-E-I

The 154 instruments meet, on average, just more than seven (7.1) of the 18 assessment criteria. Seven measuring instruments score positively on four criteria (see figure 3.1), which is the lowest score. The highest score is 10, which 16 instruments met. The score of 10 is mainly achieved by job registers of public employment services, the score of 9 by the *Job Vacancy Statistics* of Eurostat, the score of 8 usually by online recruitment services such as *Monsterboard* and *Randstad*, the score of 7 usually by *Manpower Talent Shortage Survey*, the score of 6 often by various sector studies on job vacancies, the score of 5 by the *Labour Force Survey* of Eurostat and the score of 4 by the rest of the measuring instruments. The result of a 7.1 out of 18 average indicates that room for improvement exists with regard to the measuring instruments in Europe.

3.6 Quantitative analysis of the measuring instruments per characteristic (step 5)

Analysis per group of criteria

The next step is a separate quantitative analysis for each of the three representative characteristics of the measuring methods, i.e. per type of respondent, per type of data collection and per type of source¹². The goal is to determine which characteristics of the measuring methods can be related to an adequate measurement of job vacancies.

First I did a general analysis, and grouped the various criteria in three groups: content criteria, data criteria and methodological criteria. For each of these three groups I determined how many measuring instruments adhered to the set criteria, expressed in a percentage (see table 3.3). A higher percentage of instruments means that the specific criteria are measured by more instruments. The minimum is zero percent if none of the 154 instruments score on a criterion, and the maximum is 100 percent if all 154 instruments score positively on the criterion. This is what I call the *quality score*, because this indicates the quality of the measurements of the job vacancies. I then proceeded to calculate the averages, based on the assumption of an equal weight of the criteria. I define a difference of minimally 10 percent point compared to the average of all instruments a significant difference (minimally 10 percent point lower in red and minimally 10 percent point higher in blue).

¹² An explanatory analysis would be interesting, but my database does not allow this. One specific variable to be explained does not exist: the nature of the number of job vacancies differs for each source (open job vacancies, filled job vacancies, job vacancies at temporary work agencies, etc.), meaning that it does not allow comparison. The sources are also too fragmented: different countries, national, sectoral and intermediaries.

Table 3.3 Quality Score: the share of measuring instruments with a positive score per group of criteria, per characteristic (n=154)

Quality score (%)	Type of respondent		Type of data-collection		Type of source		All instruments (n=154)
	Companies (n=118)	Job finders (n=36)	Survey (n=106)	Register (n=48)	NSO or research institute (n=111)	Intermediaries (n=43)	
content criteria (1-6)	44%	31%	45%	32%	43%	36%	41%
data criteria (7-11)	53%	43%	41%	72%	43%	71%	51%
operational definition (1-11)	49%	36%	44%	50%	43%	52%	46%
methodological criteria (12-18)	47%	31%	38%	53%	39%	53%	43%
All assessment criteria (1-18)	48%	34%	41%	52%	42%	52%	45%

Source: JVS-E-I. Red: ≤10 percent point lower compared to average total (last column). Blue: ≥ 10 percent point higher compared to average total.

The quantitative analysis of the characteristics of the measuring instruments per group of criteria has led to the following results:

1. Overall, the 154 instruments reached an average quality score of 45 percent, which clearly shows that room for improvement exists with regard to the measuring instruments.
2. No characteristics of measuring instruments score 10 or more percent points higher than the total average of 45 percent for all 18 assessment criteria. Measurements via job finders have a relatively low quality score at 34 percent.
3. With regard to the content criteria, measurements via job finders score lower (31%) compared to measurement via companies (44%).
4. For data criteria it is noted that registers (72%) and measurements via job market intermediaries (71%) score relatively high and surveys score relatively low (41%).
5. If the operational definition is the starting point, measurements via job finders (36%) provide poorer results than measurements via companies (49%).
6. Differences can be seen based on the methodological criteria: registers (53%) score higher for the quality criterion than surveys (38%), measurements via intermediaries (53%) have a higher score than NSOs and research institutes (39%) and measurements via job finders (31%) have a lower score than measurements via companies (47%).

Analysis per separate criterion

To obtain a more detailed overview, I carried out a separate analysis of the 18 criteria. Table 3.4 shows the quality scores per criterion. I have followed a points system to describe the results. One point is given per characteristic if the score is at least 90 percent for a criterion, or if the score is more than 10 percent points higher than the total score of the criterion. The minimum amount of points is zero when no criterion has scored positively and the maximum is 18 points when all the criteria have scored positively. There are also negative points when the score is more than 10 percentage lower than the total. For example: of all the 118 job measurements with a company as a respondent, 97 percent of the cases actually measured active search (criterion 2) and 97 percent met both the detail and validity criteria. Thus, overall, measuring through companies scores three plus points (three times a minimum of 90 percent) and no negative points.

Table 3.4 Quality score: the share of measuring instruments with a positive score per criterion, per characteristic (n=154)

Quality score (%)		Type of respondent		Type of data-collection		Type of source		All instruments (n=154)
		Companies (n=118)	Job finders (n=36)	Survey (n=106)	Register (n=48)	NSO or research institutes (n=111)	Labour market Intermediaries (n=43)	
Content criteria	1. Recruitment domain	80%	92%	99%	46%	96%	47%	83%
	2. Search activity	97%	6%	73%	83%	67%	100%	76%
	3. Occupancy job	17%	0%	19%	0%	18%	0%	13%
	4. Work available	17%	0%	19%	0%	18%	0%	13%
	5. Contract available	0%	0%	0%	0%	0%	0%	0%
	6. Status	56%	89%	63%	65%	61%	70%	64%
Data criteria	7. Delineation	75%	100%	75%	92%	77%	91%	81%
	8. Characteristics	4%	0%	5%	0%	5%	0%	3%
	9. Detail	97%	8%	70%	90%	69%	93%	76%
	10. Frequency	57%	86%	57%	79%	58%	79%	64%
	11. Time perspective	35%	19%	0%	100%	7%	93%	31%
Methodological criteria	12. Representativeness	64%	94%	96%	15%	98%	0%	71%
	13. Validity	97%	0%	71%	83%	68%	93%	75%
	14. Reliability	20%	8%	0%	56%	4%	53%	18%
	15. Sensitive to mistakes (less)	35%	8%	0%	92%	4%	93%	29%
	16. Costs (less)	65%	100%	100%	15%	99%	7%	73%
	17. Response burden (less)	14%	0%	0%	33%	0%	37%	10%
	18. Timeliness	31%	3%	0%	79%	1%	86%	25%
All assessment criteria (1-18)		48%	34%	41%	52%	42%	52%	45%
Number of criteria with ≥ 90% score		3	4	3	4	3	6	0
Number of criteria with ≥ 10%-point compared to average (last column)		0	2	0	4	0	4	-
Number of criteria with ≤ 10%-point compared to average (last column)		0	9	4	5	4	5	-

Source: JVS-E-I. Red: ≤10 percent point lower compared to average (last column). Blue: ≥ 10 percent point higher compared to average.

The quantitative analysis of the characteristics of measuring instruments per criterion has resulted in the following observations from table 3.4:

1. Most of the 154 instruments meet the following criteria: recruitment domain (83%), delineation (81%), active recruitment (76%), detail (76%), validity (75%), less cost (73%), representativeness (71%), status (64%) and frequency (64%).
2. The 154 instruments do not meet the other assessment criteria or do so only marginally: contract available (0%), characteristics (3%), less response burden (10%), occupancy job (13%), work available (13%), reliability (18%), timeliness (25%), less sensitive to human mistakes (29%) and time perspective (31%).
3. Measurements via job finders score negatively on nine of the 18 criteria, whilst measurements via companies do not measure negatively on a single criterion. Measuring via job finders results in the highest score for status (89%).
4. Registers have higher scores when compared with surveys, with regard to detail, frequency and time perspective and lower scores with regard to representativeness and cost, where surveys clearly score better.
5. Measurements with NSOs and research institutes as source only have a positive score where it concerns measuring active recruitment, representativeness and costs. Measuring job vacancies through labour market intermediaries scores positively on ten criteria.

3.7 Quantitative analysis of the measuring instruments per method (step 6)

Analysis per group of criteria

In the following quantitative analysis I have studied the scores per criterion per measuring method, i.e. for the eight combinations of type of respondent, type of data gathered and type of source. This section addresses the question of to what extent the different scores between surveys and registers may be explained by the composition, i.e. the differences in type of respondent and type of source and vice versa. Ambiguity is always involved in assigning the advantages and disadvantages of measuring instruments to either the type of respondent, or the type of data collection or the type of source. For instance, measurements through intermediaries score high, because these mostly involve registers. That is why an analysis was done of the eight methods that form a combination of these three elements. The result is shown in table 3.5.

Table 3.5 Quality score: the share of measuring instruments with a positive score per group of criteria, per type of measuring method (n=154)

Quality score (%)	I. Company survey NSO and research institutes (n=76)	II. Company survey intermediaries (n=1)	III. Company register NSO and research institutes (n=1)	IV. Company register intermediaries (n=40)	V. Job finder survey NSO and research institutes (n=27)	VI. Job finder survey intermediaries (n=2)	VII. Job finder register NSO and research institutes (n=7)	VIII. Job finder register intermediaries (n=0)	All instruments (n=154)
Content criteria (6)	50%	50%	33%	35%	33%	50%	17%	-	41%
Data criteria (5)	43%	0%	20%	76%	40%	20%	60%	-	51%
Operational definition (11)	47%	27%	27%	53%	36%	36%	36%	-	46%
Methodological criteria (7)	42%	14%	29%	56%	29%	14%	43%	-	43%
All assessment criteria (18)	45%	22%	28%	54%	33%	28%	39%	-	45%

Source: JVS-E-I. Red: ≤10 percent point lower compared to average (last column). Blue: ≥ 10 percent point higher compared to average.

The quantitative analysis of measuring methods per group of criteria has led to the following results (table 3.5):

1. When looking at each method, company registers of intermediaries (type IV) has the highest overall score with 54 percent of the assessment criteria, but still less than 10 percent points above the total quality score. For this type of measuring instrument the high scores for data criteria and the methodological criteria are balanced by a lower score for content criteria. The company survey of NSOs and research institutes (type I) is most common (76 of 154) and has no abnormal scores for each group of criteria. The job finder register of NSOs and research institutes (type VII) does not score significantly below the overall norm, but it does score low for operational definition (36%) and especially for content criteria (17%). The other types of methods clearly score less than these three types.
2. With regard to the measurement of job vacancies according to the operational definition, no one method stands out positively. None of the methods has a score that is more than 10 percent point higher than the average. On the basis of the low scores, types II, III, VI and VII should be assessed as being less suited to measuring job vacancies according to the operational definition.
3. Not one of the measuring methods clearly fits all the content criteria. None of the methods has a score of more than 10 percent points higher than average. With a score of 17 percent, a job finder register of NSOs and research institutes (type VII) scores low on content criteria.
4. With a score of 76 percent, the company register of intermediaries (type IV) is clearly within the requirements of the data criteria.
5. With a score of 56 percent, the company register of intermediaries (type IV) scores higher than average for methodological criteria (43%).

Analysis per separate criterion

To get a more detailed overview per type of measuring method, I have analysed the quality scores for each of the 18 criteria separately (table 3.6). The point system described above has been used for this, where a positive score for a criterion counts as a plus point and a negative score counts as a minus (Section 3.5).

Table 3.6 Quality score: the share of measuring instruments with a positive score per criterion, per type of measuring method (n=154)

Quality score (%)		I. Company survey NSO and research institutes (n=76)	II. Company survey inter-mediarities (n=1)	III. Company register NSO and research institutes (n=1)	IV. Company register intermediaries (n=40)	V. Job finder survey NSO and research institutes (n=27)	VI. Job finder survey inter-mediarities (n=2)	VII. Job finder register NSO and research institutes (n=7)	VIII. Job finder register intermediaries (n=0)	All instruments (n=154)
Content criteria	1. Recruitment domain	100%	100%	100%	43%	100%	100%	57%	-	83%
	2. Search activity	97%	100%	0%	100%	0%	100%	0%	-	76%
	3. Occupancy job	26%	0%	0%	0%	0%	0%	0%	-	13%
	4. Work available	26%	0%	0%	0%	0%	0%	0%	-	13%
	5. Contract available	0%	0%	0%	0%	0%	0%	0%	-	0%
	6. Status	49%	100%	100%	68%	100%	100%	43%	-	64%
Data criteria	7. Delineation	67%	0%	0%	93%	100%	100%	100%	-	81%
	8. Characteristics	7%	0%	0%	0%	0%	0%	0%	-	3%
	9. Detail	97%	0%	0%	100%	0%	0%	43%	-	76%
	10. Frequency	43%	0%	0%	85%	100%	0%	57%	-	64%
	11. Time perspective	0%	0%	100%	100%	0%	0%	100%	-	31%
Methodological criteria	12. Representativeness	99%	0%	0%	0%	100%	0%	100%	-	71%
	13. Validity	99%	0%	0%	100%	0%	0%	0%	-	75%
	14. Reliability	0%	0%	100%	58%	0%	0%	43%	-	18%
	15. Sensitive to mistakes	0%	0%	100%	100%	0%	0%	43%	-	29%
	16. Costs	100%	100%	0%	0%	100%	100%	100%	-	73%
	17. Response burden	0%	0%	0%	40%	0%	0%	0%	-	10%
	18. Timeliness	0%	0%	0%	93%	0%	0%	14%	-	25%
All criteria (1-18)		45%	22%	28%	54%	33%	28%	39%	-	45%
Number of criteria with ≥ 90% score		6	4	5	7	6	5	4	-	0
Number of criteria with ≥ 10%-point compared to average (last column)		2	0	0	3	0	0	2	-	-
Number of criteria with ≤ 10%-point compared to average (last column)		8	12	11	5	10	11	10	-	-

Source: JVS-E-I. Red: ≤10 percent point lower compared to average (last column). Blue: ≥ 10 percent point higher compared to average.

The quantitative analysis of the measuring methods per criterion has led to the following results as shown in table 3.6:

1. The company register of intermediaries (type IV) has the highest number of plus points (10) and the lowest number of minus points (5). The minus points are for three content criteria and for the criteria representativeness and costs.
2. The company survey of NSOs and research institutes (type I) has eight minus points, which is relatively low. The weak points of this type of measuring instrument are status, delineation, frequency, reliability and sensitivity to human mistakes, response burden and timeliness. All the other instruments have received at least ten minus points.

3. Occupancy of the job and work available are important content criteria. For existing measuring methods these variables can only be found for some company surveys of NSOs and research institutes (type I).

3.8 Qualitative analysis of the measuring methods (step 7)

Research objective

The goal of the qualitative analysis of the measuring methods is to have a more in-depth look at the results of the quantitative analysis. The standardisation in the assessment framework has been delineated and is therefore restricted in some areas. Additional qualitative information was gathered per criterion, through desk research (JVS) and expert-to-expert talks (JVE). All the relevant information that I was able to find in my JVS database that concerns the assessment of the measuring instruments has been compared with the results of the quantitative analysis. I referred constantly to the quality score (tables 3.3 and 3.4).

Type of respondents: companies (48%) and job finders (34%)

Type of respondents and content criteria (companies 44% and job finders 31%):

- Status: in general, companies are better informed about the origin and termination of job vacancies. Companies are in a position to provide information on the creation of job vacancies (inflow), filled and withdrawn job vacancies (outflow), as well as on existing open job vacancies (stock). This is an important advantage when using a company as a respondent (JVE). It is therefore striking that measurements through job finders provide an insight into flow figures more often than measurements through companies (89% versus 56%). However, this may be explained by the fact that the company surveys in JVS-E-I are mostly limited to the measurement of open job vacancies, such as the national *Job Vacancy Studies* that follow the Eurostat definition. Studies based on job finders as respondents can present a picture of hires (outflow), but not of the stock and inflow of job vacancies (JVE).

Type of respondents and data criteria (companies 53% and job finders 43%):

- Time perspective: job finders can only present a picture of the past, i.e. found jobs (JVE). An advantage from measurements via companies is that both current and future job vacancies can be asked for. Forecasts of companies giving the number of job vacancies for the month to come turn out to be accurate (Ferber and Ford, 1966; Meyers and Creamer, 1967; Hoffmann, 1992).

Type of respondents and methodological criteria (companies 47% and job finders 31%):

- Validity: data collection via companies may present a valid picture of the number of job vacancies if the explanation accompanying the data collection is up to standard (Ferber and Ford, 1966; Meyers, 1965a; 1965b; 1966; Meyers and Creamer, 1967; Joint Economic Committee in the US, 1966). However, a basic problem is that companies do not have a job vacancy register and that companies do not record the activities they undertake to recruit (Baldi, et al, 2008).
- Validity: a disadvantage of measurements through companies is that companies may underestimate or overestimate their real demand for employees. In a tight labour market the employer may underestimate its own chances, meaning that fewer job vacancies are reported. On the other hand, the number of job vacancies may be overestimated in order to improve the chance of success. Companies sometimes recruit to build a stock of applicants by reporting fictitious or so called ghost vacancies. Qualitative research has shown that conscious underestimations or overestimations do not occur very often (Meyers and Creamer, 1967). Comparison of sequential prospective job vacancy studies in the Netherlands leads me to the conclusion that underestimation of the number of job vacancies occurs more often than overestimation (CWI, 2006b; 2007; 2008; UWV WERKbedrijf 2009; 2010a; 2011).

- **Validity:** a validity problem can occur when measuring job vacancies in very large companies. In very large companies there may be not a single person who has a picture of the overall situation. In smaller companies the director has an overview in most cases, whereas in larger companies this will be the personnel manager. Main offices of companies do not always have an overview of the job vacancies at the subsidiary offices (Anghel, 2008; Baldi, et al, 2008). In these cases the information will have to be gathered through a central approach. In the United Kingdom, the power to decide to hire staff resides mostly at the level of the branch office (88%), against twelve percent for the central level – eight percent primarily at central level and four percent only at central level (UKCES, 2011). The preferred method for job vacancy data collection, however, is to obtain a separate picture for each office, the main office being seen as a separate entity (Palm, 1966; CWI, 2006b).
- **Validity:** studies of job finders in general are not suitable for measurements according to the definition of unmet demand, because job finders cannot give adequate information that matches the operational definition of job vacancies (JVE).
- **Cost:** based on my own research (JVS) I consider the costs of job vacancy measurement to be primarily dependent of the type of data-collection: survey or register (table 3.2). However, the type of respondent can play a role. At an equal net sample size a company has a better overview of job vacancies than a job finder of hires. Job finders can only provide information on a single or a few job matches, whereas companies are in a position to give an insight into all job vacancies with a company. Data collection from individuals requires larger quantities of data, also because the number of individuals in a country is always much larger than the number of companies. Therefore, the research costs per job vacancy are higher with job finders than with companies.

Type of data-collection: surveys (41%) and registers (52%)

Type of data-collection and content criteria (surveys 45% and registers 32%):

- In general, (company) surveys offer better possibilities to control definitions and measurement of job vacancies than do registers (Hoffmann, 2000; Depickere, 2008). My own analysis has shown a higher quality score for registers and a lower score for surveys (table 3.3). Registers score better than surveys with regard to the data criteria (72% and 41%) and the methodological criteria (53% and 38%). As far as the content criteria are concerned, surveys score marginally higher (45% and 32%).
- **Occupancy of the job:** job vacancies for occupied and unoccupied positions — one of the most important characteristics according to the definition of unmet demand — cannot be measured with surveys in a satisfactory manner. Unmet demand is not measured through national registers for social security or registers at the public employment services. According to Hoffmann (1992, 1999) a survey of companies is the only method that will lead to a measurement of the concept of job vacancy in the unmet demand tradition. The experience, however, is that unmet demand is difficult to measure using a questionnaire, and especially the difference between job vacancies for occupied and unoccupied jobs (Anghel, 2008). This is also my personal criticism, based on my own job vacancy studies (JVS).

Type of data-collection and data criteria (surveys 41% and registers 72%):

- **Delineation:** in surveys the delineation of the population can be a problem caused by inadequate sample frames. If no adequate register of companies or job finders exists as a sample frame, then a good survey is not possible. Sampling frames used for surveys covering the entire population of companies are not always available (Gordon Committee, 1962; Palm, 1966; Myers and Creamer, 1967; Konstant and Wingard, 1968; CWI, 2006b; Baldi, et al, 2008). Registers of Chambers of Commerce are often useful, but not all countries have Chambers of Commerce (Boom, et al, 2008). Also, the quality of the register is sometimes below standard. The data files are not always up to date, which may be due to insufficient administrative discipline and limited budgets. Specific problems for job vacancy measurement vis-à-vis the sample frames are the following:

- Company registers sometimes concentrate on the main offices and not the subsidiary offices. It is sometimes a combination and sometimes it is diffuse (JVE).
- Small companies are often hidden from view (Gorant and Ulrich, 2009).
- Specific sectors have not always been registered very well, e.g. agriculture. For the agricultural and government sectors sometimes separate sampling frames are needed (*Job Vacancy Statistics Spain*, 2008, CWI, 2006b)
- Membership lists of branch and professional organisations can be used as sample frames, but are not always available. A weak point is that these frames do not generally cover the entire branch or professional group (JVE).
- Information on job vacancies can be obtained through a survey of temporary work agencies. However, collecting information at the various (branch offices of) temporary work agencies is difficult, as was seen in Italy (Fivizzani and Sorrentino, 2009). The *Current Population Survey* in the US is a comparable source to also present a picture of temporary agency workers (Estevao and Lach, 1999).
- I did not come across studies giving a picture of job vacancies in households. Hoffmann (1992) has pointed at the importance of representation of households as employers. A study by Heyma (2006) among statistical bureaus in Europe showed that job vacancies at households exist, but only few.
- In sample frames the meaning of companies with zero to one employee is mostly unclear. These may be empty companies or self-employed workers without personnel. In most job vacancy surveys these categories are omitted (JVE, JVS).
- The use of different sampling frames for population estimations may lead to large differences in the results of job vacancy estimations for an assumed population (CWI, 2006b).
- A distinct disadvantage of the use of a sampling frame of companies at a specific moment in time is that the underlying dynamics of companies remain invisible. A disadvantage of the use of a stock sample frame is that it does not include all companies that were present during the research period. Job vacancies may have been created at companies that disappeared during the research period, for instance because of bankruptcy (JVE).
- Characteristics: in general surveys offer better possibilities for controlling breakdowns than do registers (Depickere, 2008). Relevant labour market characteristics such as occupation and education are generally present in job vacancy registers at public employment services. But data records for social security, for instance, do not always allow the extraction of data that is relevant to the labour market, such as occupation and education (JVE, JVS).
- Detail: the level of detail in registers is superior to the level of detail in surveys. Job vacancy data from public employment services is highly detailed. However, if the samples of surveys taken are of sufficient size it is also possible to achieve detailed breakdowns, with the *Labour Force Survey* for example. To a certain extent, a questionnaire may also be used to collect information on individual job vacancies. This is achieved by first asking for the total number of job vacancies, followed by the distribution according to specific categories, for example, profession. Additional questions selected by a randomiser may be used to further focus on specific job vacancies or hired persons. This approach is made easier by CATI (Computer Assisted Telephonic Interviewing) or an online questionnaire that includes a randomiser (CWI, 2006b).
- Time perspective: I did not find retrospective or prospective information in registers. Surveys do include this. However, measurements through surveys carry the significant risk of suffering from memory effects (JVE). On the other hand, retrospective measurement offers more clarity about the question of whether there was a real job vacancy, since filled and cancelled job vacancies can only be measured afterwards (Dow and Dicks-Mireaux, 1958). In surveys, prospective measurements do involve uncertainties about the future course and the future status of a job vacancy. The original literature shows that companies are generally able to look ahead for between one and three months how the demand for labour will develop during that period (Ferber and Ford, 1966; Myers and Creamer, 1967). Nevertheless, recent studies show that a future perspective of six months is also possible (UWV WERKbedrijf, 2012).

Type of data-collection and methodological criteria (surveys 38% and registers 53%):

- Representativeness: registers of labour market intermediaries do not provide a complete and representative picture of all companies or job finders in a country. Only specific national registers sometimes provide a representative picture of companies and job finders, such as national records of taxes and social security contributions. Pension records have drawbacks if not all employees have pensions (JVE).
- Validity: a survey will have to take into account that many of the companies that will be approached did and do not have job vacancies, nor will they have them in a specific period of time (Gonzalez, 1968; CWI, 2006b; Brnot, 2009; Dares, 2010). This issue cannot be solved during the sampling itself, meaning that selection questions will have to be included in the questionnaire and the weighting of the sampling results. Unfortunately, in most job vacancy studies it remains unclear whether this issue has been taken into account (JVS).
- Validity: online data collection does not necessarily lead to the desired results, which is due to a very low and selective response rate (CWI, 2006b). However, a combined approach of data collection by telephone and online data collection did lead to satisfying results (Donker van Heel and De Wit, 2012).
- Reliability: job vacancy statistics based on registers have no statistical margins. In surveys, the ranges of estimates of numbers of job vacancies are generally large. The margins are even larger with breakdowns. In Finland, with a sample size of net 2,500 respondents (companies), the margin of the estimation of the total number of open job vacancies is 5.5 percent, so for the total number of job vacancies of 80,000, there is a margin of plus or minus 4,400. If the totals are differentiated further —e.g. according to sector — the margins sometimes increase more than 25 percent per sector (Martikainen, 2008).
- Sensitive to human mistakes: Registers carry the risk that the researcher interprets the meaning of the information incorrectly, because this researcher has not been involved in the formulation of the definition and data collection. The registration process is also sensitive to human mistakes during the observation, checking and correction of the data (Bakker, 2009 and 2012). It is evident that there is a risk of coding and entering mistakes during the registration process (JVE). The results of job vacancy surveys are sensitive to the decisions taken during the process as well as to the way in which the survey is conducted. Each part of the process is highly sensitive to human mistakes (Barker, 1983; Brnot, 2011). The decisions taken during subsequent measurements will have to be consistent, meaning that there must be protocols to ensure this. The interviewer may cause specific measuring mistakes to occur, e.g. by asking suggestive questions (Bakker 2009). The analysis can also incur human error. Checks on the internal consistency of the answers are crucial. There has to be a protocol indicating when cases and answers are to be included or removed. Without a robust protocol chances are that outliers will be processed differently in a subsequent measurement, especially if the analysis is done by different persons. The outcome appears to be highly sensitive to outliers and missing values (Martikainen, 2008). Expert researchers agree that a job vacancy survey and especially the analysis involved by a single person include the risk of analytical mistakes, and that these analytical mistakes may have a large impact in the ultimate result (JVE).
- Cost: the costs of an analysis of registers are relatively high compared to a survey, provided that the investment costs and operational costs of the job vacancy register system are included into the equation (mostly hidden costs). On the other hand, the use of registers of legally obligatory information has the advantage that it requires no additional effort from companies or individuals, meaning that the cost for society remains limited (Depickere, 2008). Sampling among companies almost invariably includes stratification, which helps to manage cost (Myers and Creamer, 1967; Gonzalez, 1968; Frumermann, 1979). The cost is then mainly determined by the method of data collection. The highest cost per interview is personal data collection, followed by telephonic, written and online data collection (based on hundreds of calculations I did myself and JVE).
- Response burden: the response burden of a survey can be much higher for a respondent compared to that from a register. The many questions and explanations in a survey mean the length of the questionnaire may vary strongly. The maximum effort that can be expected from a company is approximately sixty minutes for a personal interview, twelve minutes for a written or online questionnaire and twelve minutes for an interview by telephone (based on several job vacancy projects I did myself and JVE). A survey has limits because of the

risk of survey fatigue. Heyma (2006) proposes to perform a maximum of one survey per company per quarter for a limited number of questions.

- Timeliness: the information contained in registers at labour market intermediaries such as public employment services is more up to date compared to surveys. However, the information from national registers sometimes includes a larger time lag than information from surveys. These databases are sometimes complicated and very large (JVE).

Type of source: NSO/research institutes (42%) and labour market intermediaries (52%)

The various sources are presented separately: public employment services, advertisements, online recruitment services and temporary work agencies.

Public employment services as a source:

- Status: registers of public employment services provide an insight into the status of job vacancy, stocks and flows, statistically allowing a closed flow equation. A public employment service is a closed system in which the job vacancies — after an employer has reported them — are entered administratively (inflow), processed and, after some time transferred administratively (outflow). These administrative systems and the connecting management information systems could only be programmed on the basis of job vacancy flows (Gottenbos and Donker van Heel, 1986; Hoffmann, 2000).
- Representativeness: according to Myers and Creamer (1967) job vacancy information of public employment services is not a good alternative for a company survey, because registers of, for example, advertisements and public employment services only provide a selective picture of the total job vacancy market. Not only the numbers are much smaller, the developments according to profession also present a completely different picture. The limited market coverage of public employment services has been mentioned by other authors (Hoffmann, 1996, 2000; Heyma, 2006). As a public organisation aiming to get the unemployed to work, public employment services have a special position. This has an influence on the registered demand. Due to the supply offered by public employment services and the preferences of companies the public employment services only have a specific coverage of job vacancies, which generally are job vacancies for individuals with a relatively low level of education (CWI, 2006b). This issue will be elaborated on in section 5.5.
- Validity: the quality of the job vacancy data at public employment services is a problem in itself. Various studies have shown that the job vacancy databases can be 'polluted' (De Koning et al, 1995¹³; Hoffmann, 1992, 2000; Farm, 2000). The status of the job vacancies included in the register does not conform to reality. For instance, job vacancies that are registered as open have actually already been filled.
- Validity: differences in administrative procedures of job vacancy registers exist. Public employment services each have their own way to determine whether a job vacancy was filled or not through their mediation. In several countries the closure of job vacancies is a standard administrative activity, without it being known whether the job vacancy has been filled or not (Shelton and Neef, 1966). This is confirmed by experts (JVE). Some dedicated studies have shown that the individual employees of the public employment services in the Netherlands do not always follow the procedures in the same manner and that sometimes even a single employee will use different manners to follow the same procedure (Derksen and Donker van Heel, 1992; De Koning et al, 1995). A policy discontinuity can also create quality problems (Hoffmann, 1997; Heyma, 2006). As a result it is not always clear which job vacancies have been included in the register and which have not. Because of the differences in administrative procedures the comparability of the job vacancy information of public employment services is problematic (Christine, 1999). For this reason caution is advised when comparing the data from public employment services in and between countries (JVE).
- Validity: not many public employment services are able to supply information on hires (Hoffmann, 2000; De Koning, et al, 1995). The registers of public employment services do not always show whether unemployed people have found a job, or whether any job was found through a registered job vacancy. Job finders are not

¹³ Although the study by De Koning et al. (1995) is not very recent, it is an important one. It is unique of its kind. I have never again come across such a thorough research, in which even the computer programs for job vacancy registration by public employment services were investigated.

always registered in an adequate manner according to experts. Therefore, the registers of job finders at the public employment services are less suitable as a source for the measurement of hires (JVE).

Advertisements in written media as a source¹⁴:

- Representativeness: job vacancy advertisements in the written media have a limited market coverage and market share, which is a major disadvantage when using this information for job vacancy analysis. A weakness of this method is that it is not clear to what extent newspapers provide a total picture of all job vacancy advertisements. At the same time, these advertisements are mainly used by the government and the business services industry to find more highly educated personnel. Also, the focus is on administrative personnel, not production personnel (Boschan, 1966; Palm, 1968; Hoffmann, 1992; CWI, 2006b). If the database is limited to the larger national newspapers this will also lead to selectivity, because these tend to focus on the more expensive advertisements for job vacancies in the higher salary segments. For a broader and more representative picture it is best to also use job vacancy advertisements in local newspapers and house-to-house papers. Local newspapers feature different job vacancy advertisements than national newspapers (Donker van Heel and Dekker, 1989).
- Representativeness: a complicating factor is that any inclusion or exclusion of newspapers has a direct effect on the results. The *Help Wanted Advertisement Index (HWAI)* of the Conference Board, for instance, in the early period started on the basis of twenty-five to thirty newspapers, which became a hundred at a later stage (Zagorsky, 1997). Per 2012 the HWAI uses fifty-one (website HWAI). My conclusion is that this not only influences the number of job vacancy advertisements measured, but also the internal composition. Not comparing the same newspapers during the entire measuring period means that it remains unclear to what extent possible changes of the index may be due to changes in the job vacancy market or to changes in the measuring tool.
- Validity: job vacancy information from advertisements is influenced by double counting of job vacancies. It is possible to correct for double counting, but this is not easy (Gottenbos et al, 1989; Burdett and Cunningham, 1998). Removing the double counts in the advertisements from the *HWAI* shows that two-thirds are removed on a weekly basis. Other corrections when processing the data are related to seasonal influences and the influence of Sunday newspapers (Zagorsky, 1997).
- Cost: if the advertisements have to be screened, coded and entered this will lead to relatively high costs (Donker van Heel and Dekker, 1989a). Presently, however, it is also possible for publishers to deliver the coded information directly. This information is ready for analysis and also much more cost-effective.

Online recruitment services as a source:

Job vacancy information of online recruitment services is not suitable for statistical purposes yet. The job vacancy data from online recruitment services at this stage is mainly suitable for the recruitment of personnel, for which they were designed in the first place, and not for statistical purposes and especially not for time series. This conclusion is clarified below:

- Representativeness: the market coverage and market share of online recruitment services are limited and selective, causing a serious problem of representativeness. In general, companies in agriculture, the industry and construction make less use of this method. As a result, the job vacancies for work at the lower level of education (production work) are less present in online job vacancy banks (Section 5.5). Therefore, my conclusion is that job vacancies in online job vacancy sites are not a true reflection of the total job vacancy market.
- Representativeness: the online advertisement has a growing market share (Section 5.5), but it is unclear what the coverage of the specific instrument is compared to all job vacancies published online. According to the information on the website of the Conference Board in the US the ambition of *Help Wanted Online*

¹⁴ The literature about this method may seem outdated. The most recent study is presented by Zagorsky (1997). More recent literature I have not encountered, probably because it concerns a relatively outdated method. The job ad has made way for the online advertising (see 5.5). I consider the literature important because the job vacancy ad is the forerunner of the online recruitment.

(HWOL) of 100 percent coverage was achieved per January 2012. In many cases the statistics made on the basis of job vacancy advertisements on the internet underestimate the total advertisement market, because not all sites are included. The market share of the *Monsterboard Employment Index (MEI)* is not known and is not publicly available (Section 4.3).

- Validity: the status of job vacancies of online recruitment services is unclear. It is not always known to what extent the job vacancy is actually still open. The real starting and ending dates of online job vacancies are mostly unknown. Even the date of publication in the source involved is sometimes unknown. The inflow date is mostly the date of registration. The outflow date is mostly set automatically, meaning that this is not a good indicator of the true termination date of the job vacancy. In many cases the job vacancy will be removed from the databank after a set period of time, meaning that the number of open job vacancies is sometimes overestimated and sometimes underestimated. This means that it is not possible to achieve a sound estimation of the real status of job vacancies on the basis of the data of online recruitment services (JVE).
- Validity: one of the specific validity problems of using information from online recruitment agencies and job ads is the risk of double counting (Donker van Heel and Dekker, 1989; GfK Austria, 2009; Mair, 2010; Adecco, 2011; Monsterboard, 2011; Randstad, 2011; Textkernel, 2012). The double count problem is much larger with online recruitment services than in the written media. Job vacancy figures based on sites might produce an overestimation, because the removal of double counts is most probably not complete. This problem occurs because of parallel and serial placement of advertisements by companies. Parallel placement is publishing the same job vacancy in different media, whereas serial placement is placing the job vacancy in the same medium at various moments. The validity of results is unverifiable without insight into the degree to which double counts have been removed. An additional problem is the unwillingness of (commercial) providers to give an insight into both the degree of double count removal and coverage, including the methodology. As long as this is the case, I think it is not possible to trace whether growth has to be attributed to a real increase in the number of online job vacancies or to new job vacancy websites and job boards being included. A tool to achieve deduplication has been recently developed by a Dutch company, the tool called *Job Feed* (Textkernel, 2012).
- Validity: the so-called ghost job vacancies on the Internet cause a specific validity problem. These are job vacancies that are permanently there. Companies use this method to recruit for a stock of applicants. This way companies and temporary work agencies build a reserve of suitable CVs. From the point of view of mediation this is problematic, because there will not be a real job vacancy once a candidate comes forward. From the point of view of statistics the problem is less important if job vacancies with extremely long job vacancy duration are simply removed. Ghost job vacancies also occur in other recruitment channels, but may be more present in online job boards, because this method does not bring many costs for the employer. It does not require much work for an employer and has a large coverage (JVE).

Temporary work agencies as a source:

Unfortunately, information about job vacancies of temporary work agencies and assignments as an indicator for job vacancies filled is lacking in almost all countries in Europe. This is unfortunate, because the temporary work agencies are a very important source for job vacancy research, if only because the developments in temporary work are an important 'early indicator' of developments in the economy and the labour market (Canoy et al, 2009).

- Representativeness: the confined market share and the selective population of temporary work agencies limit the possibilities of job vacancy information for statistical purposes (JVE).
- Reliability: based on 41 of my own studies on temporary agency work, my conclusion is that the quality and reliability of registration data of temporary work agencies is generally very high (JVS). Temporary work agencies accurately register the assignments carried out for hiring parties because these intermediaries operate on a commercial basis. The registration is founded on the current contracts with hiring parties (companies). Due to the accurate registrations of these assignments temporary work agencies can say exactly how many job vacancies have been filled and also to what extent these job vacancies were filled by individuals who at that moment did not have a (permanent) contract at the temporary work agencies. In this

respect there can be no double counts between temporary work agencies. This means the temporary work agencies can indicate exactly how many individuals have been assigned, which is a good indicator of the number of hires of temporary work agencies. Unfortunately, almost no information of job vacancies and assignments of temporary work agencies is published.

3.9 Conclusion (step 8)

None of the existing methods to measure job vacancies meets the relevant criteria to a sufficient degree. Of the 154 measuring instruments not one has a positive score of more than 10 out of the 18 criteria. The quality score is 45 percent, the share of all the positive scores of all the measuring instruments for all 18 criteria together. The results clearly show that there is room for improvement with regard to the measuring instruments. Weak points in all instruments are the measurement whether the job is occupied or unoccupied, to what extent work is available, whether a contract is available, characteristics, time perspective, reliability, sensitivity to human mistakes, response burden and timeliness. The following table shows a summary of the results of the analyses.

Table 3.7 Summary of results

Assessment	Relatively high scores on assessment criteria	Relatively low scores on assessment criteria
a. quantitative analysis 154 measuring instruments	registers public employment services	Labour Force Survey (Eurostat)
	Job Vacancy Statistics (Eurostat)	sector job vacancy studies
	online recruitment services (Monsterboard, Randstad)	Manpower Talent Shortage Survey
b. quantitative analyses of three characteristics of measuring methods (criteria aggregated)	registers (data criteria, methodological criteria)	job finders
	intermediaries (data criteria, methodological criteria)	surveys (data criteria)
c. quantitative analysis of three characteristics of measuring methods (18 criteria)	all instruments: recruitment domain, delineation, active recruitment, detail, validity, costs, representativeness, status, frequency	all instruments: contract available, characteristics, response burden, occupancy job, work available, reliability, timeliness, sensitive to human mistakes, time perspective
	companies	job finders
d. quantitative analyses eight types of measuring methods (criteria aggregated)	company register intermediaries (data criteria and methodological criteria)	job finders survey NSOs and research institutes
	company survey NSOs and research institutes	
e. quantitative analyses eight types of measuring methods (18 criteria)	company register intermediaries	
	company survey NSOs and research institutes	
f. qualitative analysis	companies: occupancy job, status, time perspective, costs	companies: validity
	survey: occupancy job, characteristics, detail, time perspective, less sensitive mistakes, less response burden	job finders: validity
	register: characteristics, reliability, less costs	survey: delineation, validity, reliability
	intermediaries: status, frequency and reliability	register: representativeness, sensitive to human mistakes, timeliness intermediaries: status, delineation, representativeness, validity, reliability, costs

Source: JVS-E-I.

The analysis of three characteristics of measuring methods shows that measurements via companies are more suitable than measurements via job finders, measurements via registers are more suitable than measurements via surveys and measurements via intermediaries are more suitable than measurements via NSOs and research institutes. In drawing conclusions about the value of registers for job vacancy measurements it must be taken into account that registers may be partly based on information obtained through surveys (Bakker, 2009). In these cases, advantages and disadvantages of both types of data-collection can either reinforce each other or not. In my analysis I made a sharp distinction between both forms of data-collection to make advantages and disadvantages more visible.

By combining these three characteristics, eight types of measuring methods evolve. A company register by intermediaries is the best instrument on the basis of the total quality score (54%) and the score per individual criterion. However, as can be seen from the quantitative and qualitative analysis, this instrument also has significant negative points, especially the limited market coverage, selectivity and the limited possibilities to measure the content of the job vacancies according to the operational definition. A company survey of NSOs and research institutes is also a relatively good measuring instrument, but it also has various disadvantages. Negative points of this type of measuring instrument can be found with regard to delineation of the population, frequency, reliability, sensitivity to human mistakes, the response burden and timeliness.

3.10 Design of an optimal instrument to measure job vacancies (step 9)

Registration of significant moments in the search process on a company level

Because none of the methods meets the criteria to a sufficient degree, I have designed an alternative measuring instrument that fully meets all criteria. The optimal method to measure job vacancies is a combination of the characteristics of a register and a survey. The core will be an application to register job vacancies within companies using a fixed format. The aim of such a register would be to obtain an accurate and detailed picture of the stocks and flows of individual job vacancies within companies. Specific events during internal and external recruitment processes will be recorded by the companies themselves, including date (and time). This allows a precise determination of the starting and termination dates of job vacancies, including all relevant moments in between. Taking records must be part of the regular workflow within the company. This way, job vacancies can be measured according to any desired operational definition, including the definition of unmet demand. Central data collection at companies using such a job vacancy register — for instance using a panel — would generate the total representative picture. No examples of this practice were found, which would make it an innovative approach.

Significant moments in the search process must be registered, enabling a precise determination of the status of the job vacancy, including its starting and termination dates, thereby allowing a precise definition of job vacancy flows. In doing this, the intention is to partly build on the approach by Burdett and Cunningham (1994; 1998), who pointed out a number of clear breaks in the recruitment process. A similar approach was followed by Magvas and Spitznagel (2002) in their analysis of the recruitment process. The building of administrative automated systems relies on the use of dates (and times), as evident in the author's own work developing an automated job vacancy registration system for public employment services in the Netherlands in which open job vacancies and job vacancy flows were determined by dates. This produced data sets that allowed analyses of job vacancy flows (Gottenbos and Donker van Heel, 1986; Donker van Heel and Dekker, 1987). The beginning and ending of job vacancies can be determined by the selection of a specific combination of the criteria and the dates applying to the events in the recruitment process.

In the typical recruitment process followed by an employer, the following dates are relevant to determine the start of a job vacancy:

1. Date on which an internal decision by the company was made confirming that an employment contract is available for an external new employee. From this date an employment contract is potentially available for a jobseeker (decision date).
2. The date on which the contract can be signed at the earliest (date to sign contract). This date may shift during the recruitment and selection process.
3. The date on which the employee can report for work and can actually start working (date to start work).
4. Date of the start of the use of a specific channel for recruiting outside the company (date start active (a) recruitment or (b) recall).
5. Date on which the job is unoccupied (date start unoccupied).

Each recruitment and selection activity also has a termination date which is relevant to determine the end of a job vacancy:

1. Date of the end of active recruiting (date end active recruitment).
2. Date of application by new external employee (date application passive recruitment).
3. Date of decision to cancel the job vacancy, without filling it at all (date withdrawn).
4. Date of entering an employment contract with a new external employee (date start contract).
5. Date of the new external employee starting the work (date start work).

Job vacancy flows relate to a specific period between two dates, for example from January 1st to December 31st. The job vacancy inflow in a specific year is the number of job vacancies for which the starting date lies between or on January 1st to December 31st of a particular year (inflow date). The outflow of job vacancies is the number of job vacancies for which the date of ending lies between or on January 1st to December 31st of a calendar year (outflow date). The stock of job vacancies involves the open job vacancies at a specific date (stock date or reference date). In other words, it requires the determination of an inflow date, an outflow date and a reference date.

According to the concept of unmet demand job vacancies are by definition stock figures. In my view, however, by using the method outlined above it is possible to put the unmet demand concept in a dynamic perspective, i.e. to also generate unmet demand flow figures. This means that the duration of unmet demand is defined by defining the beginning and the end. It should be noted that within this concept the job vacancy ends when production is started, so overall, after a contract has been concluded.

Develop a computer application: Job Vacancy Onsite Registration (JVOR)

A computer programme should be developed based on the structure of the operational definition using dates. The data structure is shown in table 3.8, below. This instrument meets 16 out of the 18 relevant criteria, including a very accurate measurement of the content-related components. The cost and response burden, however, are relatively high. If these drawbacks are compensated for by generating income for the companies involved, a 100 percent score comes within reach, meaning that all 18 assessment criteria are fully met.

I propose to call this measurement instrument *Job Vacancy Onsite Registration (JVOR)*. Based on my experience with building a computer job registration programme for employment agencies, the development of JVOR is technically possible. As far as I know this instrument does not exist yet, although nothing stands in the way of its development.

The next step will be to get a representative sample of companies to start using JVOR. Distributing the programme amongst companies requires a specific marketing approach, which goes beyond this dissertation.

Table 3.8 Structure of Job Vacancy Onsite Registration (JVOR)

INPUT		type of data
definition job vacancies (unmet demand/job matching/other)		coding (default)
characteristics	company activities	coding (default)
	single/multiple job vacancy	boolean
	multiple job vacancy	numeric
	occupation	coding
	education	coding
start job vacancy	1. decision date	date
	2. date to sign contract	date
	3. date to start work	date
	4a. data start active recruitment	date
	4b. date start recall	date
	5. date unoccupied	date
end job vacancy	6. date end recruitment	date
	7. date application passive recruitment	date
	8. date withdrawn	date
	9. date start contract	date
	10. date start work	date
recruitment	difficult to fill	boolean
	recruitment channels	coding
	hiring channel	coding
OUTPUT		Type of data
standards	stock job vacancies	date
	inflow job vacancies	period
	outflow job vacancies	period
	job vacancies filled	period
	withdrawn job vacancies	period
	number difficult to fill	period
	job vacancy duration complete	period
	job vacancy duration uncomplete	period
Ratios/rates	share of job vacancies filled	period
	share of withdrawn job vacancies	period
	stock-flow ratio	period
	success rate recruitment channels	period
breakdowns	sector	all standards and ratio's
	occupation	all standards and ratio's
	education	all standards and ratio's
	recruitment channel	all standards and ratio's
	hiring channel	all standards and ratio's

Source: Donker van Heel.

4. Measuring job vacancies in Europe

4.1 Research objective

Research question

This chapter focuses on job vacancy measurement in Europe (27 EU-countries, Norway is excluded in the figures). It aims to draw a comparative picture of the total number of job vacancies in 27 European countries (stock, inflow, outflow, including filled and withdrawn job vacancies), thus showing which lacunas and opportunities for improvement remain in job vacancy data collection in Europe, and defining issues for further research. It is important to note that this study is not a substantive labour market study, but rather a study on how to improve the methodology. The leading research question is the following:

Which starting points can be found for further research, to obtain a better insight into the job vacancy market in Europe, on the basis of an analysis of job vacancy measurements in 27 European countries?

To be able to answer the main question, three sub-questions have to be answered, the third of which also has a sub-question:

1. Which instruments are available in 27 countries of Europe to measure job vacancies in a similar manner so that a comparison can be made of those countries (supranational measuring instruments)?
2. What are the results of those measurements; in other words, what is the actual number of job vacancies in Europe according to those measurements?
3. To what extent are the results of these measurements sufficient to be able to carry out analyses of the job vacancies? And what is meant by job vacancy analysis?

Research design

To be able to answer the first sub-question I have carried out an analysis on all 154 instruments in my database JVS-E-I. The first sub-question can largely be answered on the basis of the *European Vacancy Monitor* carried out by the European Commission on the job vacancy market in Europe (European Commission, 2012c). During this study, use was made of measuring instruments in 27 countries within Europe that are suited to providing an impression of the job vacancy market in Europe. I worked on this project as Team Leader and was closely involved in the detection and selection of the instruments. The instruments used are public domain, which has allowed me to include them in my own JVS-E-I database. Consequently, I assessed the instruments with the use of my own assessment framework (Section 3.4).

The study by the European Commission also plays a central role for the second sub-question. For this analysis I used my JVD database containing publicly available statistics from the *European Vacancy and Recruitment Report 2012* (European Commission, 2012c), the *European Job Mobility Bulletin* (2012a) and the *European Vacancy Monitor* Bulletins (European Commission, 2010; 2011a; 2011b; 2011c; 2012b). The data collection and the cleansing of this data were done by Ecorys Netherlands and ICON Germany, commissioned by the European Commission. The most important underlying source is Eurostat. My own analysis concentrates on the assessment of the availability of figures on stocks and flows of job vacancies, including hires, job finders and withdrawn job vacancies. Where the information that is available is incomplete, I have searched for best practices, selected from my database of empirical studies (JVS-E-I). This concerns national level instruments that are available in one country or in several countries.

Box 1. Types of job vacancy analyses (see annex 5 for an elaboration)

The 423 job vacancy studies in JVS-E include the following eight types of job vacancy analyses:

- I) Study of the size and structure of a job vacancy market (412);
- II) Study of the dynamics of the labour market (84);
- III) Study of the bottlenecks at the demand side of the labour market (141);
- IV) Study of the mismatch between demand and supply on the labour market (127);
- V) Study of the development of the economy (163);
- VI) Study of the performance of labour market intermediaries (152);
- VII) Job vacancy prognoses (9);
- VIII) Qualitative research (17).

The first type of analysis concerns the calculation of the total size and structure of a job vacancy market (412 studies). These can be studies with a national, sector, regional or local scope. An important aspect of this type of analysis is that in addition to stock figures — such as the *Job Vacancy Statistics* of Eurostat — it also analyses flow figures, i.e. job finders in the *Labour Force Survey*. Important variables to describe the structure of the job vacancy market include sector, region, size of the company employer, occupation, education, and type of contract. These basic statistics of the job vacancy totals are crucial for all other job vacancy analyses.

The second type of analysis deals with bottlenecks specifically on the demand side of the labour market, concerning hard to fill job vacancies. This type of analysis must not be confused with the study of mismatches, which includes a comparison of demand and supply (see analysis type IV). The 141 job vacancy studies dealing with demand bottlenecks include various indicators. The first approach is to ask companies to what extent specific job vacancies are hard to fill. The second approach is to use the job vacancy duration as an indicator. The third approach is the ratio between the stock and flows as an indicator for hard to fill job vacancies.

The third type is about the ratio between job vacancies and employment (84 studies). I view this as a vertical comparison, because the job vacancies (the numerator of the fraction) form a subset of employment (the denominator of the fraction). This type of analysis provides an insight into the state of employment dynamics. A higher share of job vacancies in the employment field indicates more dynamics. High mobility may indicate the presence of a relatively high number of temporary and short-term contracts or problems with recruitment.

The fourth type of analysis concerns the ratio between job vacancies and unemployment, indicating mismatches on the labour market (127 studies). I view this as a horizontal comparison, because the job vacancies and unemployment are in a sense each other's mirror image. Alternatives for unemployed are other supply groups, like job seekers, students and school leavers. A popular analysis is the comparison between the demand for labour and the supply of (coming) school leavers, looking specifically at the education and profession. Sometimes students who are working and trainees are included in the equation. This type of analysis is especially important for the planning of education and schooling capabilities.

The fifth type concerns the relation between job vacancies and economic development, the issue being to what extent job vacancy developments are indicators of the state of the economy (163 studies). These are about business cycle analysis, using job vacancy time series and in many cases explicitly addressing the relation between job vacancies and economic indicators such as economic growth (GDP growth).

The sixth type deals with the assessment of the performance of labour market intermediaries (152 studies). Two groups of indicators can be distinguished: organisational effectiveness and market effectiveness. Organisational effectiveness is about the results of job vacancy processing. The main indicators are job vacancy inflow, hires, stock of job vacancies, job vacancy filling rate, the number of cancelled job vacancies and the job vacancy duration. The market effectiveness concerns the position of intermediaries on the job vacancy market. Here, the main indicators are market penetration, market coverage and market share.

The seventh type deals with job vacancy prognoses (9 studies). These should not be confused with employment prognoses.

The eighth type consists of qualitative studies of the demand for labour (17 studies).

Source: JVS-E.

Starting from the third sub-question it was necessary to define 'relevant job vacancy analyses'. To obtain a framework for the analyses I made an inventory of different types of job vacancy analyses, based on the 423 studies of the JVS-E. The types of analysis in the empirical studies address the size and structure of the job vacancy market (412 studies), the dynamics of the labour market (84), bottlenecks on the demand side of the labour market (141), the mismatch between supply and demand on the labour market or shortages and surpluses (127), the state of the economy or the business cycle (163), the performance of labour market intermediaries on the job vacancy market (152) and job vacancy prognosis (9)¹⁵.

By carrying out a number of job vacancy analyses I have demonstrated where the information is incomplete and where opportunities to improve data collection are possible. When interpreting the information I have made use of the results of chapter 3, more specifically the assessment framework (Section 3.5), the supporting empirical studies (JVS-E) and information that I have obtained through expert-to-expert talks (JVE).

No extended time series analyses were performed, apart from the calculation of correlations. As far as most time series are concerned, I am not interested in the development over time, but in the question whether the absolute figures of the various sources differ from each other in a specific period. Time series were also used to present an image of the available information from the various countries in order to visualise the results and to show which (kinds of) job vacancy data are available.

In this chapter, sub-question 1 has been dealt with in section 4.2, sub-question 2 in section 4.3 and sub-question 3 in section 4.4. Conclusions in these sections are marked with a number in between square brackets [...]. Section 4.5 contains a further elaboration of these conclusions, thus answering the leading research question.

4.2 Selection of measurement instruments

Objective

This section concerns sub-question 1. It has an in-depth look at which instruments are available in the 27 EU countries. The source of information is my JVS-E database, which contains 423 empirical studies of the 154 measuring instruments in JVS-E-I.

National level instruments

First, I selected national level instruments from my JVS-E-I database. I defined a measurement instrument as collection of primary job vacancy data in a specific country, according to a specific method, i.e. a specific combination of the source, the respondent and the type of data collection (Section 3.1). National level measurement instruments exclude instruments with a regional, local or sector delineation. I have detected 124 unique national level measurement instruments in Europe. Together they form a representative corpus of all national level instruments in Europe per January 2012.

¹⁵ A systematic overview is presented in Box 1 and a description of these types of job vacancy analyses and 28 indicators are presented in annex 5.

Table 4.1 Number of unique instruments in Europe measuring the total number of job vacancies in a country classified by type of method (n=124)

Type of respondent	Type of data collection				Total number of instruments
	Survey		Register		
	Source type NSO, research institutes	Source type intermediaries (PES, TWA, ADV, OLR)	Source type NSO, research institutes	Source type intermediaries (PES, TWA, ADV, OLR)	
Companies	51 (41%)	0 (0%)	0 (0%)	37 (30%)	88 (71%)
Job finders	27 (22%)	2 (1%)	7 (6%)	0 (0%)	36 (29%)
Subtotal	78 (63%)	2 (1%)	7 (6%)	37 (30%)	124 (100%)
Total	80 (65%)		44 (35%)		124 (100%)

Source: JVS-E-I (selection 124 instruments).

As table 4.1 shows, most of these 124 instruments use companies as respondents (71%) and fewer use job finders (29%). Most are surveys (65%), the remainder being registers (35%). The most frequent source is the NSO or a research institute (69%). In other cases the source is an intermediary on the labour market (31%). The most common method is the company survey of NSOs and research institutes (41%) and the register of companies of intermediaries (30%).

Supranational instruments

In the following step I have determined which of the 124 instruments can be used to compare the number of job vacancies in the various countries. In total 70 of the 124 instruments at national level have a comparable methodology where there is enough coordination that the methodology can be used for comparison between those countries. This corresponds with the instruments that have been used for the *European Vacancy Monitor* (European Commission, 2012c). I have not been able to find another one. These 70 instruments can be combined to form three supranational measuring instruments with comparable results for the various countries. The first supranational instrument is the *Job Vacancy Statistics* available for 24 countries. In most countries the *Job Vacancy Statistics* is a company survey measuring the stock of job vacancies following the Eurostat definition, which is basically the definition of unmet demand. The second instrument is the *Labour Force Survey* available for 27 countries. The *Labour Force Survey* is a population survey, including job finders (the equivalent of hires). The third instrument is the register of job vacancies by public employment services available for 19 countries. The other 54 instruments in my JVS-E-I database are only available for one country or for a few countries and are not suitable for obtaining an overall impression of the number of job vacancies in Europe.

4.3 The number of job vacancies in Europe

Objective

This section discusses the question of what the results are of job vacancy measurements; in other words, the number of job vacancies in Europe according to those measurements. To be specific, I studied the extent to which the number of job vacancies can be shown in stocks and flows (both inflow and outflow) and in terms of hires (filled vacancies, job finders) and withdrawn job vacancies. The sources are my JVD database for the statistics and my JVS-E database for the empirical studies. Specific studies and countries have been explicitly named when supranational information is not available and they are the only examples that I have been able to find. Random examples have not been mentioned.

The stock of job vacancies in Europe

In the Eurostat *Job Vacancy Statistics*, a job vacancy is defined as a paid post that is newly created, unoccupied or about to become vacant. The figures are excluding the agricultural sector and including estimates of missing

parts for the public sector or small companies in some countries (table 4.2). At a specific point in time (January 2012) a continuous time series from the first quarter of 2008 until the third quarter of 2011 was available for 15 countries. Two countries use registers and not surveys (Luxembourg and Slovenia). In nine countries the unit of analysis is a local enterprise and not the corporate enterprise (Denmark, France, Finland, Germany, Spain, the Netherlands, Poland, Portugal and Sweden). Information about the public sector is not known for one or more quarters in six countries: Denmark, France, Greece, Italy, Poland and Portugal. Three countries do not collect data on small companies with less than 10 employees: France, Italy and Malta.

Table 4.2 Stock of job vacancies (Job Vacancy Statistics, 2011 Q3) and the number of job finders (Labour Force Survey, 2010), available information per January 2012

Column percentages	Job vacancies stock ultimo quarter: <i>Job Vacancy Statistics</i> 2011 Q3 (x 1,000) 22 countries	Job finders per year: <i>Labour Force Survey</i> 2010 (x 1,000)	
		22 countries	27 countries
Austria	71 (3%)	982 (3%)	982 (2%)
Belgium	46 (2%)	784 (2%)	784 (2%)
Bulgaria	15 (1%)	426 (1%)	426 (1%)
Cyprus	3 (0%)	82 (0%)	82 (0%)
Czech Republic	39 (2%)	680 (2%)	680 (2%)
Estonia	8 (0%)	157 (0%)	157 (0%)
Finland	40 (2%)	836 (3%)	836 (2%)
Germany	912 (43%)	9,165 (28%)	9,165 (21%)
Greece	15 (1%)	376 (1%)	376 (1%)
Hungary	27 (1%)	647 (2%)	647 (1%)
Latvia	3 (0%)	326 (1%)	326 (1%)
Lithuania	12 (1%)	273 (1%)	273 (1%)
Luxembourg	3 (0%)	36 (0%)	36 (0%)
Netherlands	129 (6%)	1,055 (3%)	1,055 (2%)
Poland	60 (3%)	3,041 (9%)	3,041 (7%)
Portugal	12 (1%)	786 (2%)	786 (2%)
Romania	27 (1%)	419 (1%)	419 (1%)
Slovakia	14 (1%)	293 (1%)	293 (0%)
Slovenia	7 (0%)	161 (1%)	161 (9%)
Spain	131 (6%)	5,131 (16%)	5,131 (12%)
Sweden	58 (3%)	1,687 (5%)	1,687 (4%)
United Kingdom	478 (23%)	4,896 (15%)	4,896 (11%)
Denmark	-	-	879 (2%)
France	-	-	6,796 (16%)
Ireland	-	-	331 (1%)
Italy	-	-	3,222 (7%)
Malta	-	-	24 (0%)
Total	2,110 (100%)	32,239 (100%)	43,491 (100%)

Source: JVD-EU.

At the end of the third quarter of 2011, the stock of job vacancies in 22 countries was 2.1 million, according to the *Job Vacancy Statistics* (table 4.2). This is the most recent statistic per January 2012. No comparable information about the stock of job vacancies is available for Denmark, France, Ireland, Italy and Malta. With two thirds of all job vacancies, Germany (43%) and the United Kingdom (23%) together have a dominant share of the total of all open job vacancies in 22 countries. Eighteen of the 22 countries have three percent or less of the total of open job vacancies in Europe. If the share of job finders of the five missing countries is an adequate proxy for the share of open job vacancies, we are missing 26 percent of the stock of job vacancies in Europe. The absence of statistics, especially those from France and Italy, has an impact. That said, no comparable statistics about the stock of job vacancies is available for five countries [conclusion 4.1].

Job Vacancy Statistics is limited to open job vacancies for unoccupied positions. The *Job Vacancy Statistics* of Sweden and Finland show that the difference between job vacancies for occupied and unoccupied jobs is substantial. Finland's *Job Vacancy Statistics* distinguishes 15,236 job vacancies for unoccupied jobs and an additional 19,969 for occupied jobs, meaning that this definition criterion of the *Job Vacancy Statistics* leads to a number of open job vacancies that is 57 percent lower than the number of job opportunities (figures of second quarter 2004). According to Swedish *Job Vacancy Statistics* figures, the inclusion of job vacancies for occupied positions produces a multiplier of 2.5 (Farm, 2005a). In this respect the *Job Vacancy Statistics* underestimates the number of job opportunities for job seekers, possibly by a substantial margin [conclusion 4.2].

The inflow and outflow of job vacancies in Europe

There are no statistics that can be compared at a European level for the inflow or outflow of job vacancies covering the total national job vacancy market. I found specific measurement instruments or estimations concerning the total inflow of job vacancies on the national level in only four countries (JVS-E-I). In Belgium the most recent measurement of inflow of job vacancies dates back to 2005. It is based on a representative sample of 1,500 private companies (Gevers and Peeters, 2006). In Italy each year, the Association of the Chambers of Commerce conducts an employer survey — *Excelsior* — asking for data about the expected inflow (Unioncamere). *Excelsior* is a survey of 100,000 companies that has been conducted since 1997. In Ireland the total inflow of job vacancies is estimated in a number of stages, using total employment minus employment of the public sector, care and government and not including the self-employed, together with an estimate of labour turnover based on research in other countries and the figures for labour turnover from the *Job Openings and Labor Turnover Survey* from the Bureau of Labor Statistics in the United States, plus a correction for the number of withdrawn job vacancies (Fox, 2009). In the Netherlands since 1984, an employer survey has been carried out by the public employment services (involving 7,500 companies in 2010) measuring the expected inflow of job vacancies (JVD-NL). Between 1992 and 2008, the inflow of new job vacancies has also been measured through an employer survey by Statistics Netherlands (JVD-NL). My conclusion is that almost no information exists at the European level on the inflow of job vacancies and information on the outflow is completely absent [conclusion 4.3].

Hires in Europe

There are no statistics on hires that can be compared at a European level. I found statistics about the number of hires in only five countries. In the Netherlands, hires have been measured by the public employment services since 1984 (UWV Werkbedrijf, 2012) and by Statistics Netherlands (CBS, 2011d), both using an employer survey. A study in Belgium measured hires using an employer survey (Gevers and Peeters, 2006). In Germany data on hires is collected by a company survey but published only recently (Institut für Arbeit- und Berufsforschung, 2011). In Spain the national register of all new contracts provides monthly statistics on all newly closed employment contracts (Estadística del Registro de Contratos). And in Italy the employer survey *Excelsior* asks for data about hired persons (Unioncamere) each year. No other sources are known to me. A clear lacuna with regard to the statistics on hires at the European level exists [conclusion 4.4].

Job finders in Europe

The *Labour Force Survey* of Eurostat is the only supranational instrument with comparable information about job finders. In the *Labour Force Survey*, job finders are defined as the number of employees who have been employed for three months at the most at the moment of the survey (in the Netherlands for a year at the most). In 2010 in 27 EU countries, the number of job finders was 40.5 million, meaning that an equal number of hires was realised (table 4.2). These are the most recent statistics per January 2012. The dominant position of Germany (21%) and the United Kingdom (11%) in the total of all job finders is clearly shown in the table. I consider the *Labour Force Survey* a very important instrument for job vacancy measurement because it is the only instrument that gives comparable information about job vacancy flows. It is a delicate instrument, because it relies strongly on the participation of two countries, Germany and the United Kingdom [conclusion 4.5].

Table 4.2 demonstrates the size of the difference between stock (*Job Vacancy Statistics*) and flow figures of job vacancies (*Labour Force Survey*). On an annual basis 32 million people find a job (in 22 countries). This is equal to the number of job vacancies that are filled, but excludes the withdrawn vacancies. The flow figure is more than 15 times higher than the number of open job vacancies. It should be taken into account that the number of open job vacancies in these figures excludes the agricultural sector. This large difference underpins the importance of flow figures of job vacancies.

Withdrawn job vacancies in Europe

No information about withdrawn job vacancies that can be compared at the European level is available. Of the 423 studies in my database of empirical job vacancy studies (JVS-E), 50 deal with withdrawn job vacancies. The largest number of these studies is from the Netherlands and most of the studies concern registered job vacancies at public employment services (see below). This empirical research has shown that about 1/6 of all job vacancies that occur are eventually cancelled by the company. The precise motives behind this phenomenon are unknown, although the expectation is that a considerable share of these job vacancies have been withdrawn by the employer because a suitable candidate was not found. These job vacancies probably form a special category of difficult to fill job vacancies, viz. job vacancies that cannot be filled. My conclusion is that withdrawn job vacancies may be an important indicator for very difficult or impossible to fill job vacancies, and that the share of withdrawn job vacancies is considerable, but that hardly any statistics are available [conclusion 4.6].

The number of job vacancies in Europa according to intermediaries

Public employment services as a source of job vacancy statistics

According to experts (JVE), some public employment services transfer job vacancies after a standard period of time without any knowledge of the result. Public employment services are unable to tell how many job vacancies were filled even on the basis of their own administration. For the Dutch situation, this is explained in an exhaustive study (De Koning et al, 1995). Based on this evidence and several interviews with experts (JVE), my conclusion is that information on open job vacancies and filled job vacancies of public employment services is less suitable for comparison between countries, due to the differences in the administrative organisation and working methods of public employment services. However, within countries this type of job vacancy information offers good opportunities for job vacancy analyses [conclusion 4.7].

According to the experts, differences in administrative procedures are less problematic concerning the inflow of registered job vacancies (JVE). In total, 13 countries are able to provide information on the inflow of job vacancies registered at the public employment services, starting in 2008 (JVD-EU, based on European Commission, 2012c). Comparing the yearly figures of 13 countries 2008-2010 the dominant position of the United Kingdom (47%) and Germany (23%) is clear. From the end of 2010 onwards, this information is available for 22 countries, declining to 19 countries in the third quarter of 2011. Statistics about the inflow of job vacancies registered at public employment services offer good possibilities for an international comparison, but are lacking for five countries [conclusion 4.8].

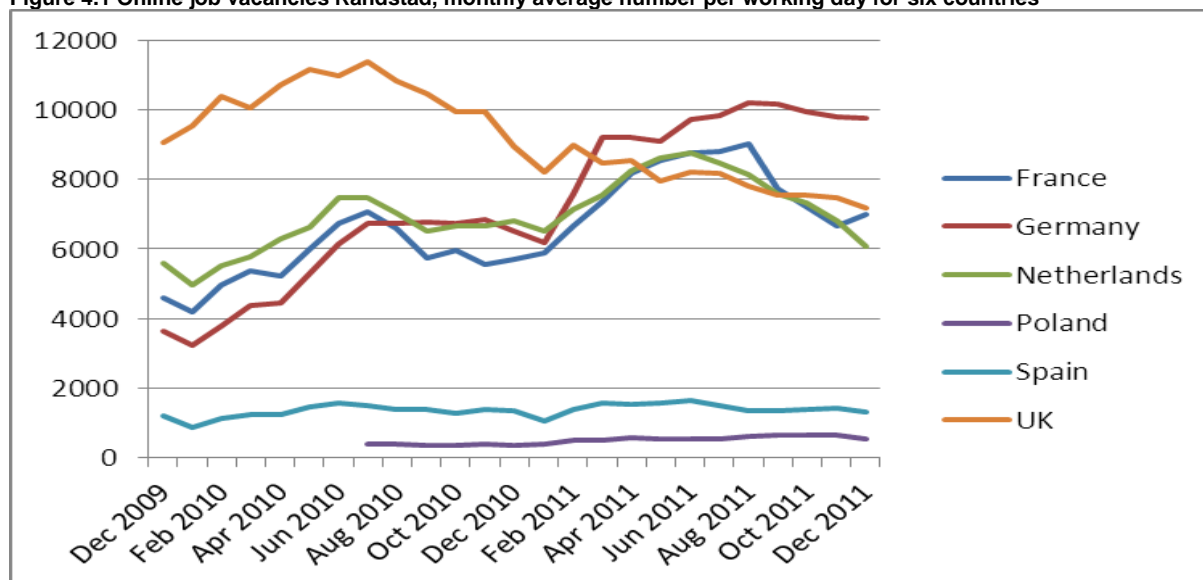
As mentioned above, no comparable information is available about withdrawn job vacancies, not even from public employment services. In Austria, in 2010 the total outflow of registered job vacancies was 395,867, 14 percent having been withdrawn by the employer or by the public employment service itself (Arbeitsmarktservice Österreich, 2011). In the Czech Republic, companies are under a legal obligation to register their job vacancies at the public employment service, through a form or through the internet. After a check on completeness by a specialised organisation, the job vacancy is then entered into the system, the *OK Práce system*. A special feature of this system is the publication of inflow and outflow figures; the latter includes a distinction between job vacancies filled and withdrawn job vacancies (Czech Ministry of Social Affairs). However, it is not known to what extent the withdrawn job vacancies were withdrawn by the employer or by the public employment service itself.

The share of the withdrawn job vacancies included in the outflow figures is relatively high (59% in 2010) and to my mind this is likely to be connected with the mandatory job vacancy reporting procedure in the Czech Republic [see conclusion 4.6].

Temporary work agencies as a source for job vacancy statistics

No statistics that can be compared are available on the number of open or filled job vacancies of temporary work agencies (assignments). Figures are known for a limited number of individual temporary work agencies. Randstad publishes absolute figures on the open online job vacancies in six European countries (see figure 4.1), but it only publishes job vacancies on the Internet that cannot be filled directly from the available pool of candidates. For December 2011, the figures represent the average number of job vacancies per working day in a specific month, with an average stock of 38,143 online job vacancies in six countries. If a specific job vacancy was reported at a number of subsidiaries of the Randstad Group there may be double counts, underlined by Randstad itself. Figure 4.1 shows a different per country pattern. Whereas the number of online job vacancies of Randstad is on the rise in Germany, it is dwindling in the United Kingdom. The figures are also at different levels, with Spain and Poland showing relatively low figures compared to other countries. In 2011 at least, Adecco published indices of their own open job vacancies, but no absolute numbers were given (and they are not available anymore). Only in the Netherlands and Belgium is the number of assignments estimated. In these two countries the number of job vacancies for temporary agency work is at least as high as the number of job vacancies with all regular employers in the country (section 5.3). Thus, information on open job vacancies and assignments of temporary work agencies is important, but is lacking. Account must be taken of very different patterns per country [conclusion 4.9].

Figure 4.1 Online job vacancies Randstad, monthly average number per working day for six countries



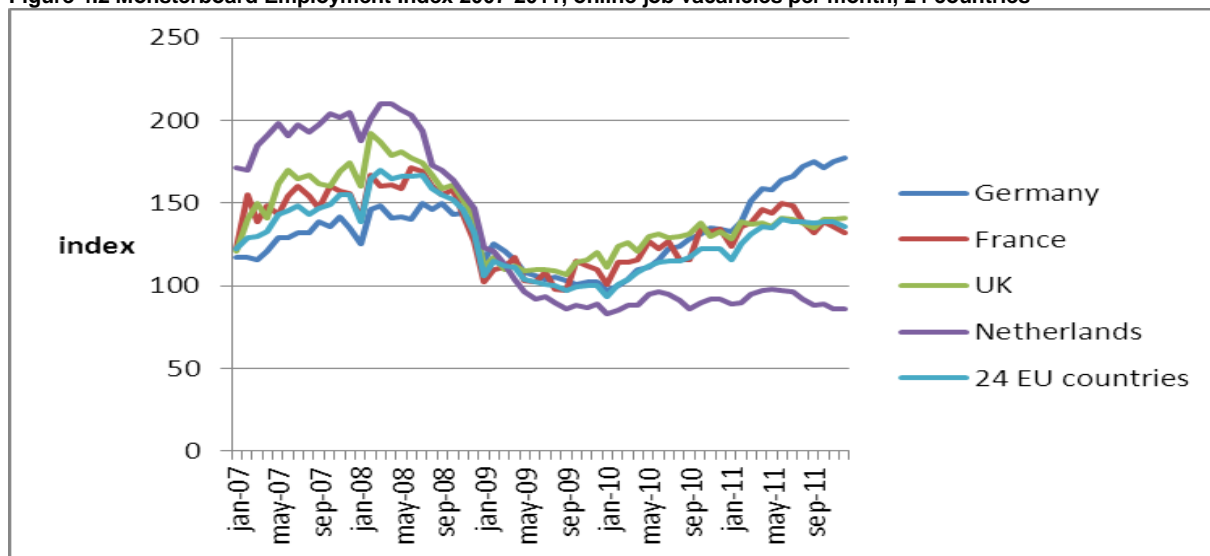
Source: JVD-EU (selection Randstad), see also European Commission, 2012c.

Correlation Germany and UK: $R = -0.731$; $p = 0.000$ (two sided, significant).

Online recruitment services as a source for job vacancy statistics

The *Monster Employment Index (MEI)* is a representation of job opportunities on a selection of career websites. It provides an index, no absolute figures. The index per occupational group (ISCO) shows differences with the figures of the *Labour Force Survey* (European Commission, 2010), indicating that the *Monster Employment Index* focuses on specific occupational groups. The extent to which the addition of new job vacancy sites to this tool by the holder of the index further influences the existing picture is unknown. It is therefore unclear if an increase in the index is the result of the addition of new job vacancy websites or the result of an improving labour market. At the same time the problem of double counting of job vacancies exists (Section 3.4)¹⁶ [conclusion 4.10].

Figure 4.2 Monsterboard Employment Index 2007-2011, online job vacancies per month, 24 countries



Source: JVD-EU (selection Monsterboard), see also European Commission, 2012c.

Correlation Germany and Netherlands: $R = -0.72$; $p = 0.568$ (two sided, not significant).

4.4 Job vacancy analyses in Europe

Objective

This section looks at the extent to which the results of the job vacancy measurements are sufficient to be able to carry out job vacancy analyses at European level. The analysis framework has been described in annex 5, which is an overview of existing job vacancy analyses. In this section I have carried out the following analyses, selected from the overview: (1) a comparison of job vacancies with employment (dynamics of the labour market), (2) bottlenecks on the demand side of the labour market, (3) comparison of job vacancies and unemployment (mismatches) and (4) an analysis of the performance of labour market intermediaries on the job vacancy market. The statistics on the number of job vacancies, employment and unemployment per country are based on my JVD-EU database, including statistics from the *Job Vacancy Statistics* and the *Labour Force Survey* (European Commission, 2012c). When interpreting the information, I make use of the results from chapter 3 and more specifically my assessment framework (Section 3.5), the underlying empirical studies (JVS-E) and information that I have gathered through expert-to-expert talks (JVE).

Three types of job vacancy analysis integrated

In this section, three types of job vacancy analyses have been integrated to present a picture for 27 EU countries: (1) analysis of employment dynamics, (2) analysis of bottlenecks on the demand side of the labour market (3) and

¹⁶ In 2014 Monsterboard stopped the publication of the *Monster Employment Index*.

analysis of mismatches. The statistics from eight countries do not allow one to draw a complete picture of the relevant period (2010), which is mostly due to the lack of *Job Vacancy Statistics* for Belgium, Denmark, France, Hungary, Ireland, Italy, Malta and Spain (table 4.3).

The right column in table 4.3 gives a concise interpretation of the results per country on the basis of extreme values. Bulgaria, the Czech Republic and Slovenia show average scores, as do Belgium, France, Hungary, Ireland, Italy and Malta. However, the job vacancy information from these latter countries is incomplete. In 2010, according to these job vacancy analyses, bottlenecks occurred on the demand side of the labour market in Austria, Germany, the Netherlands and the United Kingdom. In the same year, bottlenecks mainly occurred on the supply side in Latvia, Lithuania and Portugal. Due to the fact that the information is derived from various sources the results mutually reinforce each other, leading to a more plausible outcome. Elaboration of these three types of analysis follows below.

Table 4.3 Three types of job vacancy analyses (dynamics labour market, bottlenecks demand side and mismatches)

2010 and 2010q4	Dynamics labour market (1)		Bottlenecks demand side (2)	Mismatches: surplus or shortage of supply (3)			Short interpretation
	Job vacancy rate (%) 2010Q4 (column 1a)	Job finder rate (%) 2010 (column 1b)	Stock-flow ratio 2010 In calendar days (column 2)	Ratio unemployment-job vacancies 2010Q4 (column 3a)	Ratio unemployment-job finder 2010 (column 3b)	Ratio inflow registered job vacancies public employment services and unemployment public employment services 2010 (column c)	
Austria	2,25	28	28	2	0,19	4	High mobility, bottlenecks demand side and shortage of supply
Belgium	0,90	20	statistics stock missing 2009Q4	12	0,52	-	Average picture, statistics missing
Bulgaria	0,62	16	13	21	0,82	-	Average picture
Cyprus	1,03	26	13	8	0,31	-	Shortage of supply
Czech Republic	0,81	17	17	12	0,56	-	Average picture
Denmark	statistics stock missing	36	statistics stock missing	statistics stock missing	0,25	-	High mobility and shortage of supply, statistics missing
Estonia	0,93	31	11	25	0,74	6	Surplus of supply
Finland	1,49	40	13	7	0,27	-	High mobility and shortage of supply
France	statistics stock missing	30	statistics stock missing	statistics stock missing	0,42	-	Average picture, statistics missing
Germany	2,88	27	36	3	0,32	6	High mobility, bottlenecks demand side and shortage of supply
Greece	0,45	13	11	50	1,67	-	Low mobility and surplus of supply
Hungary	0,75	20	statistics stock missing 2009Q4	19	0,73	-	Average picture, statistics missing
Ireland	statistics stock missing	22	statistics stock missing	statistics stock missing	0,88	-	Average picture, statistics missing
Italy	statistics stock missing	19	statistics stock missing	statistics stock missing	0,65	-	Average picture, statistics missing
Latvia	0,28	40	3	93	0,66	16	Mobility not clear, less bottlenecks demand side and surplus of supply
Lithuania	0,52	23	8	48	1,07	8	Less bottlenecks demand side and surplus of supply
Luxembourg	1,14	18	23	5	0,29	-	Shortage of supply
Malta	statistics stock missing	17	statistics stock missing	statistics stock missing	0,51	-	Average picture, statistics missing
Netherlands	1,75	15	38	3	0,37	-	Bottlenecks demand side and shortage of supply
Poland	0,49	25	7	28	0,56	-	Less bottlenecks

2010 and 2010q4	Dynamics labour market (1)		Bottlenecks demand side (2)	Mismatches: surplus or shortage of supply (3)			Short interpretation
	Job vacancy rate (%) 2010Q4 (column 1a)	Job finder rate (%) 2010 (column 1b)	Stock-flow ratio 2010 In calendar days (column 2)	Ratio unemployment-job vacancies 2010Q4 (column 3a)	Ratio unemployment -job finder 2010 (column 3b)	Ratio inflow registered job vacancies public employment services and unemployment public employment services 2010 (column c)	
Portugal	0,33	21	6	48	0,76	22	Low mobility, less bottlenecks demand side and surplus of supply
Romania	0,33	7	17	36	1,73	-	Low mobility and surplus of supply
Slovakia	0,71	15	16	28	1,33	-	Surplus of supply
Slovenia	0,68	20	12	14	0,47	-	Average picture
Spain	0,94	34	statistics stock missing 2009Q4	32	0,9	-	High mobility, statistics missing
Sweden	1,25	42	11	8	0,25	3	High mobility and shortage of supply
United Kingdom	2,00	20	33	5	0,5	-	High mobility, bottlenecks demand side and shortage of supply
All countries	1,59	24	26	8	0,53	6	
# countries	19	27	19	19	27	7	

Source: JVD-EU.

Analysis of the number of job vacancies and employment: dynamics labour market

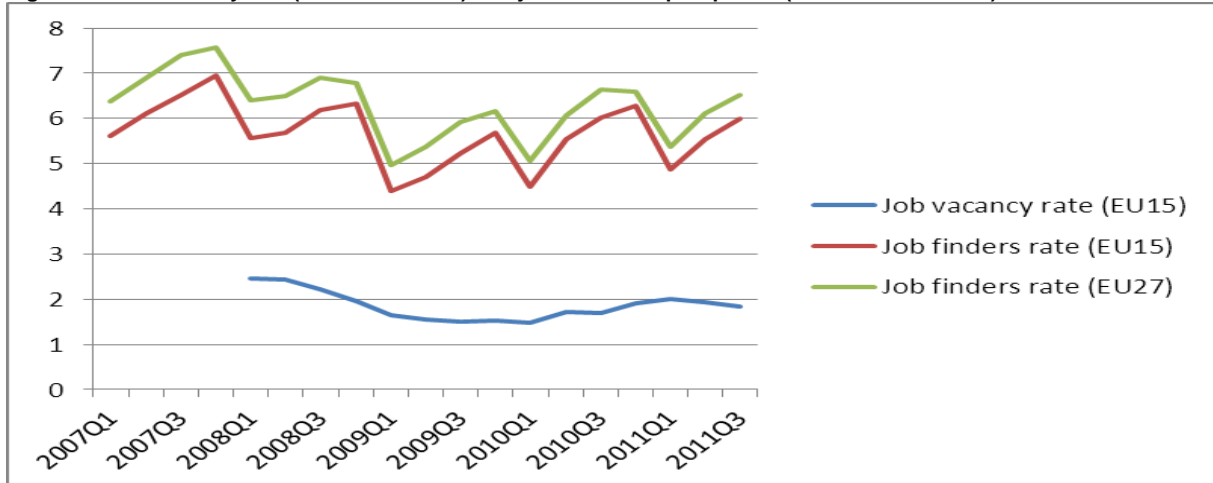
Job vacancy rate

The ratio of the number of job vacancies and employment indicates the dynamics on the labour market (employments dynamics). I found 85 studies of this type of analysis (JVS-E). Two indicators have been calculated: the job vacancy rate and the job finder rate. The job vacancy rate was calculated by comparing the number of open job vacancies (*Job Vacancy Statistics*) with the number of employees, excluding the number of self-employed (*Labour Force Survey*). In the final quarter of 2010, values in 19 countries varied between 0.28 and 2.88 percent with an average of 1.59 percent (table 4.3, column 1a). Figure 4.3 presents the development of the job vacancy rate from the first quarter of 2008 until the third quarter of 2011 for 15 countries (for four countries the time series are not complete). One should take into account the statistical margins, especially in the numerator (open job vacancies). The example of Sweden and Finland shows that these margins are considerable (Section 3.8).

Job finder rate

A better indicator for labour market dynamics is the ratio of hires and employment (common terminology is hiring rate, job vacancy mobility rate or turnover). It uses flow figures, providing a better picture of the dynamics involved. However, we have to limit ourselves to the job finder rate as an indicator, job finders being the equivalent of hires. In 2010 the average job finder rate for 27 countries is 24 percent. The differences between countries are substantial: the job finder rate (JFR) in Sweden was 42 percent and 7 percent in Romania, meaning that labour market mobility is higher in Sweden than in Romania (table 4.3, column 1b). The number of job finders per quarter compared to the number of employed this quarter demonstrates the volatility of mobility during the year (Figure 4.3) [conclusion 4.11].

Figure 4.3 Job vacancy rate (15 EU countries) and job finder rate per quarter (15 and 27 countries) in %



Source: JVD-EU. Correlation job vacancy rate (EU 15) and job finders rate (EU15): $R = 0.288$; $p = 0.298$ (two sided, not significant)

Analysis of the number of job vacancies and bottlenecks demand side labour market

My database of 433 empirical job vacancy studies (JVS-E) includes 142 job vacancy studies on bottlenecks on the demand side of the labour market. Analysis of these 142 studies shows that the concept of bottlenecks is treated very differently in the various countries. Studies dealing with bottlenecks are available for 15 countries, although the approach, operationalization and terminology differ strongly, making it difficult to gain a comparative insight based on country studies. My conclusion is that the study of bottlenecks on the demand side of the labour market is hampered by differences in operationalization and methodology [conclusion 4.12].

The stock of job vacancies as an indicator for bottlenecks on the demand side of the labour market

The stock of job vacancies is generally used as an indicator for bottlenecks. Experts view the stock of job vacancies as such a better indicator of bottlenecks on the labour market than job vacancy flows (JVE). Comparable information about this indicator is available in the *Job Vacancy Statistics* for 22 countries (Section 4.2). However, my conclusion is that due to limitations of the available statistics additional indicators must be used to assess bottlenecks on the demand side of the labour market [see conclusion 4.12].

Hard to fill job vacancies according to the employer

The first alternative indicator is the share of hard to fill job vacancies measured through employer surveys. The only international comparative study I found is the *Talent Shortage Survey* by Manpower, a company survey by a multinational temporary work agency for a limited number of countries, presenting the share of companies with hard to fill job vacancies (JVS-E). Unfortunately the methodology of this source is not publicly available. In my JVS-E database I detected ten country-specific studies concerning hard to fill job vacancies.

In eight countries the share of the *companies* having hard to fill job vacancies is measured by company surveys: Austria (Gaubitsch and Luger, 2011), Belgium (Gevers and Peeters, 2006), Bulgaria (Bulgarian National Statistical Institute), Finland (Keinänen, 2006), France (NSO), Germany (IAB, 2010), the United Kingdom (UKCES, 2008).

In two countries the share of the hard to fill *job vacancies* is measured by company surveys: Italy (Unioncamere, no date) and the Netherlands (UWV Werkbedrijf, 2012). I consider this type to be a more valid indicator of hard to fill job vacancies than the former. Based on this analysis, my conclusion is that systematic and comparable information in Europe on hard to fill job vacancies according to the employer is not available, Italy and the Netherlands being the exceptions [see conclusion 4.12].

Job vacancy duration

According to experts a relatively long job vacancy duration is an indication of hard to fill job vacancies and bottlenecks on the demand side of the labour market (JVE). The importance of this indicator has also been supported by three scientific studies from my database JVS (Sharir, 1971; Van Ours en de Ridder, 1992; Burdett and Cunningham, 1994). However, it is important to take note of the differences between small and large companies: a long recruitment process is quite normal in large companies (Donker van Heel and Dekker, 1987). In my JVS-E database I found three examples of measuring the job vacancy duration through surveys: Belgium (Peters and Gevers, 2006), Germany (Heckmann, Kettner and Rebien, 2011) and Hungary (Ministry of National Economy Employment and Social Office and the Chamber of Commerce and Industry, 2010). However, in the cases of both Germany and Hungary, it is not clear to what extent these statistics are actually used as indicator for hard to fill job vacancies.

In four countries the job vacancy duration is based on a register at the public employment services, namely in Austria, Germany, the Netherlands and Sweden. However, because of differences in administrative procedures it is not possible to compare the job vacancy duration registered by public employment services between countries (Section 4.2). My conclusion based on job vacancy studies in my database (JVS-E) and expert-to-expert talks (JVE) is that any systematic information on job vacancy duration is lacking in Europe [see conclusion 4.12].

Other job vacancy indicators for bottlenecks on the demand side of the labour market

I found three other examples of indicators for bottlenecks on the demand side of the labour market (JVS-E). In Belgium, the job vacancy filling rate of public employment services is used as an indicator for hard to fill job vacancies. I found a more qualitative approach in Spain (Observatorio de las Ocupaciones) and Ireland (FAS Expert Group on Future Skills Needs, 2011). Some experts consider job vacancies offered by temporary work agencies to public employment services to be difficult to fill, because it seems to indicate no own supply exists (JVE). No comparable information for these three alternatives is available [see conclusion 4.12].

Stock-flow ratio of job vacancies as an indicator for job vacancy duration

A concrete possibility for obtaining an international comparative picture of bottlenecks with existing statistics is to calculate the stock-flow ratio of job vacancies. I consider the ratio between the stock and flows of job vacancies to be an indicator for the average period the job vacancies in a country are open. In the Netherlands, and possibly also in other countries, it is an accepted approach to compare the stock and flows in order to determine the job vacancy duration (see e.g. Donker van Heel and Dekker, 1987; Klaver and Sprangers, 1990). Several calculation formulas are used, but I prefer the following (see annex 5 for an explanation):

$$\text{stock-flow ratio} = (\text{stock end date of a year} / (\text{stock a year earlier} + \text{inflow in the year preceding the end date})) * 365$$

The calculation of the stock-flow ratio is hampered by shortcomings in job vacancy statistics. Comparable information about the inflow of job vacancies is not available for most countries. Therefore, for 2010 I calculated the stock-flow ratio using the stock of job vacancies (*Job Vacancy Statistics*) as the numerator and the number of job finders (*Labour Force Statistics*) as the denominator. I think this offers a good indication of bottlenecks on the demand side per country, but it is not optimal. Thus calculated, the average of the job vacancy duration based on the stock-flow ratio for 19 countries is 26 calendar days (table 4.3, column 2). This result would be lower if the inflow figures could be used instead of job finders. On average the number of job finders over a longer period is approximately a factor of 5/6 lower than the inflow (Section 4.10). On the other hand, the calculation would lead to a higher ratio if statistics on open job vacancies for unoccupied and occupied positions could be used. The *Job Vacancy Statistics* is limited to open job vacancies for unoccupied positions. Stock figures including occupied positions offers a better ratio between numerator and denominator, because the number of job finders (in the denominator) incorporates all job vacancies filled including those that were occupied. My conclusion is that the

stock-flow ratio can be used as an indicator for difficult to fill job vacancies. However, statistical information on job vacancy flows, more specifically the inflow of job vacancies, is missing [conclusion 4.13].

Analysis of the number of job vacancies and the labour force: mismatches

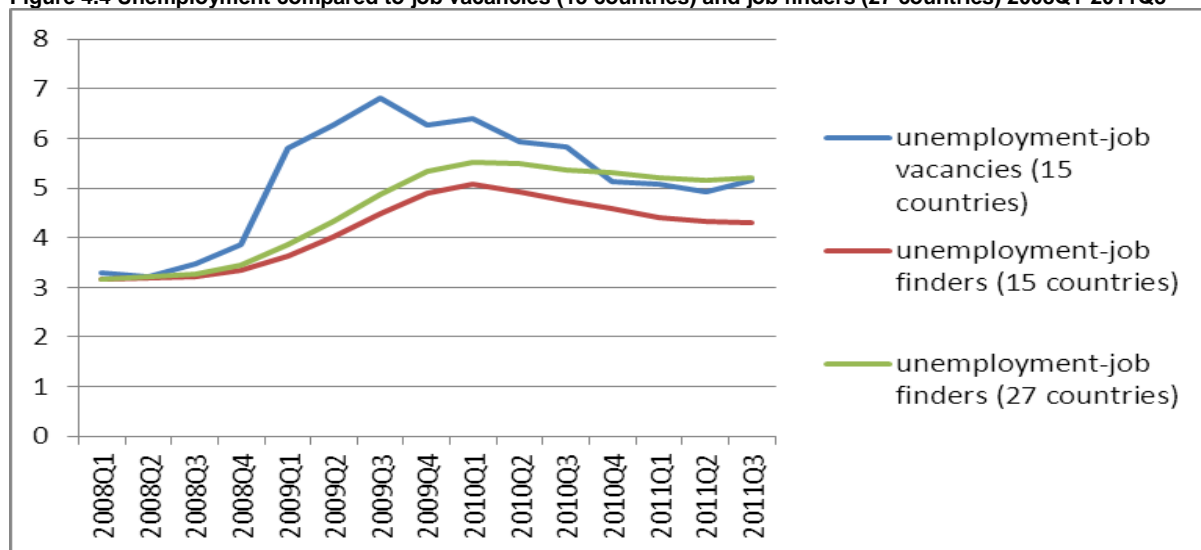
Ratio of job vacancies and unemployment: shortages and surpluses

The ratio of the number of job vacancies and the number of unemployed is used for indicating mismatches on the labour market (see annex 5). I detected 127 studies of this type in the JVS-E. In the following I discuss four variants of this type of analysis, with the goal of discovering whether the statistical information is sufficient.

Ratio stock of job vacancies and the stock of unemployed

The ratio of unemployment (U) and the stock of job vacancies (V) is the first indicator for measuring tension on the labour market (UV-ratio). By performing this analysis at various points in time it is possible to make a statement about the development of the (mis)match of demand and supply. This is called a UV-analysis or Beveridge analysis. The Beveridge analysis uses stock figures of job vacancies and stock figures of unemployment (Yashiv, 2007). In figure 4.4 the number of job vacancies is based on the *Job Vacancy Statistics* and the number of unemployed is based on the *Labour Force Survey*. The calculation of the UV-ratio is possible for 15 countries from the first quarter of 2008 until the third quarter of 2011 (blue line in figure 4.4) and for 19 countries for the fourth quarter of 2010 (table 4.3, column 3a). Statistics on the stock of job vacancies of countries with a supposedly relatively large share (France and Italy) is missing, making an assessment of mismatches in Europe as a whole by calculating an UV-ratio less valid [conclusion 4.14].

Figure 4.4 Unemployment compared to job vacancies (15 countries) and job finders (27 countries) 2008Q1-2011Q3*



Source: JVD-EU. *Unemployment is the average of four quarters and job finders is the sum of four quarters. Correlation: unemployment-job vacancies (15) and unemployment-job finders (15): $R = 0,812$; $p = 0.000$ (two sided, significant).

Ratio unemployment and job finders

The only indicator of mismatches able to make a comparison between 27 countries is what I call the UJF-ratio (green line in figure 4.4). The UJF-ratio is the ratio between unemployment (as measured by the *Labour Force Survey*) and the number of job finders (also *Labour Force Survey*). This indicator does have added value for countries without *Job Vacancy Statistics* and/or registers the public employment services, such as Denmark, Ireland and Italy (table 4.3, column 3b). The UJF-ratio is the only ratio of mismatches that can be calculated for all 27 EU countries. My conclusion is that by using the unemployment-job finder ratio it is possible to draw a comparable picture between countries in Europe, because statistics are available [see conclusion 4.14].

Ratio inflow of registered job vacancies and (the stock of) registered unemployed

The third indicator is the comparison between the stock of the number of unemployed and the inflow of the number of job vacancies registered at the public employment services. I call this the UVP-ratio. In my JVS-E database, the only example of this type of analyses was in Belgium. In this study a final shortlist of 83 bottleneck professions was derived using a comparison between the number of unemployed and the inflow of public employment services job vacancies. A low number of unemployed connected to a bottleneck occupation tends to indicate a quantitative mismatch (Brussels Observatorium voor de Werkgelegenheid, 2010). The UVP-ratio can be calculated for seven countries (table 4.3, column 3c). Table 4.3 (column 3c) shows that Portugal and Latvia have a relatively high supply of registered unemployed for the job vacancies that are reported to the public employment services throughout the year. The figures — 22 and 16 unemployed per reported job vacancy, respectively — indicate a larger unemployment problem in these countries than in for example Sweden (3) and Austria (4). Statistics on the inflow of registered job vacancies at public employment services could be provided on a daily basis, meaning that they form a powerful early indicator (JVE). My conclusion is that this type of job vacancy analysis could be useful to detect mismatches on the labour market, but that statistics of public employment services is lacking in most countries [conclusion 4.15].

Ratio of the stock of registered unemployed compared and the stock of registered job vacancies

The ratio of the stock of registered job vacancies and the stock of registered unemployed is used as an indicator for mismatches in the labour market in at least two countries (JVS-E). In Lithuania, to indicate the degree of labour market tightness, a UV-comparison is calculated comparing the number of the stock of registered job vacancies at the public employment services with the number of the stock of registered unemployed, according to sector and occupation (Methodological Centre for Vocational Education and Training Vilnius, 2008). In the Netherlands the public employment services regularly publish a comparison of the stock of registered job vacancies and the stock of unemployed per occupational group (UWV Werkbedrijf, 2012). Also in the Netherlands, the ratio of the stock of registered unemployed to the number of all filled job vacancies is published, the former based on an employer survey. This specific analysis includes a breakdown by gender, age, region, occupational groups and education (UWV Werkbedrijf, 2012). My conclusion is that this type of job vacancy analysis is very useful within countries, but is not possible between countries because of differences in administrative procedures [see conclusion 4.7].

Analyses of the performance of labour market intermediaries

Studies about the performance of labour market intermediaries on the job vacancy market

Job vacancy statistics are used to determine the performance of labour market intermediaries (152 studies in JVS-E), the most exhaustive studies being Finland (Räsänen, 2004), Austria, (Arbeitsmarktservice, 2011; GfK, 2010), Belgium (Gevers and Peters, 2006), Malta (Employment and Training Corporation, 2009), Slovenia (Spuk, 2011), United Kingdom (UKCES, 2011) and the Netherlands (UWV Werkbedrijf, 2012). In the following section, I will focus on the market position, with a critical eye toward the usefulness of the existing information on job vacancies for this type of analyses.

Position of labour market intermediaries on the job vacancy market

The *Labour Force Survey* allows one to draw a comparative picture of the market position of public and private employment services and to calculate the market share of the intermediaries among the job finders (see annex 5 for a definition). This is the equivalent of the number of filled job vacancies by the public employment services compared to all job vacancies filled in the same period of time. An analysis covering 27 countries in Europe shows that on average eight percent of the job finders found a job through the public employment services (8.3%) and another eight percent through a temporary work agency (7.7%) per quarter. The various market shares of public employment services differ between countries. The public employment services in the Netherlands scores low with three percent compared to Slovenia with 15 percent (European Commission, 2012c).

Other sources are less suitable for comparative analyses. The comparison between the number of registered open job vacancies and the total number of open job vacancies (*Job Vacancy Statistics*) is not possible due to the differences in administrative procedures. One other possibility would be to compare the inflow of registered job vacancies with the inflow of all job vacancies in a country in order to calculate the market coverage. However, the inflow of all job vacancies in a country is unknown. As an alternative I calculated the ratio between the inflow of registered job vacancies at the public employment services and the number of job finders (according to the *Labour Force Survey*). The latter is a proxy for the inflow of job vacancies in a country. It appears that the results vary largely between countries (table 4.4). Between 2008 and 2010 the average market share of public employment services in 13 countries is 36 percent, fluctuating from 12 percent in Latvia to 71 percent in the United Kingdom. Taking into account the results of this analysis and the studies in eight countries about the performance of the public employment services, a market coverage of 33 percent appears to be the rule of thumb, including a job vacancy filling rate of likewise 33 percent and — consequently — a market share of 11 percent. The country studies originate from Belgium, Germany, Finland, Romania, Slovenia, United Kingdom, Malta and the Netherlands (JVS-E). These results show that statistics on job vacancies given by intermediaries only apply to a relatively small segment of the job vacancy market [conclusion 4.16].

Table 4.4 Ratio inflow registered job vacancies public employment services and job finders as an indicator for the market coverage of public employment services (13 countries)

Market coverage public employment services	2008	2009	2010	2008-2010
Austria	41%	41%	41%	41%
Czech republic	66%	35%	33%	45%
Denmark	23%	15%	13%	18%
Estonia	10%	10%	24%	15%
Finland	51%	47%	47%	49%
Germany	20%	20%	22%	20%
Ireland	20%	18%	21%	20%
Latvia	20%	11%	6%	12%
Lithuania	38%	45%	55%	46%
Netherlands	37%	39%	25%	33%
Portugal	14%	16%	16%	15%
Sweden	35%	27%	33%	32%
United Kingdom	69%	70%	74%	71%
13 countries	37%	35%	36%	36%

Source: JVD-EU.

Intermediaries and segments on the job vacancy market

Studies in JVS-E confirm the selectivity of job vacancy information of labour market intermediaries such as public employment services, temporary work agencies and online recruitment services. An analysis of the statistics of the *Labour Force Survey* for 27 countries shows that the public employment services and temporary work agencies each work in specific market segments, according to sectors, occupational groups and educational level (European Commission, 2012c). The few available country studies confirm this picture. Austrian studies show that the public employment services are mainly used for job vacancies generally requiring applicants with lower levels of education, with advertisements for job vacancies aiming at applicants with lower vocational education and online recruitment services especially targeting job seekers with higher education (GfK Austria, 2010a and 2010b). In the United Kingdom it was found that the public employment services register significantly above average numbers of job vacancies of large companies, the health sector and social work, but significantly below average numbers of job vacancies in agriculture and financial services. Job vacancies at online recruitment services are underrepresented in construction, but overrepresented for large companies and business services.

National newspapers published significantly more job vacancies in education (UKCES, 2011). In Belgium, an employer survey showed that the various recruitment channels display different market coverages. The use of the various recruitment channels differs for each sector, size of companies (in employment terms) and occupation (Denolf, Denys and Simoens, 1999). Another Belgian study (Gevers and Peeters, 2006) and a Dutch study (CWI, 2006b) confirm that the various recruitment channels have a different market position. The coverage of intermediaries on the job vacancy market is thus limited and selective. This is why the job vacancy statistics supplied by intermediaries must be dealt with carefully [see conclusion 4.16].

4.5 Conclusions: clues for further research

I have marked my conclusions in the previous sections with a number in between square brackets [...]. These conclusions form the basis of my formulation of the starting points for more in-depth studies to obtain a better insight into the job vacancy market in Europe. In chapter 6 I present concrete recommendations for follow-up studies.

Conclusion 4.1: No comparable statistics about the stock of job vacancies for five countries

Statistics on the stock of job vacancies at the end of the third quarter of 2011 are available for 22 of 27 EU countries. A continuous time series 2008Q1-2011Q3 is available for 15 countries. The figures exclude the agricultural sector and include estimates for missing parts in some countries for the public sector or small companies. No comparable information about the stock of job vacancies is available for Denmark, France, Ireland, Italy and Malta.

Conclusion 4.2: The *Job Vacancy Statistics* underestimates the number of job opportunities for job seekers

The *Job Vacancy Statistics* of Sweden and Finland show that the difference between job vacancies for occupied and unoccupied jobs is substantial. According to Swedish *Job Vacancy Statistics* figures, the inclusion of job vacancies for occupied positions produces a multiplier of 2.5. Because the *Job Vacancy Statistics* follows the definition of job vacancies in the unmet demand tradition only job vacancies for unoccupied jobs are measured. As a result the real recruitment needs of companies and the job opportunities for job seekers are to a substantial degree underestimated by the *Job Vacancy Statistics*. This also affects the job vacancy analyses using these figures, such as analyses of mismatches including the UV-analysis. A *Job Vacancy Statistics* with a broader definition – also measuring job vacancies for occupied jobs – will deliver better results. At the same time, my conclusion is that it is very difficult to measure the extent to which an open job vacancy relates to an unoccupied or occupied position.

Conclusion 4.3: Almost no information about job vacancy inflow and outflow

My conclusion is that almost no information exists in Europe on the inflow of job vacancies and information on the outflow is completely absent. I found specific measurement instruments or estimations concerning the total inflow of job vacancies on the national level in only four countries. Hardly any investment has been done on time series of job vacancy inflow, the Netherlands being an exception. The lack of this type of job vacancy information hampers the analysis of the demand for labour, dynamics of the job vacancy market, the analysis of bottlenecks on the demand side of the labour market and the analysis of mismatches.

Conclusion 4.4: Almost no information about hires

No comparable statistics about hires is available in Europe. I found statistics about the number of hires in only five countries, although the methods used vary widely. A mutual comparison of the results in different countries is therefore not possible. Also, these studies are mostly obsolete. The lack of this type of job vacancy information hinders the analysis of the demand for labour, dynamics of the job vacancy market, the analysis of bottlenecks on the demand side of the labour market and the analysis of mismatches.

Conclusion 4.5 Information available about job finders

A job finder is the equivalent of a hire. The *Labour Force Survey* provides comparable information about job finders in 27 countries. I consider the *Labour Force Survey* a very important instrument for job vacancy measurement, because this is the only instrument that provides comparable information about flows.

Conclusion 4.6: The share of withdrawn job vacancies is considerable, but hardly any statistics available

Analysis of empirical job vacancy research has shown that about 1/6 of all job vacancies that occur are eventually cancelled. This is an indication based on a few studies. Despite the importance of these types of job vacancies (bottlenecks on the demand side of the labour market) and the relatively high share, hardly any statistics are available. The issue of withdrawn job vacancies is almost completely neglected in job vacancy research.

Conclusion 4.7: Information on open job vacancies and filled job vacancies of public employment services is less suitable for comparison between countries

Information on open job vacancies and filled job vacancies from public employment services is less suitable for comparison between countries, due to the differences in the administrative organisation and working methods of public employment services. However, within countries this type of job vacancy information offers good opportunities for job vacancy analyses.

Conclusion 4.8: Information on the inflow of registered job vacancies at public employment services is suitable for comparison between countries

Statistics about the inflow of job vacancies registered at public employment services offer good possibilities for international comparison. From the end of 2010 onwards this type of job vacancy information is available for 22 countries.

Conclusion 4.9: Information on job vacancies and assignments of temporary work agencies is lacking

In some countries the number of job vacancies for temporary agency work is at least as high as the number of job vacancies with all regular employers in the country (the Netherlands and Belgium). Surprisingly, almost no country has an insight into the number of job vacancies and assignments at temporary work agencies. This insight is, however, essential because job vacancies for temporary work offer job opportunities for job seekers and especially for the unemployed. Account must be taken of very different patterns per country.

Conclusion 4.10: Still doubts about validity and reliability of statistics based on job vacancy websites

At present I still have too many doubts about the validity and reliability of statistics based on job vacancy websites. These doubts are mainly caused by the non-transparent process involved, the unclear coverage of traced online job vacancies and the results of removing double counts. Researchers should be very careful with using the data published on these sites for statistical purposes until methodologies become more transparent.

Table 4.5 General overview available job vacancy statistics

Sources	Stock of job vacancies	Inflow	Outflow	Hires	Job finders	Withdrawn job vacancies
<i>Job Vacancy Statistics</i>	x					
<i>Labour Force Survey</i>					x	
National registers (social security, taxes)					(x)	
Public Employment Services	(x)	(x)				
Temporary Work Agencies	(x)					
Online Recruitment Services	(x)	(x)	(x)			
Country specific sources	x	x		x	x	(x)

(x) Available, but significant drawback

Conclusion 4.11: Hiring rate and job finder rate are better indicators compared to job vacancy rate

The hiring rate (or job vacancy mobility rate or turnover) and the job finder rate are better indicators for labour market dynamics compared to the job vacancy rate. The job vacancy rate is a stock figure and it shows small changes in time and differences between countries combined with relatively high margins. However, because of a lack of statistics about hires we have to limit ourselves to the job finder rate as an indicator, the number of job finders being the equivalent of the number of hires.

Conclusion 4.12: Study of bottlenecks demand side hampered by differences in methodology

The observation after studying 142 job vacancy studies about bottlenecks on the demand side of the labour market is that the concept is treated very differently in the various countries. The stock of job vacancies is used as an indicator for bottlenecks on the demand side. Due to limitations of the available information about the stock of job vacancies additional indicators must be used. However, systematic and comparable information about hard to fill job vacancies according to the employer is not available in Europe. According to experts, the job vacancy duration is a useful indicator for difficult to fill job vacancies, but systematic information is missing. In some countries the job vacancy duration is based on the registers of the public employment services. However, due to the differences in administrative procedures it is not possible to compare the job vacancy duration of public employment services between countries. Occasionally the job vacancy filling rate of public employment services is used as an indicator for hard to fill job vacancies.

Conclusion 4.13: Stock-flow ratio as indicator for difficult to fill job vacancies

The stock-flow ratio can be used as an indicator for difficult to fill job vacancies, comparing the stock of job vacancies and the inflow of job vacancies. In the Netherlands the stock-flow ratio is used as an indicator for difficult to fill job vacancies. The following formula is appropriate using job finders as a proxy for the inflow of job vacancies:

$$\text{stock-flow ratio} = (\text{stock end date of a year} / (\text{stock a year earlier} + \text{inflow in the year quarters preceding the end date})) * 365$$

Currently, statistical information about the inflow of job vacancies is missing. For the time being the number of job finders can be used as a proxy of the inflow of job vacancies. A comparison between countries in Europe can be made using the *Job Vacancy Statistics* (stock of job vacancies) and the *Labour Force Survey* (job finders).

Conclusion 4.14: Calculating an UV-ratio for Europe hampered by lack of statistics from large countries

Statistics on the stock of job vacancies of countries with a supposedly relatively large share (France and Italy) is missing, making an assessment of mismatches in Europe as a whole by calculating an UV-ratio less valid. My conclusion is that by using the unemployment-job finder ratio it is possible to draw a comparable picture between 27 countries in Europe, because statistics are available.

Conclusion 4.15: Statistics inflow of registered job vacancies at public employment services are missing

Statistics on the inflow of registered job vacancies at public employment services may be used for equations with unemployment statistics to analyse mismatches on the labour market. However, only seven countries are able to provide the job vacancy statistics for this type of analysis. Statistics on the inflow of registered job vacancies at public employment services could be provided on a daily basis, meaning that they form a powerful early indicator.

Conclusion 4.16: Coverage intermediaries on the job vacancy market is limited and selective

The coverage of intermediaries on the job vacancy market is limited and selective. Labour market intermediaries cover only a part of the job vacancy market. Between 2008 and 2010 the average market share of public employment services in 13 countries is 36 percent, fluctuating from 12 percent in Latvia to 71 percent in the United Kingdom. At the same time, the coverage of intermediaries is selective. An analysis of statistics from the *Labour Force Survey* shows that the public employment services and temporary work agencies each work on

specific market segments, broken down according to sectors, occupational groups and educational level. This is why the statistics on job vacancies supplied by intermediaries must be dealt with carefully.

Conclusion 4.17: Results of job vacancy studies show some convergence

Despite the limitations of the measurements, results of job vacancy studies show some convergence. At the end of the third quarter of 2011, the stock of job vacancies in 22 countries was 2.1 million, according to the *Job Vacancy Statistics*. At the same time, 17.6 million job seekers were looking for a job in the same 22 countries, meaning a supply of 8.3 job seekers per open job vacancy. In 2010, the number of job finders was 43.5 million in 27 EU countries, meaning that an equal number of hires has been realised. In 2010 the job finder rate for 27 countries, which is defined as the number of job finders vis-à-vis the number of employees, is 24 percent. Up to a point, job vacancy analyses show constant results, with differences occurring between countries and sources and also changes through time. If no statistics are available, or to conduct checks, specific constant values may be used, as follows:

- The number of open job vacancies is 1/4 of the outflow of job vacancies;
- The number of hires (job finders) is 5/6 of the outflow and the number of cancelled job vacancies is 1/6 of the outflow;
- The average job vacancy duration is approximately three months (the proxy being the number of open job vacancies/flow figure in specific year x 12);
- The number of open job vacancies is approximately 2 percent of the number of employees;
- The number of hires (the number of job finders) is 25 percent of the number of employees;
- At a specific point in time, the number of unemployed is 10 times as high as the number of open job vacancies;
- The market penetration of public employment services is 10 percent (in countries without mandatory job vacancy registration);
- The market coverage of public employment services on the job vacancy market is 1/3 (stock and flow);
- The job vacancy filling rate of public employment services is 1/3;
- The market share of public employment services equals the product of the market coverage and the job vacancy filling rate: 11 percent.

5. Measuring job vacancies in the Netherlands

5.1 Research objective and design

Research objective

This dissertation includes a study of a specific country, the Netherlands. The Netherlands has the lead in Europe in the measurement of job vacancies, as can be concluded from the comparison between the instruments of 27 European countries (Chapter 4). In general, it is recognised that the Netherlands is the leading country in the field of labour accounting systems (Hoffmann, 1997). In the Netherlands, both public and private institutions have long been involved in the measurement of job vacancies through employer surveys and registers: the national statistical organisation, research institutes, the public employment services, social partners (employers and employees organisations), sector organisations, (semi-)public institutions and educational organisations. Several instruments are also used within the country that aim to measure the size of the same job vacancy population, allowing a comparison of the measurement results of these instruments.

I investigated which measuring instruments in the Netherlands provide a picture of the stock and flows of job vacancies. I defined a measurement instrument as collection of primary job vacancy data in a specific country, according to a specific method, i.e. a specific combination of source, respondent and way of data collection (Section 3.2). The leading research question is the following:

What is the state of affairs in the Netherlands in regards to the measurement of job vacancy stocks and flows, and what are the starting points for further research as a result of this analysis?

The analysis focuses on the number of open job vacancies (Section 5.2), the number of hires, filled job vacancies and job finders (Section 5.3) and the inflow of job vacancies (Section 5.4). The market position of labour market intermediaries is relevant to understand the value of these intermediaries as sources for job vacancy data (Section 5.5). Separate attention has been paid to the measurements at sector level (Section 5.6). This country study provided leads for a follow-up research (Section 5.7).

Table 5.1 Number of instruments measuring the total number of job vacancies in the Netherlands classified by type of method (n=52)

Type of respondent	Type of data collection				Total number of instruments
	Survey		Register		
	Source type national statistical offices, research institutes	Source type intermediaries	Source type national statistical offices, research institutes	Source type intermediaries	
Companies	36	1	1	10	48
Job finders	1	2	1	0	4
Subtotal	37	3	2	10	52
Total	40		12		52

Source: JVS-E-I (selection the Netherlands).

Design of the case-study

The case study is largely based on an analysis of the 52 unique measuring instruments that are known in the Netherlands (JVS-E-I). Table 5.1 illustrates that it covers a broad spectrum of measuring methods. Nationally, this includes eight instruments that measure the number of open job vacancies (5.2), five instruments that measure the number of job vacancies filled or job finders (5.3) and four instruments that measure the inflow of job vacancies (5.4). See annex 6 for a short description of these instruments. The selection of these instruments forms a complete picture of all instruments on the national level in the Netherlands as per January 2012. The other measuring instruments concern the sectoral, regional or local levels and a number of specific instruments. The job vacancy market of intermediaries is analysed on the basis of an employer survey carried out by the public employment services in the Netherlands since 1984 (5.5). The analysis of job vacancies in sectors is based on 23 sector studies (5.6).

Job vacancy statistics from the several measurement instruments has been used to compare the results for specific base years (JVD-NL). In addition, empirical studies that are related to these instruments (JVS-E-S) and my own knowledge from having carried out two of the national studies and several sector studies have been used. If empirical information is lacking, I have made use of the expert-to-experts talks (JVE).

5.2 Measurement of the number of open job vacancies

A comparison of eight instruments

Eight instruments to measure the number of open job vacancies have been identified (table 5.2). At the end of 2011, mid 2009 was the most recent measurement moment. The results vary from 7,000 to 275,000 open job vacancies. The result obtained from the instruments that set out to measure the total number of job vacancies in the Netherlands, excluding the intermediaries (public employment services, ABU, Randstad and Twitterbaan.nl), varies from 128,000 to 275,000. The highest measurement was seen in the *Panel Demand for Labour* of OSA/SCP, with 275,000 job vacancies in mid 2009. This is an estimate I made based on the job vacancy rate (OSA/SCP) and employment (SN). The UWV *Job Vacancies in the Netherlands* study showed 192,000 open job vacancies. Compared with this, the SN's *Job Vacancy Statistics* and the *Survey Economic Structure* are fairly low with 128,000 open job vacancies. The intermediaries' job vacancy markets have a relatively low score: the register of job vacancies of public employment services, the ABU *Survey Inflow of Temporary Agency Workers* and the register of online job vacancies from Randstad and Twitterbaan.nl. The following section provides a more in-depth look at possible explanations for these differences.

Table 5.2 The number of open job vacancies in the Netherlands according to eight different instruments (Mid 2009)

Source	Instrument	Operational definition	Level of detail (in digits)	Type of source	Time series	Frequency of publication	Total stock (x 1,000)
1. Statistics Netherlands (SN)	<i>Job Vacancy Statistics</i> (Vacature-enquête)	Unmet demand, including temporary agency work, including internal job vacancies	Sector (1)	Written and online employer survey	1952-2010	Quarter	128
2. Statistics Netherlands (SN)	<i>Survey Economic Structure</i> , including Job Vacancy Statistics (Structuur-enquête)	Unmet demand, including temporary agency work, including internal job vacancies	Sector (5), occupation (2), region (3)	Written and online employer survey	1992-2008	Bi-yearly	128
3. UWV	<i>Job vacancies in the Netherlands</i> (Vacatures in Nederland)	Job opportunities	No details	Employer survey	2006-2010	Year	192
4. OSA/SCP	<i>Panel Demand for Labour</i> (Vraagpanel)	Job opportunities	Sector (1), occupation (1), education (1)	Employer panel survey	1995-2008	Two years	275
5. Public Employment Services	Job vacancy register	Job opportunities	Detailed	Register	2000-2011	Month	57
6. ABU	<i>Survey Inflow of Temporary Agency Workers</i> (Instroom-onderzoek)	Estimation based on assignments	Sector (1), occupation (1), education (1)	Survey temporary agency workers	1991-2008	Two years	19
7. Randstad	Register online job vacancies	Job opportunities	No details	Register of open job vacancies	2010-2012	Quarter	7
8. Twitterbaan.nl	Open job vacancies in social media	Job opportunities	No details	Internet	None	Infrequent	100

Source: JVS-E-I (selection of eight instruments).

Job Vacancy Statistics, Job Vacancies in the Netherlands and Panel Demand for Labour compared

The first four instruments (table 5.2) aim to provide a representative picture of the stock of job vacancies in the Netherlands. The SN *Job Vacancy Statistics* measures the number of open job vacancies following more or less the concept of unmet demand. This survey is executed in a more detailed format bi-yearly (*Survey Economic Structure*). Between 1997 and 2010 the yearly average of open job vacancies is circa 175,000. Compared with the *Job Vacancy Statistics*, two other instruments — *Job Vacancies in the Netherlands* and the *Panel Demand for Labour* — show higher results for the number of open job vacancies. On average, the figures of the *Job Vacancies in the Netherlands* for 2006-2010 are 56 percent higher than those of the *Job Vacancy Statistics*. In 2007 and 2008 the differences are significant. In five years — 1999, 2001, 2003, 2005 and 2007 — the *Panel Demand for Labour* shows figures of the number of open job vacancies that are 22 percent higher on average (table 5.3).

Table 5.3 Number of open job vacancies in the Netherlands according to three instruments (1999-2010)

Year	<i>Job vacancy Statistics SN</i> (annual average)	<i>Job Vacancy Statistics SN</i> (measured at end of June)	<i>Job Vacancies in the Netherlands UWV</i> (measured at end of June)	<i>Panel Demand for Labour OSA/SCP</i> (measuring moment unclear)
1999	172,000	-	No measurement	286,020
2001	198,400	-	No measurement	271,776
2003	110,000	-	No measurement	93,171
2005	150,200	-	No measurement	134,995
2006	206,300	-	292,000	No measurement
2007	240,000	-	416,000	274,725
2008	240,400	-	417,000	No measurement
2009	143,400	128,400	192,000	No measurement
2010	121,600	117,500	163,000	No measurement

Source: JVD-NL (selection three instruments).

Correlation Job Vacancy Statistics (2006-2010) and Job Vacancies in the Netherlands (2006-2010): $R = 0.982$; $p = 0.003$ (two sided, significant)

The differences in the results cannot be explained by a difference in the measuring moments. For both 2009 and 2010 it is possible to compare the stock figures at the end of June supplied by the *Job vacancy Statistics* and the *Job Vacancies in the Netherlands*. In June 2009, the latter study measured 50 percent more open job vacancies than the former, and 39 percent more in June 2010. The data collection method does not explain these differences either, because all three sources are based on employer surveys.

A possible explanation for the lower figures in the *Job Vacancy Statistics* might be that the survey is carried out among the main offices (c. 350,000) and the *Job Vacancies in the Netherlands* among local offices (c. 500,000), meaning that the lower figures in the *Job Vacancy Statistics* result from the fact that respondents from main offices often cannot provide a complete picture of all job vacancies at the local offices (CWI, 2006b).

The operational definition offers another explanation for the lower outcomes of the *Job Vacancy Statistics*. The questions of the *Job Vacancy Statistics* focus on job vacancies that can be filled immediately or as soon as possible, more or less following the Eurostat definition. Both of the other survey instruments do not have this restriction: the *Job Vacancies in the Netherlands* and the *Panel Demand for Labour* are aimed at measuring job opportunities. Remarkably, the *Job Vacancy Statistics* has a lower outcome despite the fact that the measurement by this survey includes internal job vacancies and includes job vacancies for temporary agency work, which are excluded from the *Job Vacancies in the Netherlands*.

It is unknown which of these two differences – the difference in measuring units and the difference in definition – has the largest impact on the measuring results. The quantification of the differences is in this case not possible. The quantification of the differences in the measuring at the level of the main office or at the level of the branch offices cannot be demonstrated, because the *Job Vacancy Statistics* makes exclusive use of the first approach, whereas *Job Vacancies in the Netherlands* uses only the second approach. The impact on the measuring result due to the difference in operational definition is unknown, because the quantitative effects of the separate components of the operational definitions are unknown.¹⁷

¹⁷ The effects of differences in operational definitions of job vacancies can be substantial. According to Swedish data, the inclusion of job vacancies for occupied positions produces a multiplier of 2.5. This does not even include an extension with job vacancies that involve only passive recruitment resulting in a multiplier of 1.4 (Farm, 2005^b) (see footnote 8, section 2.9).

Register of public employment services and Job Vacancy Statistics compared

The number of job vacancies that are open at public employment services is always smaller than the total number of open job vacancies in a country, because not all job vacancies are reported to the public employment services. In the period from 2000 up to and including 2009 the market coverage, i.e. the ratio between the number of open job vacancies of public employment services and the total number of open job vacancies in the Netherlands (*Job Vacancy Statistics*), is on average 33 percent (table 5.4). The numerator and the denominator are based on different sources. To avoid discussion about the market coverage of public employment offices based on registers, in the Netherlands the market coverage is often based on a survey measuring the denominator as well as the numerator (Section 5.5).

Table 5.4 Ratio open job vacancies public employment services and Job Vacancy Statistics compared (2000-2009)

Year	Public Employment Services (average number of registered job vacancies of ultimo four quarters)	Job Vacancy Statistics SN (number of open job vacancies end of June)	Ratio Public Employment Services and Job Vacancy Statistics SN (market coverage stock)
2000	75,925	203,700	37%
2001	65,911	198,400	33%
2002	48,804	150,400	32%
2003	37,483	110,000	34%
2004	48,053	118,800	40%
2005	70,111	150,200	47%
2006	58,870	206,300	29%
2007	61,145	240,000	25%
2008	56,544	240,400	24%
2009	56,544	143,400	39%
Average 2000-2009	57,949	176,160	33%

Source: JVD (selection two instruments). Correlation: $R = 0,557$; $p = 0,940$ (two sided, not significant).

Registers of intermediaries compared

The number of all open job vacancies for temporary agency work is unknown. Interviews with employees from the temporary work agency branch and labour market experts (JVE) revealed that job vacancies for temporary work are only open for a relatively short period of time, sometimes only a few hours or some days at the most. Using figures from 2000 until 2008 and starting from an average job vacancy duration of a week, the estimate is 19,000 open job vacancies for temporary work, just to have an impression of the order of magnitude (table 5.2). This number of open job vacancies is significantly lower compared to the number of open job vacancies of public employment services (57,000). This coincides with the fact that job vacancies are filled swiftly by temporary work agencies.

On the basis of the data of a single temporary work agency it is not possible to provide a representative picture for the whole of the Netherlands, especially in view of the limited market share. It should also be taken into account that the individual temporary work agencies are active in specific sectors of the temporary work market, resulting in selection effects. The most representative temporary work agency in the Netherlands is Randstad, one of the largest temporary work agencies in the world. In mid 2010 this agency started to supply absolute figures on open job vacancies (European Commission, 2011a). However, these figures only concern job vacancies that were reported at the branch offices of Randstad and were subsequently published on the Internet when they could not be filled immediately through the branch offices themselves. Randstad publishes the daily average per month (table 5.5), clearly showing that the number of open job vacancies for temporary work is largest during the summer months, which is largely due to seasonal work. The average between December 2009 and May 2011 is 6,743 open job vacancies. Another company Adecco publishes its own job vacancy index on the Internet, but the absolute numbers and the methodology used are not published publicly.

Table 5.5 Open online job vacancies at Randstad (December 2009-May 2011)

Month	Open online job vacancies Randstad Netherlands
December 2009	5,596
January 2010	4,979
February 2010	5,531
March 2010	5,762
April 2010	6,278
May 2010	6,634
June 2010	7,462
July 2010	7,468
August 2010	7,047
September 2010	6,511
October 2010	6,680
November 2010	6,665
December 2010	6,807
January 2011	6,533
February 2011	7,155
March 2011	7,548
April 2011	8,264
May 2011	8,459
Average Dec 2009-May 2011	6.743

Source: JVD (selection one instrument).

At present no statistics on open job vacancies based on social media exist. One should, however, note the initiative by a number of students from the city of Deventer who use Twitter in combination with job vacancies. They quickly managed to trace 100,000 job vacancies using the hashtag ‘job vacancy’, which gave rise to a commercial enterprise (Twitterbaan.nl, 2011). Although it is relatively easy to quickly detect the data, the follow-up is still underdeveloped, viz. the removal of double counts. This tool is therefore useful for mediation and less useful for statistics, which was corroborated by the developers in a personal interview (JVE).

5.3 Measurement of filled job vacancies, hires and job finders

Comparison of five instruments

Using the year 2009 as base year, the number of filled job vacancies, hires and job finders provided by five instruments have been compared (table 5.6). It appears that the *Policy Register* of UVW is by far the highest with 3.700 million new income situations (*inkomstenverhoudingen*), an indicator for the number of hires (data 2011). The number of hires according to the *UWV Job Vacancies in the Netherlands* (886,000) is approximately the same as the number of filled job vacancies in the *SN Job Vacancy Statistics* (794,000). The *SN Labour Force Survey* gives a number of 642,000 job finders. The *ABU Survey Inflow of Temporary Agency Workers* shows that temporary agencies fill 1.231 million assignments on average per year (2000-2008). No data is available from public employment services or from online recruitment services with regard to filled job vacancies, hires or job finders. This section takes a further look at possible explanations for these differences.

Table 5.6 Instruments measuring hires, filled job vacancies and job finders in the Netherlands (2009)

Source	Instrument	Unit of analysis	Level of detail (in digits)	Type of instrument	Time series	Frequency of publication	Total in 2009 (x 1,000)
1. UWV	<i>Job Vacancies in the Netherlands</i> (Vacatures in Nederland)	Hires (recruited persons), equivalent of job vacancies filled	Sector (2), occupation (2), education (2)	Employer survey	1984-2010	Year	886
2. SN	<i>Job vacancy statistics</i> (Vacature-enquête)	Filled job vacancies	Sector (1)	Written and online employer survey	1952-2010	Quarter	794
3. SN	<i>Labour Force Survey</i> (Enquête Beroepsbevolking)	Job finders	Sector (4), occupation (4), education (4)	Population survey	1984-2011	Quarter	642
4. UWV	<i>Policy Register</i> (Polisadministratie)	New income situations	Sector (4), occupation (4)	Employee register	2006-2011	Ad hoc	3.700 (year 2011)
5. ABU	<i>Survey Inflow of Temporary Agency Workers</i> (Instroomonderzoek)	Assignments	Sector (1), occupation (1), education (1)	Survey temporary agency workers	1991-2008	Two years	1.231 (average 2000-2008)

Sources: JVS-E-I (selection five instruments).

The national sources compared

The first four instruments (table 5.6) aim to provide a representative picture of the number of job vacancies filled in the Netherlands. For the period between 1997 and 2006, the *Job Vacancies in the Netherlands* presents figures that are on average 20 percent higher than those of the *Job Vacancy Statistics*. Starting from 2006, the differences become smaller. The *Job Vacancies in the Netherlands* comes out lower in 2008 and 2010. Between 1997 and 2005 the annual difference was 29 percent, from 2006 onwards only six percent. This change in the results per 2006 coincides with the new set up of *Job Vacancies in the Netherlands* per 2006, including the use of a different research institute to collect and analyse the data.

The figures of the *Job Vacancy Statistics* published by SN in 2007 — dealing with 2006 — are lower than the figures on 2006 published by SN in 2011. This is due to (minor) changes in the definition and calculation method through time, including a recalculation of historical figures by SN.

Table 5.7 Number of filled job vacancies in the Netherlands according to two instruments (1997-2010)

Number of filled job vacancies (x 1,000)	Job Vacancy Statistics (SN)	Job Vacancies in the Netherlands (UWV)	Absolute difference between Job Vacancy Statistics and Job Vacancies in the Netherlands	Difference Job Vacancy Statistics and Job Vacancy in the Netherlands in terms of percentage
1997	679	791	112	16%
1998	834	924	90	11%
1999	904	1,153	249	28%
2000	997	1,495	498	50%
2001	989	1,415	426	43%
2002	781	1,110	329	42%
2003	672	849	177	26%
2004	697	862	165	24%
2005	830	926	96	12%
2006	988	1,007	19	2%
2007	1,105	1,183	78	7%
2008	1,088	1,039	-49	-5%
2009	794	886	92	12%
2010	737	686	-51	-7%
1997-2006	864	1,023	174	20%
Until 2006	820	1,058	238	29%
2006-2010	942	960	58	6%

Sources: JVD-NL (selection two instruments).

Correlation Job Vacancy Statistics and Job Vacancies in the Netherlands: $R = -0.613$; $p = 0.020$ (two sided, significant).

In the period 2007-2010, the average number of job finders per year was 808,000, according to the *Labour Force Survey* (table 5.8). Measured over four years, the outcome of the *Labour Force Survey* is 15 percent lower than the *Job Vacancy Statistics* (931,000 filled job vacancies) and 17 percent lower than the *Job Vacancies in the Netherlands* (949,000 filled job vacancies). However, more significant differences were observed per year, with a caesura in 2010. For 2010, the *Labour Force Survey* shows a figure that is substantially higher than the outcomes of the other two instruments. This was caused by the introduction of a new operational definition in the year involved. Starting in 2010, job finders are defined as persons who have held their present position for less than a year, as opposed to the earlier definition, viz. those who found a job in the last quarter (times four). The changed definition obviously has a considerable effect.

Table 5.8 The number of job finders, filled job vacancies and hires in the Netherlands according to three instruments 2007-2010

Instrument	job finders (Labour Force Survey or LFS)	filled job vacancies (Job Vacancy Statistics or JVS)		hires (Job Vacancies in the Netherlands or JVN)	
	Absolute (x, 1000)	Absolute (x 1,000)	Difference with LFS (%)	Absolute (x 1,000)	Difference with LFS (%)
2007	756	1,105	46%	1,183	56%
2008	778	1,088	40%	1,039	34%
2009	642	794	24%	886	38%
2010	1,056	737	-30%	686	-35%
Average 2007-2010	808	931	15%	949	17%

Source: JVD-NL (selection of three instruments).

Correlation LFS and JVS: $R = -0.385$; $p = 0.615$ (two sided, not significant).

Correlation LFS and JVN: $R = -0.218$; $p = 0.782$ (two sided, not significant).

Correlation JVS and JVN: $R = -0.733$; $p = 0,267$ (two sided, not significant).

The *Policy Register* of UWV records new income situations (*inkomstenverhoudingen*). This includes the new employment relationships between employees and employers, but also pensions, annuities and social benefits. UWV uses the policy records to determine the amount and the duration of a possible allowance from one or more employee insurance programs. An administrative link between all individual employers and all individual employees in the Netherlands exists. In fact, in the Netherlands all labour contracts are registered in the policy records. New labour relationships are also recorded, indicating the number of hires.

For 2011 and 2012 it is possible to derive 3.7 million and 3.4 million new labour relationships respectively (online figure UWV). The *Policy Register* is linked to statistical data of Statistics Netherlands together forming the *System of Social Statistical Datasets*, formerly named *Social Statistical Database* (Bakker, Van Rooijen and Van Toor, 2014). Analysis on data of the *System of Social Statistical Datasets* show results in the same order of magnitude (Bruil, Den Butter and Kee, 2010).

Compared to the results of the other measuring instruments — also taking into account the size of the total employment in the Netherlands (approximately seven million employees) — these figures are too high to serve as a reliable indication of hires. Even if we exclude the approximately 1.1 million new contracts with temporary work agencies the remaining figures are too high to be used as a valid indication of the number of hires. The high figures are explained by the mutations of administrative data of companies and organisations. Mutations can lead to new income situations in the register even if no new job has been created. This happens, for instance, with mergers, company splits, take-overs and name changes, which involve a change in the identification numbers of employers. The *Policy Register* is aimed at registration for social security purposes, not for measuring the movements on the labour market. The influence of the administrative mutations is unclear and in any case it changes over time. For this reason the information on income transactions does not give a representative picture of job finders on the Dutch labour market, but the data is still very useful for analyses.

The number of assignments of temporary work agencies

Temporary work can be viewed as a reliable predictor of economic development. Economic growth means that more temporary agency workers are hired. When the economy starts to slump the temporary agency workers are the first to lose their jobs. The figures are regular and available at an early stage. Also, research and the literature show a strong, real-time relation between temporary work and the state of the economy (Canoy, Donker van Heel and Hazebroek, 2009). Despite the usefulness of data from temporary work agencies and the relative abundance

of information on temporary work in the Netherlands — just like in the rest of Europe — practically no statistics on job vacancies for temporary agency work exist.

In the Netherlands a proxy for the number of hires for temporary work is used, namely new assignments of temporary workers with hiring parties. The data involved were derived from the ABU *Survey Inflow of Temporary Agency Workers*, which is a survey of temporary agency workers (Donker van Heel and Van der Ende, 2009). Table 5.9 shows 1.231 million new assignments on average per annum in 2000-2008 in the Netherlands. The number of hires for temporary agency work is lower, because a number of the temporary agency workers involved already have an employment contract with a temporary work agency, meaning that in these cases no new employment contract is created. Viewed over a longer period, on average 87 percent of all temporary agency workers have no continuous employment with the temporary work agency, which equals 1.,070 million persons. In order to estimate the total number of hires the number of individuals that are yearly hired for continuous employment should be added. To roughly calculate this latter figure, the number of assigned persons in this group of temporary agency workers (92,000) should be divided by the average number of placements per annum (1.76), which makes circa 53,000 temporary agency workers. So, my estimate of the total number of hires for temporary work is on average 1.123 million per annum between 2000 and 2008 (table 5.9).

It should be noted that the estimate of the number of new assignments (and hires) includes the recall employees among the temporary agency workers, i.e. unique temporary agency workers marked for work with a specific hiring party. This particular job vacancy is therefore not open to other job seekers. Recall is involved in almost all job vacancy measurements that are available today, although one cannot rule out the possibility that recalls occur relatively often in temporary agency work.

Table 5.9 Estimate of the number of hires for temporary agency work in the Netherlands (2000-2008)

Year (x 1,000)	Inflow of persons	Inflow of persons with provision	Inflow of persons without provision	Average number of assignments per person	Number of new assignments	Number of new assignments of persons with provision	Number of hired persons without placement provision	Number of hires for temporary work	Filled according to SN	Filled according to UWV	Multiplier regular job vacancies after addition of job vacancies for temporary work
2000	746	664	82	1.75	1,306	1,162	47	1,209	997	1,495	1.8
2001	725	616	109	1.44	1,044	887	76	963	989	1,415	1.6
2002	650	559	91	1.71	1,112	956	53	1,009	781	1,110	1.9
2004	615	488	127	1.88	1,156	917	68	985	697	862	2.1
2006	730	667	63	1.83	1,336	1,221	34	1,255	988	1,007	2.2
2008	734	655	79	1.95	1,431	1,277	41	1,318	1,088	1,039	2.2
Average	700	608	92	1.76	1,231	1,070	53	1,123	923	1,155	1.9

Source: JVD-NL (selection of one instrument: *Survey Inflow Temporary Agency Workers*, ABU, 2009).

Correlation: number of hires for temporary work and filled job vacancies according to SN: $R = 0.721$; $p = 0.530$ (two sided, not significant).

Correlation: number of hires for temporary work and filled job vacancies according to UWV: $R = -0.470$; $p = 0.788$ (two sided, not significant).

The number of hires for temporary agency work in the Netherlands is considerable compared to the number of regular job vacancies filled (Donker van Heel, 1994c). The estimate of 1.123 million hires for temporary work on average in 2000-2008 is of the same order of magnitude as the estimate of 1.155 million regular filled job vacancies (*Job Vacancies in the Netherlands*). The last figure includes the temporary agency workers working at the user company and then being hired by the company and put on its payroll. In other words: both populations

mutually exclude each other: hires for temporary agency work and filled job vacancies by regular employers. The total number of hires for this period equals the sum of both figures (2.278 million hires). Roughly speaking, for the Netherlands the number of filled job vacancies or hires should be raised by a factor of two to include hires of temporary work agencies. A similar result has been calculated for Belgium (Simoens et al, 1998; Federgon, 2010), meaning that the existing job vacancy statistics would become substantially higher if the job vacancies for temporary work were taken into account as well.

The ABU *Research on Transitions (Transitieonderzoek)* will potentially offer a look at figures of hires by temporary work agencies. This study is based on the UWV *Policy Register* that registers all new income situations in the Netherlands, including those of temporary work agencies. The UWV *Policy Register* allows a distinction to be made between new employment for a company's own personnel (mediators) and employment for temporary agency workers. The *Policy Register* also allows on-call employees to be singled out, also with temporary work agencies.

5.4 Inflow of job vacancies

Comparison of four instruments

A comparison of four instruments has been made with regard to the inflow of job vacancies, using 2010 as base year (table 5.10). In that year, the *Job Vacancy Statistics* has an inflow of 743,000 job vacancies and *Job Vacancies in the Netherlands* an inflow of 759,000 job vacancies. The public employment services registered an inflow of 268,000 job vacancies in 2010, about one third of all the new job vacancies in the Netherlands (compared to *Job Vacancy Statistics* and *Job Vacancies in the Netherlands*). *Job Feed* measured an inflow of approximately 480,000 online job vacancies, about 65 percent of the total inflow (*Job Vacancy Statistics* and *Job Vacancies in the Netherlands*). The comparison is troublesome, because *Job Feed* and the registers of the public employment services include job vacancies of temporary work agencies and the other sources do not.

Table 5.10 Instruments measuring the inflow of job vacancies in the Netherlands in 2010

Source	Instrument (in Dutch)	Unit of analysis	Level of detail (in digits)	Type of instrument	Time series	Frequency of publication	Inflow in 2010 (x 1,000)
1. SN	Job Vacancy Statistics (<i>Vacature-enquête</i>)	Inflow of job vacancies	Sector (1)	Written and online employer survey	1952-2010	Quarter	743
2. UWV	Job Vacancies in the Netherlands or JVN (<i>Vacatures in Nederland</i>)	Inflow of job vacancies	-	Employer survey	1984-2010	Year	759
3. Public employment services (UWV)	Job vacancy register	Inflow job vacancies	Sector (1), occupation (1), education (1)	Register	1980-2011	Month	268
4. Textkernel	Job Feed	Job offers placed the internet (inflow)	Detailed	Linking of job vacancy websites	2009-2012	Month	c. 480

Source: JVS-E-I (selection of four instruments).

Inflow of job vacancies according to sources on the national level (SN and UWV)

Although the 2010 figures show a very small difference in results (2%), over a period of five years the differences seen in some years is larger (table 5.11). *Job Vacancies in the Netherlands* measured, on average, 17 percent more new job vacancies compared to the *Job Vacancy Statistics* over the entire period 2006-2010. In 2008 the difference was 32 percent. The methodology does vary (different sampling frameworks, different questions and a different approach to gathering data), which can all contribute to the difference in results. An important difference when operationalizing the inflow is that the *Job Vacancy Statistics* carries out measurement afterwards and the *Job Vacancies in the Netherlands* uses a combination of measuring afterwards (the inflow during the past six months) and beforehand (the expected inflow for the coming six months).

Table 5.11 Inflow of job vacancies according to *Job Vacancy Statistics* and *Job Vacancies in the Netherlands* (2006-2010)

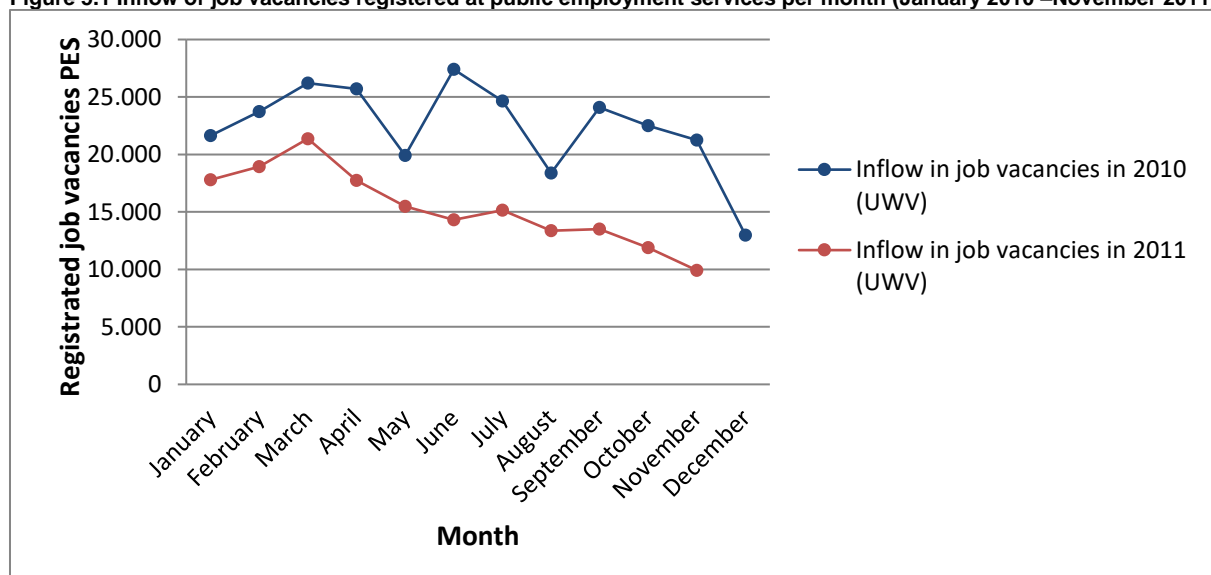
Year (x 1,000)	Inflow job vacancies (Job Vacancy Statistics)	Inflow job vacancies (Job Vacancies in the Netherlands)	Difference
2006	1,052	1,149	9%
2007	1,124	1,386	23%
2008	1,028	1,352	32%
2009	725	808	11%
2010	743	759	2%
Average 2006-2010	934	1,091	17%

Sources: JVD-NL (selection of two instruments).

Inflow of registered job vacancies at public employment services and online recruitment services

In 2010 the total inflow of notified job vacancies at the public employment services was 268,000. In 2011 the total inflow was 185,000 (December estimated), a decline of 31 percent in one year (JVD-NL). The declining trend of registered job vacancies has to do with a policy shift in recent years from active registration of job vacancies by public employment services towards online self-registration of job vacancies by employers (JVE).

Figure 5.1 Inflow of job vacancies registered at public employment services per month (January 2010 –November 2011)



Source: JVD-NL (selection UWV).

From 2010 onwards, the use of online job vacancy data for labour market statistics has increased in the Netherlands. This may be partly due to the fact that the supply of online commercial recruitment services is on the increase. Also, the existing data collection methods (surveys) are becoming too expensive. The OSA/SCP *Panel Demand for Labour* has been terminated, the SN *Survey Economic Structure* has been cancelled, the *Job Vacancies in the Netherlands* is starting to feel the pressure of budget cuts at the public employment services, and the active job vacancy registration of public employment services is moving towards online self-registration by employers. The main online source in the Netherlands is *Job Feed*, owned by Textkernel, a private company. Textkernel continually detects job vacancies on the Internet, for instance from commercial online recruitment services, job vacancy sites and job vacancies on company websites.

According to Textkernel, since it started in 2008, *Job Feed* has covered the entire market of online job vacancies in the Netherlands. This was achieved through broad detection (spidering) of job vacancies on the web, using the existing job sites of intermediaries and company websites. *Job Feed* searches through alphanumeric texts on the web, checking the html pages involved for the presence of job vacancies. Approximately 40 fields are coded, for example occupation and education. Partly on the basis of these fields — and the url — double counts are removed. The url is constantly checked to see if the job vacancy announced through the url is still open. This must guarantee the information on the open job vacancies is up-to-date, presenting a valid picture of the inflow of unique job vacancies.

The removing of double counts in *Job Feed* improved between 2010 and 2012. In 2010 the *Job Feed* figures show that 1,220,000 times a job vacancy was announced on the Internet, 439,000 directly on employer websites and 781,000 through intermediaries such as temporary work agencies. This includes parallel and sequential posting of the same job vacancies. In 2010 the result after deduplication was 67 percent. In 2012 after removal of double counts from all job vacancy announcements we are left with 26 percent job of vacancies that can be viewed as inflow (317,000). In 2010 the monthly inflow was approximately 40,000 job vacancies, in 2012 it was approximately 23,000 (source: www.jobfeed.nl, February 2011). These figures indicate that the process of removing double counts has significantly improved. A weakness of this instrument is that the actual date on which a job vacancy comes into being is not known and that the system date is used, i.e. the date that the job vacancy is traced on the web (see also section 3.8).

The online job vacancy banks are partly polluted by the so-called 'ghost vacancies' that are placed on the internet, the only purpose being to build up a pool of good candidates for whom no concrete job is available (Minister Donner of Social Affairs and Employment in Dutch Parliament, 3 February 2010). The actual volume of this phenomenon is unknown, but it is clear that the figures are to some extent propelled upwards by it. According to Textkernel this is due to some intermediaries, mostly small temporary work agencies, and less due to individual employers.

5.5 The job vacancy markets of intermediaries

The market position of intermediaries

This section looks at the position of public employment services, temporary work agencies, advertisements, online recruitment services and social media on the job vacancy market in the Netherlands. The analyses are based on secondary analyses of statistics of the *Job Vacancies in the Netherlands (1984-2009)* as stored in JVD and some own studies based on this survey (JVS-E). The market position of labour market intermediaries is relevant for understanding the value of these intermediaries as sources for job vacancy data. Because information supplied by intermediaries is used for job vacancy analyses and policy it is vital to have an insight into the position of the labour market intermediaries on the job vacancy market. On the basis of the Dutch figures it is possible to say more about the changing position of the various recruitment channels on the job vacancy market. How strong is this position, what is the extent of the change it is going through and what exactly is this position in specific segments of the job vacancy market?

An analysis of trends and the economic situation was carried out to investigate the changing position of the recruitment channels (Donker van Heel, Legerstee and Van der Ende, 2008), using data from the *Job Vacancies in the Netherlands* survey that was conducted almost annually from 1984 until 2006¹⁸. This research contains statistics on the recruitment channels that are used and — in the case of hires — also the hiring channel (also stored in JVD). The *Job Vacancies in the Netherlands* is the only European source supplying information that can be compared on recruitment channels, providing time series long enough to allow an analysis of trends and the economic situation. It is also one of the rare employer surveys in Europe that includes breakdowns of recruitment channels across market segments.

The statistical analysis shows that from 1984 up to and including 2006 there was no structural increase or decrease of the share of each of the groups of recruitment and hiring channels that were investigated. The market coverage of the public employment service has remained constant throughout the entire period. The online job vacancy site of the public employment service (werk.nl) has helped to maintain the market coverage. The temporary work agencies also show no structural increase or decrease, and although the Internet as a recruitment channel has only been monitored for a few years, the rise of the Internet is making itself felt. The importance of the company's own website as a recruitment channel is growing. In 2006, eight percent of all of the approximately one million job vacancies was filled in this manner. However, the measuring period is too short to allow any statistical analysis at this point.

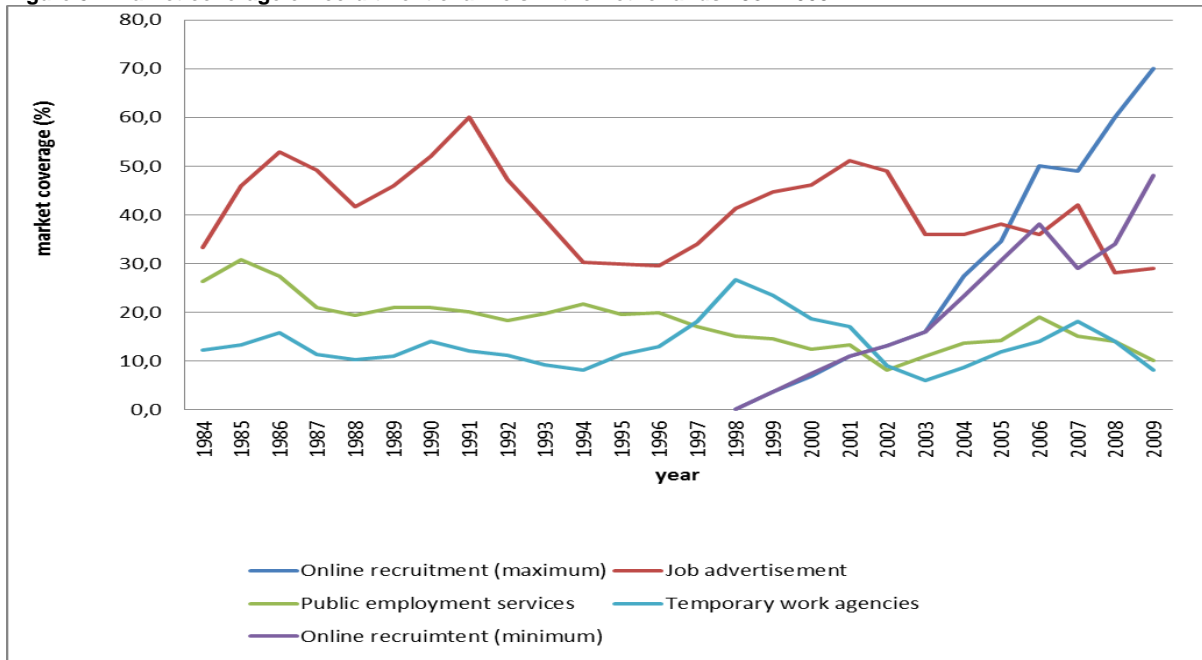
The article by Donker van Heel, Legerstee and Van der Ende (2008) stated that the Internet would become very popular as a recruitment channel. In view of its already large share, a further increase in popularity cannot be excluded. This would, in any case, mean that the use of job vacancy sites by companies, employees and intermediaries will continue to grow. The same may be said about the placement of job ads on the companies' own websites. Per 2008, the expectation was that in the future the share of the job vacancy ads in written media will experience a structural drop.

Looking at the new figures for 2006 up to and including 2009, it is seen that this expectation has already become reality (see figure 5.2). For 1998-2009 the variable 'job advertisement' shows a significant downward trend (regression coefficient shows a decline of 0.46 percent points per year ($p = 0.039$, two sided), the variable 'online recruitment services (maximum)' shows a significant increase (regression coefficient shows an increase of 6.45 percent points per year ($p=0.000$, two sided) and the variable 'online recruitment (minimum)' a significant increase of 4.01 percent points per year ($p=0.000$, two sided)¹⁹.

¹⁸ This elaboration is based on an econometric analysis that also includes separate regression analyses for each recruitment channel. The shares have been transformed into percentages to render them suitable as variable that has to be explained for linear regression. Among others, an economic climate indicator and the year of the measurement were used as variables that have to be explained. An optimal fit was sought by using the time series with a zero, one and two year delay. This analysis was done by my former colleagues Rianne Legerstee and Martin van der Ende.

¹⁹ The figures for the market coverage of online recruitment do require a marginal note. I calculated a maximum and a minimum coverage. The maximum includes recruitment through the own website, recruitment through external sites and werk.nl (online recruitment site of UWV). This means that there is an overlap, when two or three types of channels were used for the same job vacancy. The minimum is calculated on the basis of the use of the own website or recruitment through external sites (no double counting), but excluding werk.nl (CWI, 2006b, 2007, 2008; UWV, 2009). Therefore, the real coverage set off against all job vacancies is lower than the maximum en higher than the minimum. It is unambiguous for all other recruitment channels.

Figure 5.2 Market coverage of recruitment channels in the Netherlands 1984-2009



Source: JVD-NL (selection *Job Vacancies in the Netherlands*).

The Internet — including companies' own websites — and informal channels are strongly on the rise at the expense of formal recruitment channels such as ads, public employment services, temporary work agencies, recruitment and selection agencies and secondment agencies (Donker van Heel and De Wit, 2011). This development is also visible in the market shares of the hiring channels. The combined market share of the Internet, company websites and other internet sources was 26 percent in 2009, which includes corrections for double counts per hire (UWV WERKbedrijf, 2009). This means that in 2009 one fourth of all transactions on the labour market took place through the Internet. The success of these channels could include a self-reinforcing effect, meaning that the market coverage of these recruitment channels will increase further at the expense of ads in newspapers, public employment services and temporary work agencies. In other words, the job vacancy figures on the Internet will become increasingly important for labour market research (JVE).

The economic situation and the tight labour market clearly influence the use of recruitment channels and the success they have. It appears that the share of the job vacancies that companies define as hard to fill follows the economic situation with an interval of circa one year (Donker van Heel, Legerstee and Van der Ende, 2008). It is obvious that companies will only notice bottlenecks when the labour market becomes tighter, seeing fewer bottlenecks once the labour market improves. Companies start to actively recruit just before the economic situation starts to improve, using intermediaries such as public employment services, temporary work agencies, secondment agencies, recruitment and selection agencies and schools. The analysis shows that the use of formal recruitment follows the economic situation very well. If the economic situation improves the use of formal channels starts to grow, if the situation declines the use of recruitment channels starts to drop. If after some time it becomes more difficult to fill job vacancies, an extra investment is made in recruitment, using more recruitment channels that involve cost.

The temporary work agencies are mostly used prior to the improvement of the economic situation, but also during a boom (Donker van Heel, Legerstee and Van der Ende, 2008). The explanation for this double 'boost' is probably that companies may have several motives to resort to temporary workers (Donker van Heel, 2000). At the first stage of economic improvement, companies use temporary workers to handle increasing production in a flexible way, whereas during a boom companies use temporary work agencies as a recruitment channel. This additional motive provides an added impetus to the use of temporary agency workers.

The type of job vacancies of intermediaries

The job vacancies at the labour market intermediaries do not represent the total job vacancy market. The table below shows the market coverage of the main recruitment channels, including breakdowns for a number of market segments (CWI, 2006b). No such data have been published after 2006. This involves the recruitment channels, not the hiring channels. More than one recruitment channel may have been used per job vacancy, meaning that the row percentages exceed 100 percent. An ad was placed for 36 percent of all filled job vacancies in 2006, the corresponding percentages for the public employment service, the internet and temporary work agencies were 25, 38 and 14 percent respectively.

Table 5.12 Market coverage of recruitment channels according to market segments (2006)

Market coverage (%), column percentages	Advertisements in written media	Public employment services	Online recruitment services (internet)	Temporary work agencies
Total	36	25	38	14
Sector				
Agrarian	36	20	4	17
Industry	37	31	26	31
Construction	30	35	29	28
Trade, catering	32	23	22	7
Business services	37	25	51	14
Government	49	28	58	11
Other services	46	16	33	10
Number of employees				
2-19 employees	32	21	19	12
20-99 employees	46	38	39	13
100 and more employees	34	19	55	16
Occupation				
Agrarian	50	31	1	16
Production	36	26	19	29
Technical and construction	39	42	40	18
Transport	44	50	12	8
Retail	40	25	29	6
Catering	21	20	12	1
Administrative and commercial	34	19	46	19
Care and (para)medical	55	24	69	3
Education	44	13	53	5
Other	40	21	51	10
Educational level of hired person				
Primary education/no education	30	34	11	8
Preparatory secondary vocational education	33	35	22	20
Secondary school	55	31	28	12
Intermediate vocational education	43	31	35	16
Higher vocational education, university	32	12	55	9

Source: JVD (selection of one instrument; CWI, 2006b).

The various recruitment channels show a (highly) different coverage according to types of companies and job finders (table 5.12). When making use of these sources researchers will have to account for an over- and underrepresentation of specific job vacancies.

As a recruitment tool, advertisements in written media are mainly used by government institutions (49%) and other services (46%). Ads are relatively often used to recruit care and (para)-medical personnel (55%). They do not cover a population with only a primary or no education.

The public employment service has a relatively high market coverage in construction (35%), and high figures for technical and construction personnel (42%) and transport (50%). When it comes to job vacancies in higher education the public employment service plays a minor role (12%). It is only used to a limited extent for the recruitment of teaching personnel (13%).

The Internet as a recruitment tool is mainly used by the government (58%) and companies offering business services (51%). The agrarian sector makes very little use of the Internet (4%). The companies using the Internet as a recruitment tool are generally large (100 and more employees). The Internet is also an important recruitment channel for job seekers with a high level of education (55%), not for those with a low level of education (11%).

With 14 percent, the temporary work agencies show a lower market coverage than the other recruitment channels, but this CWI-study only addresses the role played by temporary work agencies in the case of hires for regular jobs with an employer (hiring company). The market coverage of the temporary work agencies would have been much larger if the measurement would also have included the job vacancies for temporary work (Section 5.3). The table above shows that temporary work agencies are mostly used by companies in industry (31%), and to a limited extent also in trade and catering (7%). The companies that make use of the temporary work agencies are generally large companies rather than small ones. Looking at the occupation of hired personnel, the temporary work agencies are mainly used to recruit production personnel (29%), and to a limited extent also personnel in catering (1%), care (3%) and education (5%). Only few companies (8%) make use of the temporary work agencies to recruit individuals with only basic education or no education at all.

Summarising, there are evidently differences in the market coverage of the various recruitment channels. The conclusion is that none of these four sources really represents the job vacancy market in the Netherlands. Any data on job vacancies based on these sources are not representative of the total job vacancy market in the Netherlands.

At the same time, the assessment of the type of job vacancies of intermediaries must be placed against the background of a trend-related changing structure of hires through time. These changes in the compilation of hires were investigated, taking into account the sector and company size of the employer, the required education and working experience, as well as some characteristics of employees that were hired, including age and education (Li and Donker van Heel, 2010). Between 1984 and 2009 the need for well-trained staff experienced by companies is increasing. In recent years the requirements for the educational level needed to fill a job vacancy have increased. The need for staff in the business and other services sector is growing. In the last decade of the last century, this sector accounted for an average of 23 percent of the hires, and in the past ten years this percentage has risen to an average of 34 percent. The job vacancy requirements show an increased focus on the requirement of working experience.

5.6 Job vacancy studies in sectors

The most detailed breakdown of job vacancies, i.e. job finders, according to sector can be made using the SN *Labour Force Survey*, the job vacancy register of the public employment services and Textkernel's *Job Feed*, although secondary analyses will be necessary. Other instruments — such as the SN *Survey Economic Structure* up to and including 2008 and the *Job Vacancies in the Netherlands* — provide standard breakdowns of 19 and 9 different sectors respectively. The *Job Vacancies in the Netherlands* enables time series according to sector. Despite the available job vacancy information by sector many supplementary labour market studies are done in sectors. The specific circumstances in each sector show the need for additional sectoral job vacancy studies. In the Netherlands I found 95 studies (JVS-E) and 23 measuring instruments (JVS-E-I). Sectoral job vacancy studies in JVS-E mostly consist of employer surveys (56).

The main reason separate sectoral job vacancy studies exist is that the national labour market information is insufficiently detailed or sector-specific. In general, national labour research does not meet the requirements of these users to a sufficient degree, as became clear from the personal expert-to-expert talks with representatives of these user groups (JVE). The expert-to-expert talks and the empirical job vacancy studies (JVS-E) show that the questionnaires of surveys are always tailor-made, taking into account the specific sub-branches, occupations, education and types of employment contracts. Sectoral labour market research is characterised by the fact that for the most part, sample frames are used that differ from those used in national surveys, for example member records of branch organisations, records of private address suppliers, public records (Chamber of Commerce), records kept by companies certified to train pupils at the workplace or records of pension funds. Most sector-specific surveys take into account the population numbers from national sources such as SN, the National Statistical Organisation, but almost invariably the ultimate choice is made to use the data on the branch's own population that are current and acknowledged within the branch itself. The importance of these population figures is high in the Netherlands because they are needed for the test of representativeness in connection with the universally binding declaration of collective bargaining agreements by the Minister of Social Affairs and Employment.

Sectoral labour market research has a strong focus on the demand for labour, including job vacancies. In total, all 95 sectoral studies in JVS-E deal with the size and composition of the sectoral job vacancy market, 40 studies address the bottlenecks in the supply of personnel, whereas 26 studies examine the mismatch between job vacancies and the supply, which mostly concerns school leavers. Bottleneck research is mainly financed by social partners (employers and employees organisations) and institutions in vocational education.

A comparison was made between the results of the instruments described above (*Labour Force Survey*, *Job Vacancy Statistics* and *Job Vacancies in the Netherlands*) and sectoral job vacancy studies. Based on secondary analyses of the 95 sector studies in the JVS-E, my conclusion is that the numbers of open job vacancies and hires in sectoral research always differ from the figures in national surveys. It is impossible to make an accurate comparison between top down (national) and bottom up (sectoral) instruments, due to the way the research is set up, e.g. by making use of deviating sample frames or member records. The distribution of companies across specific branch categories (codes) also makes the comparison of national and sectoral sources more difficult. Finally, the national sources are not sufficiently detailed for many sectors to make adequate comparisons possible, which is exactly one of the reasons why the sectors themselves conduct their own job vacancy studies.

5.7 Conclusions: clues for further research

Conclusion 5.1: It is difficult to create a clear indication of the total job vacancy market in the Netherlands based on the existing measuring methods

Different instruments exist that attempt to measure the total job vacancy market in the Netherlands, however creating a clear overview is not simple. The instruments vary strongly in their set up and operations, which leads to differences in results.

Measuring the number of open job vacancies, the *Job Vacancy Statistics* follows the unmet demand concept, whereas the *Job Vacancies in the Netherlands* looks at job matching, which enables a larger coverage. This explains to a large extent why the figures of open job vacancies according to the *Job Vacancies in the Netherlands* are on average 56 percent higher than those of the *Job Vacancy Statistics* (2006-2010).

The *Job Vacancy Statistics* and the *Job Vacancies in the Netherlands* are both aimed to provide a representative picture of the number of filled job vacancies in the Netherlands. In 2006-2010 the differences in the outcomes are relatively limited, although the figures presented by the *Job Vacancy Statistics* are slightly lower than those of the *Job Vacancies in the Netherlands*. The *SN Labour Force Survey* provides statistics on the number of job finders. Up to and including 2009, the number of job finders by the *Labour Force Survey* is lower than the number of hires according to the *Job Vacancy Statistics* and the *Job Vacancies in the Netherlands*. From the third quarter of 2010, following a change of definition in the *Labour Force Survey*, the number of job finders is significantly higher than before.

The figures with regard to the inflow of job vacancies are not clear. The *Job Vacancy Statistics* and the *Job Vacancies in the Netherlands* provide different outcomes on the inflow of job vacancies. The difference must be clarified for a large part by the differences in methodology. It is important that the first instrument measures historical data, whereas the second instrument partially measures historical data and partially measures predictions (expected inflow).

Conclusion 5.2: The existing job vacancy measurements in the Netherlands underestimate the number of job opportunities for job seekers

During the period 2000-2008 the number of filled job vacancies in the Netherlands was 2.3 million rather than the 1.2 million that was surmised based on the existing job vacancy measurements. Clear indications exist that in the Netherlands the number of hires at temporary work agencies (1.1 million per year) is more or less equal to the number of hires with all regular employers together (1.2 million per year). The fact that the number of filled job vacancies must be much higher than 1.2 million is also deduced from the new income situations in the *UWV Policy Register* (3.7 million per year), although this number is an overestimation due to administrative mutations that do not represent new contracts. Job vacancies from temporary work agencies are not included in the current job vacancy measurements, usually due to the complexity involved in measuring them. The number of job opportunities for job seekers in the Netherlands is therefore strongly underestimated.

Conclusion 5.3: job vacancy statistics of labour market intermediaries are not representative for the total job vacancy market

The analysis of job vacancy studies in the Netherlands shows that the job vacancy statistics from public employment services, temporary work agencies and online recruitment services are not representative of the total job vacancy market. The market coverage of each of the the intermediaries is limited. Moreover, the intermediaries are clearly operating in specific sectors of the job vacancy market resulting in a selective picture of the job vacancy market. For this reason it is risky to use these sources in the context of the total job vacancy market in a specific country. One should always keep in mind that this information does not provide a picture of the nature and size of the total job vacancy market.

Conclusion 5.4: The job vacancy statistics provided by intermediaries are qualitatively limited

The statistics on job vacancies by intermediaries in the Netherlands are qualitatively limited, which means that care must be taken when using them:

- As of 2010 the job vacancy statistics provided by the public employment offices in the Netherlands are not comparable with the years before, because of a drastic change in the way of recording job vacancies. In 2010 and 2011 the number of actively registered job vacancies at public employment offices is decreasing strongly.
- The number of job vacancies at temporary work agencies has been estimated once during this study on the basis of the number of assignments. Taking into consideration the very substantial number of job vacancies at temporary work agencies, the absence of systematic measurements is an important omission.
- No registers of job vacancy advertisements in the written media exist. Due to the decreasing market coverage of this recruitment channel this must not be considered a serious gap in the existing statistics.
- I have doubts about using statistics of online job vacancies because solid methodological information is lacking. Cleaning up double counting is becoming more effective, which means that the quality of the statistics is improving. Given the very strong increase in market coverage of online job vacancies in the job vacancy market, a further improvement of the quality of the information is imperative.

Conclusion 5.5: The problem of distortions caused by 'ghost vacancies' is especially seen in statistics provided by intermediaries

The fact that statistics based on online job vacancies are polluted by 'ghost vacancies' should not be excluded. This means that statistics of online recruitment agencies can overestimate the actual number of job vacancies, both for the inflow as well as for the open vacancies. 'Ghost vacancies' do not occur for filled job vacancies, whether or not they come from intermediaries. At least some online recruitment agencies place 'ghost vacancies' on their websites to give a permanent signal to job seekers. The size of this phenomenon is not known.

Conclusion 5.6: national instruments do not meet the demands of sector organisations, even in a leading country as the Netherlands

The national instruments are insufficiently tailored and detailed to meet the requirements of end users in sectors and occupational groups. The example of the Netherlands shows that many supplementary sectoral job vacancy surveys are held to achieve a sector-specific picture. For employer and employee organisations and institutions in vocational education, the national sources are insufficiently specific to serve as the basis for a labour market policy or to design educational programmes. Privately or publicly financed sectoral research will always be necessary.

Conclusion 5.7: Exogenous factors influence the results of the job vacancy measurements

Although I have not carried out a focused study on exogenous factors, it has become apparent that for various measuring instruments these factors can have an influence on the results. Exogenous factors can also be changes in policy with regard to methodology, which must be taken into consideration when using of time series of job vacancies. I have come across the following examples:

- a. A change in policy by the UWV to change from active registration of job vacancies to online self-registration by employers has led to a significant decrease in the number of actively registered job vacancies (public employment services).
- b. A change in the definition 'job finders' by SN has led to a significantly higher number of job finders (*Labour Force Survey*).
- c. A change in the research method and UWV's use of a different research institute to gather and analyse job vacancy data has led to significantly different outcomes with regard to the number of filled job vacancies (*Job Vacancies in the Netherlands*).
- d. Revision of historical data by SN has led to the replacement of statistics of filled job vacancies for previous years (*Job Vacancy Statistics*).

- e. A growing market share in combination with better deduplication of the various online job vacancy databases leads to improved statistics of online job vacancies (online recruitment services).
- f. Budget considerations influence the availability of job vacancy statistics (discontinuation of *Panel Demand for Labour*, discontinuation *Survey Economic Structure*, discontinuation *Survey Inflow Temporary Agency Workers* and a decrease in frequency of *Job Vacancies in the Netherlands*).

6. Recommendations for further research

6.1 Objective

The previous chapters have provided the starting points for further research. In this final chapter I formulate recommendations focussed on further research to gain a better insight into job vacancies. The research question is the following:

What further research is needed to gain a better insight into job vacancies?

6.2 The concept and definition of job vacancies

Recommendation 1: Test the proposed general definition of job vacancies

Based on the internationally accepted definition of jobs I propose a new and general definition of job vacancies, which fits the existing job vacancy concepts. The first recommendation is to test this new definition in further job vacancy research.

A job vacancy is an opportunity for an explicit or implicit contract between a person and a resident institutional unit to perform work for compensation.

Recommendation 2: Test the proposed operational definition of job vacancies

An operational definition of job vacancies should at least define the following content criteria: the recruitment domain (internal and/or external), search activity (active and/or passive and/or recall), job vacancies for occupied and/or unoccupied jobs, the availability of work, the availability of an employment contract and the status in terms of stock or flows (inflow, outflow, filled, withdrawn). The choice depends on the specific job vacancy concept. Operationalization should also take into account the following data criteria: delineation, the choice of specific characteristics, the level of detail, frequency and time perspective (retrospective, current, prospective). It can happen that specific criteria are not applied, meaning that the outcome of the measurements cannot be fully retraced, so that it is not clear what exactly is measured. The second recommendation is to test this new operational definition in further job vacancy research.

Recommendation 3: Define the characteristics of job vacancies

One important aim of job vacancy analyses is to gain an insight into particular characteristics or segments of the job vacancy market. The characteristics of job vacancies form an integral part of my proposed operational definition of job vacancies (see recommendation 2). However, the manner in which the characteristics of job vacancies themselves are exactly defined and operationalized must be studied more closely. When defining the characteristics of job vacancies four different types of characteristics should ideally be taken into account:

- business characteristics: sector or business category (e.g. NACE), small and medium enterprises vs. large companies, region;
- job/contract characteristics: occupation (e.g. ISCO), level of education (e.g. ISCED), required skills; form of contract (determined or undetermined, working hours per week);
- recruitment characteristics: recruitment and hiring channels, difficult to fill according to the employer, job vacancy duration;
- characteristics of contracted person: sex, age, ethnic origin, skills, level of education (e.g. ISCO), previous labour market position (unemployment, employment, self-employed, education), social security allowance, disablement, place of residence.

Recommendation 4: Study job vacancies in non-Western cultures and economies

My research is mainly confined to Europe. The study of the literature shows similarities in the approaches taken by both Europe and the United States. The question remains, however, to what extent the Western approach also applies to other cultures and economies, for example in countries with a strongly developed informal economy, countries with an entirely different political system, traditional societies, very small countries and islands. The usability of the job vacancy concept should also be researched for these countries.

Recommendation 5: Study atypical job vacancies

My research concentrates on formal employment relations. For specific groups of unemployed regular job vacancies and job vacancies for temporary agency work are not always the best solution, because the demand for competencies is not in sync with the supply. For this reason labour market policy aimed at the integration of unemployed should also take into account other types of work beside formal employment. In order to put the job opportunities for the unemployed in a broader perspective, research should be done on atypical job vacancies, for instance:

- Job vacancies in private households;
- Job vacancies for unpaid work;
- Job vacancies for work without losing social security benefits;
- Job vacancies for voluntary work;
- Job vacancies for subsidised work (wage cost subsidy or other arrangement);
- Job vacancies for protected work (for individuals with a handicap);
- Job vacancies for informal work;
- Job vacancies for jobs involving on-the-job training and learning (working and learning at the same time);
- Job vacancies for traineeships.

Also, research is needed on 'job vacancies' for work that is not seen as work from a legal point of view, for example job vacancies for work below the legally established minimum wage, work under unacceptable labour conditions, child labour and even slavery.

Recommendation 6: Study latent job vacancies

The aspect of latent job vacancies has been covered by the suggested operational definition (see recommendation 2). It is a challenge to be able to anticipate latent job vacancies, especially with regard to increasing the number of job opportunities for job seekers. Latent job vacancies can be studied in the following manner:

- a. A substantial part of the contracts are closed without the employer having actively recruited for it. By studying filled job vacancies and by determining the recruitment and hiring channels, insight can be gained into this. This concerns filled job vacancies for which the employer has not searched actively and which are filled after a spontaneous application by a job seeker (with or without the help of an intermediary). Insight into the background characteristics of this type of job vacancies can be used for pro-active searches.
- b. Employers can be approached pro-actively and asked how many job vacancies can be created. This type of action research can be expanded to atypical job vacancies (see recommendation 5), where it concerns mediating job seekers with a disadvantaged position with regard to the job market.

There is, conceivably, a form of semi-latent job vacancies. If an employer searches the Internet for an employee, then the job vacancy is not known to the outside world. There is, at that time, a job vacancy at a company but it is not known outside that company. In this case, an active search is taking place, an essential criterion of the definition unmet demand, so this type of job vacancy does fall under this definition and is implicitly included in the data. When counting job vacancies this type of semi-latent job vacancies should be evident, especially as they are important in mediation for job searchers. Therefore the recommendation is to measure the various types of recruitment channels and hiring channels (see recommendation 3).

Recommendation 7: Study ‘ghost vacancies’

Specific research is still required with regard to the phenomenon of ‘ghost vacancies’ especially online job vacancies. This is not only important for online recruitment services, but also for public employment services that make use of online job vacancies and, last but not least, the job seekers. First of all a conceptualization of the phenomenon is required. What is the difference when compared to a latent job vacancy (part of the ‘ghost job vacancies’ could be filled)? Concurrently the question is what part of the inflow of online job vacancies and the open online job vacancies can be seen as ghost vacancies and how will this phenomenon develop. The core question is to what extent will this phenomenon improve or worsen the functioning of the labour market.

6.3 The measurement of job vacancies

Recommendation 8: Improve the *Job Vacancy Statistics* for some countries

The number of countries supplying statistics to Eurostat on behalf of the *Job Vacancy Statistics* needs to be extended from 22 to 28. In the meantime, the numbers of job vacancies in various countries may be estimated on the basis of other indicators and assumptions (job vacancy rate and employment). The optimal solution would be for countries to supply reliable information by themselves. For a number of countries this would mean that the sample size of the current surveys needs to be extended to generate reliable results, i.e. absolute figures on open job vacancies. The existing job vacancy statistics require an adjustment of the measurements to enable a more accurate comparison with other countries. Some countries, for instance, could include both the public and the agrarian sectors in their measurement, as well as small companies. Other countries, such as the Netherlands, would have to adhere more closely to the prescribed definition. It is possible to clearly isolate job vacancies that involve external recruitment only and job vacancies for temporary agency work.

Recommendation 9: Measure open job vacancies also for occupied jobs

The *Job Vacancy Statistics* is limited to the measurement of job vacancies for occupied positions, thus following the unmet demand concept. As a result it presents too limited a picture of job opportunities. It is recommended to measure the open job vacancies for occupied and unoccupied positions together and break these down afterwards.

Recommendation 10: Supplement the *Labour Force Survey* with job finders among the unemployed

Further investigation of possible improvements and adjustments of the *Labour Force Survey* is needed. The aim would be to render the information from this population survey as useful as possible for the analysis of the developments at the demand side of the labour market. Researchers should study the possibility of asking the question about finding a job not just to respondents having a job, but also to the persons who are unemployed at the moment the data is being collected. The current measurements underestimate the number of job finders, because they exclude individuals who are unemployed at the moment of questioning, even though they may have found a job in the past period of time and subsequently lost it, meaning that part of the short-term jobs — the volume of which remains unknown — are left out of the equation. The inclusion of unemployed would generate a more optimal approach to establishing the number of hires.

One should also investigate ways to provide a picture of the job search and job-finding channels in a more differentiated manner. The public employment services and temporary work agencies should of course be included, but also other channels such as advertisements, the Internet, the company’s environment and unsolicited job applications. This information would provide a broader picture of the market position and success rate of the various channels involved, seen from the supply side. These analyses could then be combined with the various background characteristics known from the *Labour Force Survey*, thus creating more insight into the composition of the market coverage of job search and the market share of job finding channels.

Recommendation 11: Develop a company survey for measuring job vacancy flows

An employer survey not only allows the investigation of open job vacancies, but also job vacancy flows, difficult to fill job vacancies and the market coverage of the recruitment channels. This could be done using an employer survey, as already happens in Belgium, Germany, the Netherlands, Italy and Sweden. A possibility for some countries would be to extend the *Job Vacancy Statistics* data collection, which includes only stock figures. In most countries the data are collected through an employer survey. But this is often part of a wider survey of economic indicators. Many countries simply do not have the budget to conduct separate job vacancy surveys, even though a separate job vacancy survey of companies would generate the best results.

Recommendation 12: Use standard questionnaire for employer survey in all European countries

The use of a standard questionnaire for an employer survey for all European countries is recommended. The routing in the questionnaire can be such that it effectively involves companies with and without job vacancies. The questionnaire also can include a method for detailed questioning when it comes to the characteristics of hires and job finders. It can be suitable for both Computer Assisted Telephonic Interviewing (CATI) and Computer Assisted Web Interviewing (CAWI).

Recommendation 13: Exploit registers of new employment contracts (hires)

The extent to which alternative sources may be useful warrants further study, focusing on the registration of new employment contracts. The register data on new employment contracts would enable an alternative picture of the dynamics of the labour market. For instance, each country has its own records on taxes, social security and pensions. These registers often also record the starting date of a new employment contract (hires). In passing, one could also investigate the extent to which these systems may be used as a sample frame for (employer) surveys in order to collect more information on job vacancies.

Recommendation 14: Improve quality of data of registered job vacancies by public employment services

The ideal situation in Europe would be to expand the number of public employment services with statistics about registered job vacancies. The ambition should also include the collection of flow figures on registered unemployed. However, more research is required on the representativeness and quality of the job vacancy data at the public employment services. This calls for an analysis of the administrative organisation, working processes and the behaviour of public employment service personnel. This research should also include an investigation of the historical development of the administration kept at the public employment services. To what extent have there been far-reaching changes in the administrative organisation? Have there been policy changes or guidelines that may have had a profound effect on the numbers of job vacancies? Is it possible to detect clear changes in the administrative organisation at the various locations within a single country? To what extent have the online job vacancies and the job vacancies at the temporary work agencies been – or not been – included in the register and the statistics that are published? Could there be double counts, for example because job vacancies were reported to a number of branch offices of the public employment services? What other factors may have had an influence on the development of the series of figures? In short, there are many relevant questions that could be asked when it comes to the quality of the job vacancy registers of public employment services.

The study of job vacancy registers will enable the exchange of experiences and bring the ambition to mutually harmonise registrations one step closer. The results of such a study will also help to arrive at better explanations for the developments in time series or the differences between countries and sources. This study of the job vacancy registers could then be combined with research on the influence of the institutional context and the structure of the job vacancy market.

A study should be made of the systematic collection of information on job vacancies filled by public employment services. In general the public employment services are not in a position to establish the destination of the outflow of job vacancies as well as of the destination of the outflow of unemployed. In other words, public employment

services generally do not know to what extent job vacancies are being filled or whether unemployed find a job or not. They can tell even less about the role played by the public employment services themselves. Many reasons exist why public employment services should be able to supply this information, if only to set up its services as effectively and efficiently as possible. Also, public institutions are obliged to show society what exactly their added value is. From the point of view of solid and useful job vacancy information it is important to investigate whether public employment services can get better insight into the outflow of job vacancies (filled or not filled by the public employment service, cancelled by the employer or terminated by the public employment service itself).

Recommendation 15: Collect data on job vacancies and assignments of temporary work agencies

Various ways exist to get insight into job vacancies for temporary agency work. Research could, for instance, include a sufficiently representative sample of temporary work agencies in a sample survey of companies. This would allow one to investigate the extent to which job vacancies were filled during a specific period of time.

Some national registers do provide an insight into the number of new contracts at temporary work agencies, for example the *UWV Policy Register* in the Netherlands. This is the equivalent of job vacancies filled by temporary work agencies. Sometimes these are company registers recording new employment contracts with temporary work agencies acting as the employer. The possibilities offered by these national registers should be investigated more closely.

The registers of the temporary work agencies themselves are also suitable for job vacancy research. Temporary work agencies do have insight into the number of new employment contracts of temporary agency workers, viz. of persons with or without a placement provision. By combining the data from the various temporary work agencies, and taking into account the market share of the participating temporary work agencies, insight may be gained into the total number of hires at temporary work agencies in a specific country during a specific period of time. A possible approach would be to have the national branch organisations of the temporary work agencies request these data each month or quarter. In some countries the National Statistical Organisations (NSO) or the temporary work agencies themselves are in a position to provide data on the combined market share.

Validation through a survey of temporary agency workers would be an option, as has been done in the Netherlands between 1991 and 2008. This would provide insight into the number of assignments.

Recommendation 16: Publish the methodology of job vacancy statistics on job vacancy websites

At present there are still doubts about the validity and reliability of data published on job vacancy websites, which is mainly caused by the non-transparent process involved and especially the unclear coverage of job vacancies and the results of removing double counts. Still, the share of these websites on the job mediation market is on the rise. This means there has become a need for publications addressing the methodology of job vacancy statistics on job vacancy websites, and this in turn implies that the commercial service providers behind these sites will have to be more transparent about their working processes. Until they do, researchers should be careful with using the data published on these sites for statistical purposes.

Recommendation 17: Use personnel and salary administrations at company level as a source for job vacancy information

The personnel or salary administrations of companies and institutions differ strongly from each other in content and layout. What they do have in common is that they record data on personnel and in most cases also the starting date of a job. For this reason personnel administrations provide good insight in the numbers of hires. It may therefore be useful to study the use of these systems by companies. Suppliers of personnel administration systems could be asked to incorporate output modules presenting the newly hired employees, possibly also broken down into specific characteristics (such as wages). Following the 80/20 approach in a number of countries, a large part of the employer population could be reached through a limited number of personnel administration system suppliers. In some countries the payment of salaries is done through large administration

bureaus, which would facilitate this approach. However, the challenge lies in obtaining a representative picture that also includes companies that do not have an automated administration. This could be done using a supplementary survey that includes checking questions. An alternative would be to set up a panel, following the same (representative) group of companies, centrally and anonymously linking their personnel administrations.

Recommendation 18: Develop a tool for onsite registration of job vacancies that can be used by employers

The optimal method to measure job vacancies is a combination of a registration onsite and a survey. The core will be an application to register job vacancies within companies using a fixed format. The aim of such a register would be to obtain an accurate and detailed picture of the stock and flows of individual job vacancies within companies. Specific events during internal and external recruitment processes will be recorded by the companies themselves, including date (and time). This allows a precise determination of the starting and termination dates of job vacancies, including all relevant moments in between. Record keeping must be part of the regular workflow within the company. This way, job vacancies can be measured according to any desired operational definition, including the definition of unmet demand. Central data collection at companies using such a job vacancy registration — for instance using a panel — would generate the total representative picture. No examples of this practice were found, which would make it an innovative approach. I am working on such an instrument called *Job Vacancy Onsite Registration (JVOR)*.

Recommendation 19: Measure unmet demand separately as a subset of all job opportunities

In order to arrive at clear measurements, measuring unmet demand separately as a subset of all job opportunities is recommended. Surveys may try to get around this issue by first determining the total number of job vacancies and then breaking these down into occupied and unoccupied positions, as is the case in Sweden and Finland. In theory, on site registers of companies would allow a more accurate measurement of job vacancies for unoccupied positions, but actual examples of these measurements have not been found (see recommendation 18).

Recommendation 20: Invest in time series of job vacancy flows

The individual countries may start by building time series of job vacancy flows, based on employer surveys and registers. The data allows time series analyses on the development of the size and structure of job vacancies, the development of recruitment behaviour by employers, difficult to fill job vacancies, et cetera.

6.4 Job vacancy analyses

Recommendation 21: Develop standard job vacancy analyses for public employment services

A number of job vacancy analyses should be carried out as a standard procedure by or on behalf of public employment services. These are analyses that may be done fairly easily. The return on investment is in fact relatively high and it would be a missed opportunity not to carry out these analyses. The first is a *PES Job Vacancy Index* showing the development of the inflow of registered job vacancies (that may be presented as a progressing average). This could be done on a daily basis, per sector (NACE). This index could be an excellent early indicator of economic development as well as of bottlenecks on the demand side of the labour market, being both highly frequent and extremely up to date. This will allow a comparison between countries, and aggregation for the whole of Europe.

The second type of analysis is about the use of job vacancy registers of public employment services for analyses of mismatches, meaning the comparison of registered job vacancies with the registered unemployed, according to occupational group (ISCO, 4 digits). The mutual comparison of demand and supply per occupation provides an indication of mismatches on the labour market. This concerns a relative position vis-à-vis the average, seen through time. This analysis may take place on a monthly basis. Reports on the previous month could be published in the week after. An example of this type of analysis is found in the Netherlands. If job vacancy inflow figures are used instead of stock figures it becomes possible to compare countries and to aggregate at the European level.

The third type of analysis deals with the management information of public employment services. As a standard procedure, the following indicators may be used at public employment services: market penetration, market coverage, market share, job vacancy filling rate and job vacancy duration, including breakdowns according to sector (NACE) and occupational group (ISCO). A solid job vacancy register combined with an annual survey of companies or the *Labour Force Survey* allows reliable monitoring of both the market position and the results of public employment services.

A fourth type of analysis using job vacancy data of the public employment services is the study of the effectiveness and efficiency of methods of job vacancy services. This research contributes to the rationalisation of services. This would require of the public employment services that they determine to what extent registered job vacancies are (not) filled by the public employment service (see recommendation 14). Within the confines of the available means and taking into account the characteristics of companies and job vacancies it is possible to organise and handle job vacancies in an optimal manner. Such a study of the methods for processing job vacancies should be done at least once, while keeping an eye on the cost involved and the results in terms of filling job vacancies. It is also possible to opt for a structural implementation of this analysis.

Recommendation 22: Study the effects of difficult to fill job vacancies

Relatively little research has been done on the effects of difficult to fill job vacancies on a company itself and the individuals that are employed there. What is the extent to which production comes under pressure if no suitable personnel is found? What is the extent to which the working pressure increases for the current staff, because now the same work will have to be done with fewer workers? What are the alternative strategies of companies who are unable to fill their job vacancies? Does this lead to internal solutions, contracting out or offshoring? What are the effects on the wages paid? It is important to find out whether it is even possible to have difficult to fill job vacancies filled by unemployed. An insight into the volume and nature of difficult to fill job vacancies is also important when it comes to training and education policies. The questions also apply to withdrawn job vacancies (see recommendation 23).

Recommendation 23: Study withdrawn job vacancies as a possible indicator for bottlenecks on the demand side of the labour market

We have hardly any insight into the size and nature of the job vacancies that are withdrawn. Empirical research has shown that about 1/6 of all job vacancies that occur are eventually cancelled. The precise motives behind this phenomenon are unknown, although the expectation is that a considerable number of these job vacancies have been withdrawn by the employer because no suitable employee was found. These job vacancies probably form a special category of difficult to fill job vacancies, viz. job vacancies that cannot be filled. Withdrawn job vacancies may therefore be an indicator for very difficult or impossible to fill job vacancies.

Recommendation 24: Use the stock-flow rate as an indicator for job vacancy duration

Much more use can be made of the equation of stock and flow figures of job vacancies as an indicator of the job vacancy duration. The best way to calculate the stock-flow rate in calendar days would be to use the following formula:

$$[\text{stock end date of a year}/(\text{stock a year earlier} + \text{inflow in the year preceding the end date})] * 365$$

Recommendation 25: Use the job mobility rate as a prominent indicator for labour market dynamics

The job vacancy rate is a static and not a dynamic figure. The job mobility rate provides a better picture of the dynamics on the labour market. This indicator can be easily calculated using the *Labour Force Survey*. This source provides data for the numerator (number of job finders) and the denominator (labour population), also providing much useful data for explanatory variables.

Supplementary research could also be done on the causes of the differences in the job mobility rate, for example per sector or occupational group. The first step would be the analysis of the data from the *Labour Force Survey*, requiring additional research on the quality of the labour in sectors and occupational groups. This includes issues such as terms of employment, labour conditions, labour relations and content of the labour that help to explain the dynamics on the labour market. The image of sectors as employers or of the occupations themselves may play a role in the job vacancy mobility rate being high or low.

Recommendation 26: Use job vacancy data of the total job vacancy market for analysis of mismatches on the labour market

Job vacancy data combined with supply led data (unemployment, job seekers, school-leavers, et cetera) is suitable for the analysis of mismatches on the labour market. When data on the total job vacancy market is unavailable, use is mostly made of the job vacancy data of public employment services. The disadvantage of this procedure, however, is that it only provides a view of a small and selective part of the labour market. Although the analysis of the data from the public employment services does provide clues for mediation and training of (registered) unemployed, it is less useful as the basis for national labour market or educational policy.

Using the *Labour Force Survey* brings the analysis of mismatches at the national and even European level within reach, because it makes it possible to compare the number of hires according to occupation and education with the number of unemployed according to (last) occupation and education. A useful indicator is a comparison between unemployment (as measured by the *Labour Force Survey*) and the number of job finders (also *Labour Force Survey*). The numerator and the denominator come from the same source, long time series with quarterly intervals are possible and the data on occupations and other variables are relatively detailed.

Recommendation 27: Study substitution of job vacancies by other ways of meeting the demand for labour

The demand for work can be met in a different manner than just filling a job vacancy. Working with temporary workers is an important alternative, however not much information is available on this option (see recommendation 15). But other forms of meeting the demand for labour should also be looked into in more detail, such as partially or completely insourcing, or outsourcing to self-employed individuals. The question not only concerns which other forms of meeting the demand for labour develop and how these compare with the normal manner of filling job vacancies, but it also concerns the question to what extent does this concern substitution. How often is the job vacancy filled in a manner other than hiring someone on the company's payroll? To what extent are existing contracts converted to contracts through third parties? To what extent is use made of hiring ex-employees who are self-employed? To what extent are these forms of filling job vacancies preferred above the regular manner of filling job vacancies? To what extent are these alternative forms of filling job vacancies structural or permanent? What impact will these developments have on the development of job vacancies?

Recommendation 28: Study the job vacancy match

Various reasons exist to study the job vacancy match more closely, being the match between the job vacancy and the employed candidate and the match between the job vacancy and the final job. The goal of studying this issue more closely is to be able to formulate job requirements more specifically, to enable a more effective matching process. I see two starting points:

1. Research can be done with regard to the similarities of the job vacancy requirements and the competencies of the candidate hired for the job vacancy. Insight gained here can be used to adapt the job vacancy requirements of employers to come to a more efficient match.
2. Research can be done with regard to the similarities of the job vacancy requirements and the content of the final job. To what extent does the job match the original functional and contract characteristics (see recommendation 3)? Are the required competences still the same? To what extent does a job vacancy for a temporary job lead to a permanent job?

Recommendation 29: Study the combined use of job vacancies data of intermediaries

Job vacancy statistics are very useful as an (early) indicator of the state of the economy, the inflow data collected by the public employment services being especially valuable as an early indicator. More research is required to determine to what extent the use of a combined indicator would lead to further improvement. The question should be asked to what extent the combined job vacancy data kept by the public employment services, the temporary work agencies and the online recruitment services can play the role of an early indicator. The considerable advantage of this approach would be that this data is always up to date, due to frequent updates. The next stage of the research could then address the question whether there are specific countries, regions and/or sectors that are the first to indicate specific developments.

Recommendation 30: Link registers and surveys with job vacancy information

The linking of registers and surveys containing job vacancy information will lead to new opportunities for analysis as well as possibilities to validate the information. More and more countries are using combinations of register and survey data for statistical analyses. The *System of Social Statistical Datasets* (SSD) in the Netherlands is a good example, containing information on persons, households, jobs and more. One should actually check whether the information on filled job vacancies in the *Job Vacancy Statistics* by Statistical Netherlands can be linked with the SSD, which would enable a comparison at company level of the number of hired persons, as known from the *Policy Register* that forms part of the SSD. One should then investigate whether it is possible to extend this approach to other countries.

Recommendation 31: Invest in explanatory job vacancy research

Apart from the analysis of the job vacancy duration, relatively little explanatory research has been done in the job vacancy domain. Expanding the explanatory research is recommended. Variables requiring clarification include job vacancy growth, job vacancy mobility, the share of difficult to fill job vacancies, withdrawn job vacancies, the market position and the job vacancy filling rate of labour market intermediaries. Explanatory variables are characteristics of companies and job finders, policy as well as contextual variables. Each analysis serves a different purpose. This type of analysis has to make as much use as possible of the available data on job vacancy flows. This will allow a much more meaningful and sharper analysis than an analysis that is solely based on stock figures.

Recommendation 32: Study recruitment motives and background factors

The study on incentives for employers to recruit or not, provides insight into the manner in which the labour market works on the micro level and the possible solutions to improve it. It concerns not only the required production in type and size, the available capacity and the supply of various forms of labour. More explanatory research is necessary at micro level to determine the factors that promote or hinder the creation of job vacancies.

Recommendation 33: Study institutions serving as contextual explanations for job vacancy developments

For my research it was necessary to abstract from the (institutional) context. When comparing the results of job vacancy measurements in various countries it is often difficult to indicate the extent to which possible differences may be explained by differences in the measuring methods used, or differences in the institutional context and the specific national labour markets. This will require additional research on the correlation between the institutional context – including the specific characteristics of the national labour markets – and the results of job vacancy measurements. The following environmental factors may have an effect:

- Laws and regulations (discharge protection, temporary employment, temporary agency work, mandatory job vacancy reporting, social security, terms of employment).
- Structure of employment (self-employed, type of employment contract (permanent or temporary), duration of working week, temporary agency work contracts).
- Composition of labour population (rate of employment, age build-up, level of education, share of labour migrants).

6.5 Coordination and use of job vacancy information

Recommendation 34: Improve the quality of job vacancy statistics by coordination

The coordination of job vacancy research may lead to enhanced research quality and more efficiency. Coordination is needed at all policy levels. At the European level the EC coordinates the job vacancy statistics through Eurostat. This allows checks to be made on the extent to which the definition of job vacancies may be adjusted, whereas flow figures can for instance be collected through an employer survey. Coordination at the European level is important, in order to guard the quality of the job vacancy statistics of the public employment services. The *European Vacancy Monitor*, an initiative of the European Commission, constitutes an important step in the right direction.

At the national level various challenges exist that are strongly connected with the development stage of job vacancy statistics in specific countries. The first challenge is not to over ask both the companies and the labour population. In some countries, like the Netherlands, companies may be asked to fill out a questionnaire on job vacancies – or to answer questions by telephone – more than ten times a year. This obviously leads to some survey fatigue, non-response and less response quality. The solution lies in cooperation between organisations commissioning a survey, reuse of data and standardisation of questions and codes. This would lead to the added side effect that budgets are used more efficiently.

Coordination will enhance the quality of the results. The job vacancy statistics of the public employment services especially need to be transparent and reliable. If differences between the registers of public employment services and measuring results exist these need to be explained. If necessary the measuring tools will have to be adjusted.

Recommendation 35: use job vacancy information for policy purposes

My observation is that job vacancy information is only seldom used for policy development. Job vacancy information is being collected, but that is often where the story ends. But many questions remain. Why do or don't policy makers actually use job vacancy information? What meaning do they ascribe to job vacancy information? What are the successful applications? A closer evaluation of applications, results and effects seems needed. In my view the study of the application of job vacancy information in policies may help to improve the use made of this information.

Recommendation 36: study the functionality of different types of job vacancy analyses

In the 423 job vacancy studies that were investigated, eight different types of job vacancy analyses have been detected: study of the size and structure of the job vacancy market (412 studies), study of bottlenecks at the demand side of the labour market (141), study of the dynamics of the labour market (84), study of the mismatch between demand and supply on the labour market (127), study economic development (163), job vacancy prognosis (9), study of the performance of labour market intermediaries (152) and a limited number of qualitative studies. This simple framework of types of analysis offers a possibility for further elaboration and especially of the functionality of the different types of analyses: what do the results mean and what kind of decisions can, or cannot be made based on the results of these types of analyses?

Annexes

Annex 1 Job Vacancy Studies (JVS)

Annex 2 Job Vacancy Experts (JVE)

Annex 3. Criteria operational definition

Annex 4. Eight types of measuring methods

Annex 5. Job vacancy analyses

Annex 6. Measurement instruments in the Netherlands

Annex 7. Codebook (structure of JVS)

Annex 8. Codes JVS-E

Annex 9. Samenvatting (Summary in Dutch)

Annex 10. Curriculum Vitae

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Annex 2 Job Vacancy Experts (JVE)

Table A2.1. Number of personal expert-to-expert talks: type and level of organisation

Categories		Absolute number	Percentage
Type organisation	1. Government	24	9%
	2. Employers organisation	23	9%
	3. Employees organisation	5	2%
	4. Social partners	27	10%
	5. Public Employment Services	72	27%
	6. Private Employment Service	33	12%
	7. Online Recruitment Services	1	0%
	8. Education	14	5%
	9. National Statistical Organisations and public research institutions	8	3%
	10. Private research institutions	39	15%
	11. Municipality	5	2%
	12. Tripartite organisations (social partners and government)	11	4%
	13. Non governmental international organisation	6	2%
Total		268	100%
Level	1. International	34	13%
	2. National	121	45%
	3. Regional	13	5%
	4. Local	35	13%
	5. Sectoral	65	24%
	6. Individual	0	0%
Total		268	100%

Source: JVE

Annex 3 Criteria operational definition

Definition criteria

The study of the academic literature has shown the content criteria in defining the concept of job vacancies. I have further operationalized the job vacancy concept by making a study of the requirements for the data that has to be collected (data requirements or data criteria). A first determination of the definition criteria was formed on the basis of a review of 423 empirical studies in JVS-E. The picture gained from this was then checked against the 268 personal talks I had with policy-makers and labour market researchers (JVE). These personal talks always included the issue of the requirements for job vacancy statistics that are used to design policy and research. Together, the content criteria and the data criteria form the operational definition. In this way the concept of job vacancies is formulated as concretely as possible and defined as a measurable unit.

Table A3.1 Criteria operational definition job vacancies in JVS-E and JVE

Type of definition criteria	Definition criteria	Values	Share of publications JVS-E (n=423)	Share of experts JVE (n=268)
Content criteria	Concept job vacancies	Unmet demand	14%	6%
		Job Vacancies	83%	94%
		Undefined	3%	0%
	Recruitment domain	External	70%	100%
		Undefined	31%	0%
	Status	Flows	59%	98%
Undefined		41%	2%	
Data criteria	Delineation	National	68%	58%
		Sector	24%	-
		Region or local	8%	-
	Characteristics	All	9%	63%
		Not all	91%	37%
	Frequency	Once a year or less often	73%	43%
		Once a quarter	26%	15%
		Once a month	1%	16%
		Once a week	0%	2%
		Every day	0%	24%
	Detail	Level individual job vacancy	68%	68%
		Aggregated	24%	-
		Undefined	9%	-
	Time perspective	Retrospective	45%	65%
		Current/real time	52%	25%
Prospective		2%	10%	
Undefined		1%	0%	
Total			100%	100%

Source: JVS-E and JVE.

Content criteria

In total 14 percent of the studies in JVS-E apply the unmet demand concept (table A3.1). The most common is the *Job Vacancy Statistics*. The most important secondary studies dealing with the *Job Vacancy Statistics* are the following: Räsänen, 2004; Anghel, 2008a; Baldi, Bellisai, Fivizzani and Sorrentio, 2008; Martikainen, 2008; Kettner, 2008a; Baldi and Sorrentino, 2009; Goarant and Ulrich, 2009; Fox, 2009; Ailenei, Bobre, Marinas and Hrebenciuc, 2011; Johannesson, 2011; Statistics Sweden, 2011). An interesting study following the unmet demand concept is the *Job Openings and Labour Turnover Survey (JOLTS)* of the Bureau of Labour Statistics (BLS) in the United States. It is not always clear to what extent internal job vacancies are excluded in the figures

(31% of the studies in JVS-E) making it difficult to determine the actual concept. Almost all experts in JVE (98%) prefer to work with flow figures, while only 59 percent of the studies in JVS-E deal with job vacancy flows.

Delineation

A first requirement for job vacancy statistics is that the population is clearly delineated. The delineation refers to characteristics of the employers and job vacancies involved, the geographical spread of companies, sectors (industries) and occupations being the most important perspectives. Companies are geographically distributed, which may be through shared national boundaries of a number of countries (international), national boundaries, regional boundaries within countries, but also municipal boundaries or even specific neighborhoods. In JVS-E 68 percent of the studies follow national boundaries. A different form of demarcation is based on sectors, simply defined as groups of companies undertaking similar business activities (24% of the studies in JVS-E). In this scenario, job vacancy research may be concerned with, for example, only the agricultural sector, the maritime sector or government, within specific geographical boundaries. In total eight percent of the studies has a regional or local scope. The job vacancies handled by intermediary bodies such as public employment services, temporary work agencies and on-line recruitment services, constitute a specific sub-population.

Characteristics

One important aim of job vacancy analyses is to gain an insight into particular characteristics or segments of the job vacancy market. This is, among other things, of importance for labour market analyses carried out by labour market intermediaries and educational institutions. The policy aim of segmentation is, for instance, to permit the tracing of specific areas showing labour market mismatches, or to determine the opportunities for job seekers. Job vacancy segmentation analysis also has an important methodological aspect, because it enables the validation of various research results and statistics on the basis of a comparison of job vacancy characteristics. If the same background characteristics of the sources of job vacancies are known, it becomes possible to compare the various sources. If a survey of companies provides information on for example the number of filled job vacancies by public employment services, this information may be compared with the information coming from the public employment services themselves. If distributions show a better match then these will provide a degree of reassurance when it comes to the quality of the results. A segmentation of job vacancies leads to four different types of characteristics: business characteristics, job/contract characteristics, recruitment characteristics and personal characteristics. Though 63 percent of the experts (JVE) prefer all four types of characteristics, it is found in only nine percent of the studies (JVS-E).

Business characteristics are all about the question what sort of companies and organisations are offering job vacancies, such as the sector or business category (for example based on the Classification of Economic Activities in the European Community (NACE), the size of the company (number of employees) and region (the location of the working activities).

Job/contract characteristics are concerned with wages and specific requirements for the payment of salary (Palm, 1974). Common job/contract characteristics are occupation, for example with International Standard Classification of Occupations (ISCO), required skills, the required educational level, for instance the International Standard Classification of Education (ISCED), experience, the form of the contract — determined or undetermined — and the duration of the determined contract and the number of actual working hours per week.

A separate group of job vacancy characteristics is concerned with the recruitment method used by the companies and the successful recruitment channels used (hiring channels). The following recruitment channels may be distinguished: advertisement in a newspaper or journal, recruitment through relationships (such as business networks, friends, family, acquaintances, et cetera), own website, use of job vacancy sites on the internet, search in job seeker databanks on the internet, spontaneous or open applications, use of a recruitment and selection bureau, through their own employees, through a temporary work agency, a public employment service recruitment from among own employees (internal recruitment), direct recruitment at specific locations (e.g. market or harbour)

and through school or other educational institution (for example college or university). One additional recruitment characteristic to consider is the degree to which a job vacancy was difficult to fill (or not).

Personal characteristics are the characteristics of the persons who are, in the end, employed (with hires), such as sex, age, education (current and finished), working experience, skills and qualifications, labour market position before the job (unemployment, duration of unemployment, degree of incapacity for work), social security allowance and region (residence), ethnic origin, (period of) unemployment prior to new work, disablement, place of residence, ethnic background, skin colour, attitude and searching behaviour. These characteristics are of an entirely different nature than the other job vacancy characteristics. Still, they are important, because they help to clarify the overall picture of hires.

In some empirical definitions, specific groups of job vacancies have been left out of the equation in advance. However, from a methodological perspective it is not always sensible to exclude specific job vacancy segments in advance. Based on their own investigations, Myers and Creamer (1967) concluded that it is better to measure the total number of job vacancies in the broadest possible manner, and then to split them afterwards. The study of Verhage et al (1997) suggested that job vacancies for full-time and part-time jobs should be included, as well as job vacancies for temporary work (specific period) and permanent work (indefinite period). Job vacancies that stay open for a relatively short or long period of time should also be included. Furthermore, according to the authors it is not necessary to determine a minimum duration of the job. Therefore, in effect the authors indicated that job vacancies were to be measured in the broadest possible manner.

Though the primary question is whether specific categories allow a sharp delineation (Frumermann, 1979). The literature has shown that job vacancies — for example — for unoccupied jobs can not very well be separated from job vacancies for occupied jobs. On this basis, it would be better to include both the job vacancies for occupied and unoccupied positions in the measurements, albeit distinguishing each and allowing a split in subsequent analyses afterwards. This is the manner in which the *Job Vacancy Statistics* in Finland and Sweden is designed. The same solution can be applied when using the search criterion. Within this search range a distinction is made between recall job vacancies or those job vacancies with and without active searching. This means that all three job vacancy groups have to be included in the definition, and to further distinguish them from each other afterwards in the measurements.

Detail

Of all studies 68 percent is based on data of individual job vacancies and 24 percent on aggregated data. Aggregated data is data that has been gathered about groups of job vacancies, for instance the total number of job vacancies filled within a company, for instance, per function group. In nine percent of the studies the level of detailing is not clear. Data on individual job vacancies is mostly collected by way of registration and aggregated data mostly by way of employer surveys.

Frequency

The general requirement of job vacancy statistics is that it be measured with a certain frequency. A time series perspective is necessary to gain an insight into the dynamics of developments. Also, the possibilities for analyses increase if the time series is longer and the time interval is shorter, as well as if more observations. Following JVS-E the frequency of the information delivered is once per year (73%), per quarter (26%), per month (1%). Of all experts 24 percent prefer to have job vacancy information each day (JVE).

Time perspective

Almost half of the experts work with retrospective job vacancy data (65%). For a quarter of users (25%) job vacancy information should be real-time information as far as possible, that is, information with a view of the present. The information is as current as possible. For 10 percent of the experts the image of the future is important to examine the prospective situation. This includes addressing such questions as how many open job

vacancies will there be at a specific future point in time, or be notified in the forthcoming period, or will be filled? Prospective measurements are useful for forecasts, labour market analyses and the planning of educational programmes (Frumermann, 1979). Of all studies in JVS-E only two percent is a forecast, UWV Werkbedrijf (2011) being the best example of prognosis of job vacancies. More than half of the studies in JVS-E are based on real time job vacancy data (52%) and almost half on retrospective data (45%).

Annex 4 Eight types of measuring methods

Combination of type of datacollection, type of respondent and type of source

If the three dimensions of measurement methods are combined — the source, type of respondent and type of datacollection — we obtain an overview of eight types of methods. Data from employers and job finders is sometimes linked together. This is not a new type of method, but rather a combination of two types. Either the basic information is collected separately from companies and individuals and linked afterwards, or the information is collected unilaterally from companies or individuals. Examples of the latter are: a company survey in which it is known which individual was hired, a survey of individuals in which it is known at which company the individual found a job, a company register in which it is known which individuals have started at the company or a register of individuals in which it is known at which company the individual found a job.

Table A4.1 Systematic classification of eight methods to measure job vacancies

Type of data collection	Survey (S)		Register (R)	
Source	Source type		Source type	
Type of respondent	Source type NSO, research institutes (N)	intermediaries: public employment services, temporary work agencies, advertisements in written media, online recruitment services (I)	Source type NSO, research institutes (N)	intermediaries: public employment services, temporary work agencies, advertisements in written media, online recruitment services (I)
Companies (C)	Type I. Company survey measuring the total job vacancy market (CSN)	Type II. Company survey measuring the job vacancy market of intermediaries (CSI)	Type III. Company register measuring the total job vacancy market (CRN)	Type IV. Company register measuring the job vacancy market of intermediaries (CRN)
Job finders (J)	Type V. Job finders survey measuring the total job vacancy market (JSN)	Type VI. Job finders survey measuring the job vacancy market of intermediaries (JSI)	Type VII. Job finders register measuring the total job vacancy market (JRN)	Type VIII. Job finders register measuring the job vacancy market of intermediaries (JRI)

Source: JVS.

Type I. Company survey of NSO or research institutes (CSN)

In total 211 job vacancy studies were found in 24 countries that deal with company surveys, including 34 different instruments at the national level. Out of these 211 surveys 114 deal with the Netherlands, 97 with other countries. The *Job Vacancy Statistics* of Eurostat is the only company survey that allows a comparison between the EU countries (21 countries). Apart from the JVS in 11 countries one or more other employer surveys exist, five of which are aimed at measuring job vacancy flows (hires): Belgium, Germany, Netherlands, Italy and Sweden.

Type II. Company survey job vacancy market of intermediaries (CSI)

In some cases intermediaries carry out a survey of companies reporting job vacancies (client companies), which is subsequently published. In total I have been able to locate three studies that have been based on this method. One of these studies deals with figures of branch organisations of temporary work agencies that are members of the Eurociett. This is an inventory held among temporary work agencies. I did a similar survey in the Netherlands (Donker van Heel and Van der Ende, 2009). As far as public employment services are concerned, we have one example from Sweden in which a client employer group was approached through a survey (no date).

A specific example is the research conducted in the Netherlands by this author on behalf of the, then, Dutch ministry of Social Affairs. This continuous research included a short questionnaire that was added to all the job vacancies that were administratively transferred by the public employment service. This form was created automatically by the job vacancy registration system, together with an accompanying letter stating the name and address of the employer the moment the 'action date' was entered (to be decided by the labour market mediator). The form asked the client-employer to what extent and in which way the job vacancy had been filled. This included a question about the client satisfaction regarding the service rendered. The results were then linked to the registration data on company characteristics, job vacancy characteristics and the way the job vacancy was processed. On the basis of this research twenty-five offices of public employment services have been able to measure the performance of their job vacancy processing during a longer period of time (Donker van Heel and Dekker, 1987). Other intermediaries might also send surveys to their client-companies, in various ways and with various aims. However in most cases the results of this type of surveys are not made public.

Type III. Company register of NSO or research institute (CRN)

In the past – specifically during the Second World War – the reporting of job vacancies was mandatory in the US and the United Kingdom. In 2011 registration of job vacancies is mandatory in Lithuania, Czech Republic, Luxembourg, Romania, Slovenia and Slovakia. At the national level information on hires are obtained from company registers, or to be more specific, from tax and social security registers. The organisations tasked with gathering taxes and premiums that have to be paid by the companies are often aware which companies hired new employees during a specific period. The start of tax or premium payment is the equivalent of the start of an employment contract, which in turn is the equivalent of a hire. Of the 10 examples I found, the most clear and interesting are the Netherlands (*Policy Register* of UWV), Germany (Bundesagentur für Arbeit) and Spain (Observatorio de las Ocupaciones of SPEE).

Type IV. Company register of intermediaries (CRI)

Job vacancy registers of public employment services

Public employment services are an important source of job vacancy information (National Bureau of Economic Research, 1966; Hoffmann, 1992, 2000). In total 161 job vacancy studies of public employment services were found, 109 of which deal specifically with job vacancy register. 44 out of 109 studies deal with the Netherlands, 65 with other European countries.

Through the *European Vacancy Monitor* the European Commission has managed to collect job vacancy information from public employment services in 22 countries. In general the information consists of the initial stock, inflow, outflow and the final stock according to the international standard code on occupations (ISCO) as well as a number of other background characteristics.

Another source is EURES, an online mediating system operated by public employment services in the European countries containing information on available job vacancies and job seekers. The aim of EURES is to make available data on job vacancies and job seekers abroad. EURES is coordinated by the EC and the public employment services in the various countries decide for themselves which registered job vacancies will be made public. Some countries do not make available any job vacancies — or only a very limited number — through EURES. Other countries take a slightly broader approach, whereas some countries take the integral approach, publishing all job vacancies that are registered. What remains for analysis is a relatively complete data set for six countries, in the sense that the numbers mentioned are in line with the official numbers of job vacancies in these countries (Denmark, Ireland, Finland, Slovenia, Czech Republic and Sweden).

Examples of specific national job vacancy studies with registration data of public employment services are found in Austria (Arbeitsmarktservices Österreich, 2012), in Belgium (Brussels Observatorium voor de

Werkgelegenheid, 2010), in Germany (Bundesagentur für Arbeit, 2011a), Ireland (FAS Expert Group on Future Skills Needs, 2011), Liechtenstein (AMT für Statistik), Lithuania (Public Employment Services Lithuania, 2011) and Malta (Employment and Training Corporation, 2009).

Job vacancy registers of temporary work agencies

In total 89 job vacancy related studies of temporary work agencies have been found, but only four are specific about the use of the registers. Most studies by temporary work agencies are about surveys and online recruitment. No statistics about job vacancies of temporary work agencies exist, only of online job vacancies for some agencies. In some countries studies are carried out about assignments (hires) of temporary work agencies. Examples I found in Luxembourg (Clement and Thomas, 2010), Sweden (National Institute of Economic Research, 2010; Bemanningsföretagen, Swedish Retail Institute, 2011a, 2011b) and the Netherlands (Donker van Heel et al, 1992b; 1994; 1996; 1999; 2001a; 2002b; 2003; 2004; 2007; 2009).

Register of job vacancy advertisements in the written media

I found four examples of register of job vacancy advertisements in the written media. The history of the use of job vacancy advertisements was described by Zagorsky (1998). According to him Beveridge used these already in 1908— published in three large London newspapers — as a proxy for job vacancies. The first indices appeared in the United States in the twenties, like Bezanson's Philadelphia Index listing sector and profession (Bezanson, 1929) and Berridge's National Index listing region, sector and profession (Berridge, 1961). In the fifties the work done by Berridge was taken over by the Conference Board. The Help-Wanted Advertising Index (HWAI) of the Conference Board was published for the first time in 1964. It still appears each month. The HWAI is based on advertisements in fifty-one newspapers. Well known are the analyses of Abraham (1987), comparing advertisements, job vacancies and unemployment.

There have been similar initiatives in Europe. They never cover a longer period. A very early example is found in the United Kingdom (Dow and Dicks-Mireaux, 1958), more recent in the Netherland (Donker van Heel and Dekker, 1989; Moelker, 1992) and Austria (GfK, 2010; Mair, 2010). It is unclear why no such tradition in Europe exists. Registers of job vacancy advertisements in the written media cover only one percent of all available job vacancy studies.

The rise of the internet as a recruitment channel has wreaked havoc on the position of the job vacancy advertisements in the written media. Partly for this reason increasing use is made of the advertisements of online recruitment services as an alternative to advertisements in the written media.

Job vacancy registers of online recruitment services

The literature on statistical applications of online recruitment services is scarce to none. However, obvious parallels with the job vacancy advertisements in the written media exist. In addition I have studied information of online recruitment services on the internet stored in JVS-E (n=14) and I had personal interviews with experts in the field.

The internet has had a large influence on the recruitment and search behaviour of players on the labour market. The first online job vacancy and job seekers databanks were created at the beginning of the twenty-first century. Most sites fully depend on the self-reliance of companies and job seekers. They sometimes include intermediary services that may carry a fee. Just like the commercial players such as temporary work agencies, the public employment services are developing their own tools. In the private sector in the Netherlands we see social partners developing tools for the own employers and employees. Sometimes job vacancy databanks (or job boards) have a national scope, sometimes they aim at specific segments, for example sectors or professional groups. The publishers of newspapers publish job vacancy advertisements not only in the papers but increasingly also on their own website. At the same time a growing number of individual companies puts up the own job vacancies on the company website. The sheer speed of this development is stunning. Already the online

recruitment services in the Netherlands have taken over the top position from the advertisement as the primary hiring channel (Section 5.5).

The rise of online recruitment has led to meta job search engines. Meta engines search the web for job vacancy sites, advertisement databanks and company websites featuring own job vacancies. This search of the web is called data-mining or spidering. The internet is searched 24 hours and seven days a week, systematically and fully automated. The job vacancies found are imported and — mostly in an automated manner — classified according to profession, education, terms of employment, company data, region, et cetera.

In the US the HWAJ advertisement bank is supplemented by an online advertisement bank. In July 2005 the Conference Board started the *Help Wanted Online Data Series* (HWOL). The data from the online job vacancies of 1,200 US sites are collected and joined together. The job vacancies mentioned on the corporate websites are not part of the population of HWOL even though some of them end up in the counts through job boards. No complete job board list exists, but the Conference Board assumes that coverage is very high according to the information on their website.

Comparable information for European countries is very rare. The *Monster Employment Index* (MEI) provides monthly insight into on-line recruitment trends in some countries in the European Union. The Index is based on 1,400 corporate career sites and job boards, providing an indication of the (on-line) demand for specific occupations. The most current data presented applies to seven countries in Europe: Belgium, France, Germany, Italy, the Netherlands, Sweden and the UK.

One of the first publications addressing online job vacancies of temporary work agencies was initiated by Randstad (*European Vacancy Monitor*, 2010). Randstad — one of the largest temporary work agencies in the world — presents data about the number of job vacancies published on their own website. This data only concerns open positions that cannot be filled directly from their existing pool of candidates. The figures are based on daily measurements of the number of open job vacancies available online (stock figures). It should be noted that job vacancies can be published by more than one subsidiary of the company. The figures relate to five countries with a relatively high penetration of temporary agency work and a relatively high market share of Randstad: Germany, Spain, United Kingdom, France and the Netherlands.

Type V. Job finder survey of NSO or research institute (JSN)

Job vacancy study may be done through surveys among individuals in order to trace job finders (Levitan, 1979; Hoffmann, 1999). In total 35 studies are available (8% of all job vacancy studies). The most important source in Europe is the *Labour Force Survey*. A specific country study is found in Sweden (Statistics Sweden, 2011). All 27 countries in the EU are obliged to supply the EC with statistics on their labour population: the *Labour Force Survey*. The obligations regarding the layout of the surveys are laid down in the *Council Regulation (EC) No 57/98 of 9 March 1998 on the organisation of a labour force sample survey in the Community*. Apart from this various supplementary arrangements exist, for example on the mandatory character of the measurement of specific characteristics and the use of specific coding's. The *Labour Force Survey* is based on representative studies among individuals by the 27 separate Member States.

Type VI. Job finder survey of intermediaries (JSI)

Survey of job seekers by public employment services

Public employment services sporadically perform their own research among the unemployed who are removed from the files, thus tracing job finders. The aim of this research is to improve the quality of the own services. In specific cases a questionnaire will be sent to job seekers who have been referred to concrete job vacancies, asking them whether the job involved has been accepted (Donker van Heel and Dekker, 1987). The disadvantage of this method is that the disadvantages of the survey (no response) and the coverage of the intermediary

(selectivity) reinforce each other. For this reason the results of these surveys are less suitable for monitoring the job vacancy market. These surveys were, after all, designed to improve the quality of the own services.

Survey temporary agency workers

Of the total of 30 studies most of them concern a regular survey of temporary agency workers financed by the ABU, the Board of Temporary Work Agencies in the Netherlands. From 1991 onwards research is carried out in the Netherlands to find out how many temporary agency workers obtain a temporary job or a permanent position with an employer, unveiling a considerable number of characteristics that are relevant to the labour market (Donker van Heel et al, 1992b; 1994; 1996; 1999; 2001a; 2002b; 2003; 2004; 2007; 2009). A similar research is done in Belgium (Federgon, 2010). This type of research allows a good estimation of the number of filled temporary job vacancies (assignments), including a correction for the temporary agency workers already (permanently) employed by the temporary work agency. This research presupposes participation by the temporary work agencies that cover a substantial part of the market. These temporary work agencies in the Netherlands are prepared to provide an insight into their own populations of job finders and assignments. In fact, this type of research is often the only source in a country to provide a picture of the nature and size of the flows on the temporary agency work market.

Surveys among job seekers by publishers of job vacancy advertisements and online recruitment services

The publishers of job vacancy advertisements and online recruitment services are generally not interested in the result of the search process. In so far as is known no survey was conducted on the actual finding of a job among the job seekers reading advertisements or putting up their CV on specific websites.

Type VII. Job finder register NSO or research institute (JRN)

Not many examples of registers of individuals on the total job vacancy market exist. Only 10 examples have been found, Austria, Germany, Netherlands and Spain being the best examples. The registers of individuals by the tax department and the social security organisations offer the possibility to gain an insight into job vacancies. These institutions most often know when a person starts working (job finders). In Austria the inflow into the employee health insurance is used as an equivalent for hires (Christl, 1994). In theory, the annual statement for the tax department allows one to check whether a person has started to work in a specific year or has found a new employer. The first may be analysed quantitatively by checking to what extent someone generates an income from work in a specific year. An advanced tool is the *System of Social statistical Datasets (SSD)* in the Netherlands, linking the administrative microdata of the tax department, the social security register and the *Survey on Employment and Earnings (SEE)* (Milot and Kee, 2005; Bruil, Den Butter and Kee, 2010; Bakker, van Rooijen and Van Toor, 2014). This database contains micro data on employees that is linked to company data. It also shows the starting date of an employment contract.

Type VIII. Job finder registers of intermediaries (JRI)

Registration of job finders by public employment services

I did not find any examples of this type. If the number of registered job finders would be known, this would be the equivalent to the number of filled job vacancies by the public employment services. However, even at the public employment services using advanced information systems it turns out the administrative procedures are not designed to achieve this (Koning et al, 1995). The unemployed in the Netherlands are neither obliged to report why they unregister to the public employment services, nor whether they have found a job.

Register of job finders through advertisements and online recruitment services

The advertisements and online recruitment services do not provide any data on job finders. The publishers of written media are only interested in publishing job vacancy advertisements, not in the results of recruitment. Most online recruitment services — public and private — only offer the facility to publish job vacancies and CVs. They

offer no services during the subsequent search process. The results of the search process through the online services are therefore unknown.

Annex 5 Job vacancy analyses

Types of job vacancy analyses

The 423 job vacancy studies in JVS-E include the following eight types of job vacancy analyses:

- I. Study of the size and structure of a job vacancy market (412);
- II. Study of the bottlenecks at the demand side of the labour market (141);
- III. Study of the dynamics of the labour market (84);
- IV. Study of the mismatch between demand and supply on the labour market (127);
- V. Study of the development of the economy (163);
- VI. Study of the performance of labour market intermediaries (152);
- VII. Job vacancy prognoses (9); and
- VIII. Qualitative research (17).

The first type of analyses concerns the calculation of the total size and structure of a job vacancy market (412 studies). This can be studies with a national, sectoral, regional or local scope. An important aspect of this type of analysis is that apart from stock figures — as with the *Job Vacancy Statistics* of Eurostat — it also analyses flow figures, i.e. job finders in the *Labour Force Survey*. Important variables to describe the structure of the job vacancy market are sector, region, size of the company employer, occupation, education, type of contract, et cetera. These basic data of the job vacancy totals are crucial for all other job vacancy analyses. Examples of this type of analysis are OSA (2009), Brussels Observatorium voor de Werkgelegenheid (2010), Mair (2010), Bliem (2011) and Arbeitsmarktservices Österreich (2011).

The second type of analyses deals with bottlenecks specifically on the demand side of the labour market, concerning hard to fill job vacancies. This type of analysis must not be confused with the study of mismatches, which includes a comparison of demand and supply (see analysis type IV). The 141 job vacancy studies dealing with demand bottlenecks include various indicators. First, studies exist asking companies to what extent specific job vacancies are hard to fill. The second approach is to use the job vacancy duration as an indicator. The third approach is the ratio between the stock and flows. The stock-flow rate provides an insight into the rate at which job vacancies are filled, thus indicating hard to fill job vacancies. Examples are Keinänen (2006), Ailenei, Bobre, Marinas and Hrebenciuc (2011), Gaubitsch and Luger (2011), Kettner (2011), Weitzel, et al (2011a) and the *European Vacancy Monitor* (European Commission, 2010; 2011a; 2011b; 2011c; 2012a; 2012b; 2012c).

The third type is about the comparison between job vacancies and employment (84 studies). This is viewed by this author as a vertical comparison, because the job vacancies (the numerator of the fraction) form a subset of employment (the denominator of the fraction). This type of analysis provides an insight into the state of employment dynamics. A higher share of job vacancies in the employment indicates more dynamics. A booming economy corresponds to high dynamics, a slump to low dynamics. An additional perspective is offered by the differences between sectors and occupational groups. Higher dynamics may point at an undesired outflow of personnel, which may be related to the quality of the labour (terms of employment, working conditions, content of the work and employment relations). High mobility may also indicate the presence of relatively many temporary and short-term contracts or problems with recruitment (mediocre quality of labour, high inflow needed). Lower dynamics may point toward a lack of internal flow, for example in specific sectors or occupational groups. Examples are OSA (2009), Bemanningsföretagen/Swedish retail Institute (2011) and the *European Vacancy Monitor* (European Commission, 2010, 2011a; 2011b; 2011c, 2012a; 2012b; 2012c).

The fourth type of analyses concerns the comparison between job vacancies and unemployment indicating mismatches on the labour market (127 studies). I view this as a horizontal comparison, because the job vacancies

and unemployment are in a sense each other's mirror image. Alternatives for unemployed are other supply groups, like job seekers, students and school leavers. A popular analysis is the comparison between the demand for labour and the supply of (coming) school leavers, looking specifically at the education (level and orientation) and profession. Sometimes students who are working and trainees are included in the equation. This analysis is especially important for the planning of education and schooling capabilities. Examples are Hynninen (2007), Hämäläinen and Tuomaala (2007), Methodological Centre for Vocational Education and Training Lithuania (2008), Mair (2010), Ailenei, Bobre, Marinas and Hrebenciuc (2011), Arbeitsmarktservices Österreich (2012) and Bliem, Weiss and Grün (2011).

The fifth type concerns the relation between job vacancies and economic development, the issue being to what extent job vacancy developments are indicators of the state of the economy (163 studies). These are about business cycle analysis, using job vacancy time series and in many cases explicitly addressing the relation between job vacancies and economic indicators such as economic growth (GDP growth). Good examples are Germany (Bundesagentur für Arbeit, 2011), Luxembourg (Clement and Thomas, 2010), United Kingdom (Markit, 2007) and the *European Vacancy Monitor* (European Commission, 2010; 2011a; 2011b; 2011c; 2012a; 2012b; 2012c).

The sixth type deals with the assessment of the performance of labour market intermediaries (152 studies). Two groups of indicators can be distinguished: organisational effectiveness and market effectiveness. Organisational effectiveness is about the results of job vacancy processing. The main indicators are job vacancy inflow, hires, stock of job vacancies, job vacancy filling rate, the number of cancelled job vacancies and the job vacancy duration. The market effectiveness concerns the position of intermediaries on the job vacancy market. Here, the main indicators are market penetration, market coverage and market share. Examples are Finland (Räisänen, 2004), Austria (Arbeitsmarktservices Österreich, 2011; GfK, 2010), Belgium (Gevers and Peters 2006), Malta (Employment and Training Corporation, 2009), United Kingdom (UKCES, 2011b; 2011c) and Netherlands (UWV WERKbedrijf, 2012). For an extended description of performance indicators of public employment services, see Donker van Heel (1992e; 1993h; 1993i; 1993j).

The seventh type deals with job vacancy prognoses (nine studies). These should not be confused with employment prognoses. Examples are Donker van Heel, Van Hulst, Thio, Koot and Van Nuland (2007), Nauta, Koot and Donker van Heel (2005), Ministry of Labour Finland (2006), Behan and Shelly (2010), UWV WERKbedrijf (2011).

The final, eighth type consists of qualitative studies of the expected demand for labour (17 studies), such as qualitative studies of skills needs (FAS, 20010; 2011).

Indicators

I found 28 different indicators used in the first seven types of job vacancy analysis (table A5.1). In view of the various information requirements each analysis may be carried out on the basis of different ranges, using stock and/or flow figures, in time series, using different breakdowns or with various degrees of topicality. Each indicator may be calculated using data on the total labour market collected through surveys, as well as the register data gathered by public employment services. Each separate indicator will be briefly explained below, showing that the basic data (the job vacancy totals) are crucial for all job vacancy analyses.

Table A5.1. Job vacancy analyses and indicators

Type of job vacancy analysis	Indicator
I. Size and structure of the total job vacancy market	1. Stock job vacancies
	2. Inflow job vacancies
	3. Outflow job vacancies
	4. Hires
	5. Withdrawn job vacancies
	6. Job finders (hires)
	7. (Volume job vacancies)
II. Labour market dynamics (comparison of job vacancies and employment)	8. Zero job vacancy rate
	9. Job vacancy rate (stock)
	10. Job vacancy inflow rate (inflow)
	11. Hiring rate, or job vacancy mobility rate, or job vacancy filling rate or turnover (outflow)
	12. Job finders rate
III. Bottlenecks on the demand side of the labour market (hard to fill job vacancies)	13. Rate difficult to fill
	14. Stock flow rate
	15. Job vacancy duration
IV. Labour market mismatches between demand and supply (comparison of job vacancies and unemployment)	16. Ratio unemployment / stock job vacancies
	17. Ratio unemployment / inflow job vacancies
	18. Ratio unemployment / hires
	19. Ratio unemployment / job finders
	20. Unemployment rate / job vacancy rate
	21. Unemployment rate / job finders rate
V. Development of the economy (business cycle analysis)	22. Job vacancy indicators * economic growth (GDP, employment)
VI. Performance indicators recruitment channels (public employment services)	23. Job vacancy market penetration
	24. Job vacancy market coverage
	25. Job vacancy market share
	26. Job vacancy filling rate
VII. Prognosis	27. Prognosis of job vacancies
	28. Prognosis of job openings

I. Size and structure of the total job vacancy market

Stock, inflow and outflow (filled and withdrawn)

Data on totals of job vacancies preferably include the count at the beginning of a period, the inflow and outflow during that period and the final count of the stock at the end of the period. Analyses of the share of job vacancies that have been withdrawn by the companies are very rare (Donker van Heel and Dekker, 1987; Gevers and Peeters, 2006; Arbeitsmarktservices Österreich, 2011; Sen, 2008).

Job finders

A job finder equals a hire or a filled job vacancy, with the exclusion of individuals finding a new job at their own employer. The best source is the *Labour Force Survey*. The number of job finders is used as an indicator for the total number of hires (European Commission, 2010; 2011a; 2011b; 2011c; 2012a; 2012b; 2012c). This is an outflow figure.

Job vacancy volume

If employment is defined in terms of volume, for example the number of labour years (expressed in full-time equivalents), job vacancies should also be expressed in terms of volume in order to enable a comparison. A job vacancy can be multiplied by the part-time factor (Verhage et al, 1997). One should bear in mind, however, that the results between calculations with stock figures differ from those with flow figures. With flow figures the, probable, open duration during a specific measuring period has to be taken into account. For open vacancies this depends on the moment the measurement takes place. For the inflow and outflow of job vacancies the (probable) duration per job vacancy depends on the inflow date or the outflow date, respectively. The literature almost disregards ignores this indicator.

II. Labour market dynamics (comparison of job vacancies and employment)

Zero job vacancy rate

The zero job vacancy rate is the rate of companies without any job vacancies. A (substantial) part of the companies has no job vacancies at a given moment and/or during a specific period in the past. This share is higher during a period of recession and lower during a boom. Companies having a relatively large number of employees are more likely to have job vacancies. For this reason, larger companies always have a lower zero job vacancy rate than smaller companies. This indicator is important for tracing job opportunities. With this fact, due regard should be taken when performing sampling surveys about job vacancies among companies.

Job vacancy rate (stock)

The job vacancy rate is an indicator for the state of affairs at the demand side of the labour market. The job vacancy rate is the ratio of stock of job vacancies (numerator) and the stock of employment (denominator). The job vacancy rate is a traditional measure coming from the classic tradition of the unmet demand concept. Among other things, the indicator is used in the Beveridge analysis that looks at the ratio between the job vacancy rate and the unemployment rate during a longer period of time (see further under UV-ratio). The rate is mostly between 0.1 and 4.0 percent. An interpretation becomes difficult if the differences between time units and segments are small. This measure implies that substantial statistical margins will have to be taken into account. One additional problem is that this measure is sometimes calculated on the basis of different sources for both the numerator and the denominator, a procedure that may lead to impurities (is the numerator a subset of the denominator or not?).

Job vacancy mobility rate

The job vacancy mobility rate is the ratio between the inflow of job vacancies and employment. This idea is not new. Meyers (1965a) calculated a job vacancy rate on the basis of the job vacancy inflow (expected in advance by companies). Sometimes, for the denominator a yearly average of the employment per quarter is used.

Hiring rate

The hiring rate is the ratio between the number of hires and employment (number of jobs at the start of the period), providing the same indications the job vacancy mobility rate.

Job finder rate

The job finder rate is the ratio between the number of job finders and employment. This is a proxy for the hiring rate because the number of job finders is the equivalent of the number of hires. The advantage of this indicator is

that it also includes personal characteristics. Especially if the job finder rate is differentiated according to the background characteristics of the hired candidates this information will yield many insights into the opportunities for specific groups of job seekers on the labour market. The job finder rate is calculated by comparing the job finders with the working population, including the unemployed (European Commission, 2010; 2011a; 2011b; 2011c; 2012a; 2012b; 2012c).

III. Bottlenecks on the demand side of the labour market (hard to fill job vacancies)

Rate difficult to fill job vacancies

The most decisive indicator for job vacancies that are difficult to fill is the view of the employer, because the employer actually experiences the degree to which concrete job vacancies are difficult to fill. It is important to analyse this in order to provide an insight into the bottlenecks in the recruitment of personnel (Bastelaer and Laan, 1994; Wegerif, 1994; UWV WERKbedrijf, 2012). The investigation of job vacancies that are difficult to fill is generally important, because there may be adverse effects on both companies and employees (lower production, more overtime and higher workload). Job vacancies that are difficult to fill offer an insight into the job opportunities for job seekers, because in these cases companies may be prepared to adjust their job vacancy requirements sooner, meaning that these job vacancies also become available to job seekers that are further away from the labour market. In any case difficult to fill job vacancies offer leads for investments in education and training of both the employed and the unemployed (Brusten, et al, 1994; Fenwick, 1994).

Empirical evidence has shown that some companies only report job vacancies to public employment services if the job vacancy turns out to be difficult to fill (Donker van Heel and Van der Ende, 2009b). Note, however, that another study showed that companies themselves may consider a job vacancy not difficult to fill even if it has remained open for a long time at public employment services. This applied mostly to large enterprises where recruitment procedures take a relatively long time (Donker van Heel and Dekker, 1987).

Job vacancy duration

The job vacancy duration is defined as the period of time a job vacancy has been open. As counterpart of unemployment duration, the job vacancy duration is important in the analysis of the labour market (Holt and David, 1966; Sharir, 1971; Salverda, 1992; Wegerif, 1994). The duration of job vacancies is a supplementary indicator for the extent to which a job vacancy is hard to fill. We distinguish five different variants for the job vacancy duration, each leading to a different outcome:

- The length of time open job vacancies have been open at a specific moment (incomplete duration);
- The length of time job vacancies that flowed in are open at a specific moment (incomplete duration);
- The length of time job vacancies that flowed out have been open (complete duration);
- The length of time filled job vacancies have been open (complete duration);
- The length of time cancelled job vacancies have been open (complete duration).

Stock flow rate (proxy job vacancy duration)

Despite the differences in size and composition a close relationship exists between open job vacancies and job vacancy flows. After all, open job vacancies are the resultant of job vacancy inflow and outflow. Each open job vacancy has once flowed in, and each job vacancy that has flowed in should one day flow out. This relationship enables a comparison of stocks and flows during a longer period of time. The starting stock plus inflow minus outflow is the final stock for a specific period. This is called the "flow equation". The outflow consists of filled vacancies and cancelled (or withdrawn) job vacancies.

$$\text{starting stock} + \text{inflow} - \text{outflow} = \text{final stock}$$

$$\text{open vacancies (t0)} + \text{inflow of job vacancies} - \text{outflow of job vacancies} = \text{open vacancies (t1)}$$

Seen over an 'infinite' period of time, the total inflow of all job vacancies will be equal to the total outflow. However, on a yearly basis the inflow and outflow of job vacancies will never be equal to each other. If the inflow is higher than the outflow, the number of open job vacancies will increase in that year. If the outflow of job vacancies is higher than the inflow, the number of open job vacancies will decrease. It is important to note that the number of open job vacancies can only increase if the inflow during a specific period of time is higher than the outflow.

The stock to flow rate is not the same as the job vacancy duration, but it is a proxy. A comparison between open job vacancies and job vacancy flows can help to find out which job vacancies are overrepresented in the stock and which are not. An overrepresentation of specific types of job vacancies in the stock indicates that it is difficult to fill these vacancies. The nature of open job vacancies differs from the nature of the inflow or the outflow. Job vacancies that are open longer run a greater chance of representation in the stock of open job vacancies. And in turn, job vacancies that are difficult to fill are generally open for a longer period. This means that job vacancies that are difficult to fill occur more often within the set of open job vacancies. Differences between stock and flows of job vacancies may be compared by company characteristics (region, sector) and vacancy characteristics (occupation, type of employment (fulltime and part-time), type of employment contract (temporary and permanent), requested education).

The stock to flow rate is under certain assumptions a proxy for the job vacancy duration. Starting from a calendar year of 365 days the (incomplete) job vacancy duration of the job vacancies that have flowed in is equal — in calendar days — to the stock divided by the inflow in this specific year multiplied by 365 calendar days. In this case it is assumed that new job vacancies are equally distributed through the year, as well as a stable distribution of job vacancy durations in time. The best approach would be to use the stock at the end of the period::

$$[\text{stock end date of a year}/(\text{stock a year earlier} + \text{inflow in the year preceding the end date})] * 365$$

Experts suggest calculating the inflow divided by the outflow. Of course it is possible that if the outflow is higher than the inflow (ratio <1) the stock will go down. If the outflow is lower than the inflow (ratio >1) the stock will go up. A declining stock indicates in general a downturn in economy and an increasing stock an upturn. So we think this proposed calculation is very much appropriate as an indicator for business cycle analysis. Furthermore, it is a different indicator for difficult to fill job vacancies compared to the indicator based on the inflow and stock. But we think this is less suitable, because in the inflow to outflow ratio we will miss the job vacancies in the stock (which might be relatively difficult to fill). Especially in a situation with a high stock and relatively low flows this might lead to misinterpretation. And within the outflow we also have a part of withdrawn job vacancies (educated guess 15-20%), which will probably fluctuate with the business cycle. Withdrawn job vacancies could be more difficult to fill than average (economic expansion) or the opposite (recession). Using the outflow as such covers this effect. So, as an additional indicator we would welcome it.

IV. Labour market mismatches between demand and supply

This type of analyses concerns a comparison between job vacancies and supply (unemployed, job seekers, school leavers).

Ratio unemployment / stock job vacancies

The ratio unemployment (U) and the stock of job vacancies (V) is an indicator to measure the tension on the labour market. By performing this analysis at various points in time it is possible to make a statement about the development of demand and supply bottlenecks. This is called a UV-analysis or Beveridge-analysis. The Beveridge-analysis uses stock figures of job vacancies and unemployment (Yashiv, 2007). Unemployment flow figures are difficult to obtain.

Ratio unemployment / inflow job vacancies

Without doubt, the UV-analysis would lead to different results and conclusions if job vacancy flows were to be used instead of stock figures. Not only the figures would be different, but the composition would also change, because stock, inflow and outflow relate to different groups of job vacancies. If analyses are limited to the open demand, they will lead to different conclusions than analyses based on flow figures of job vacancies. However, traditionally the type of analyses is performed with stock figures.

Ratio unemployment / hires

See ratio unemployment / inflow job vacancies.

Ratio unemployment / job finders

See ratio unemployment / inflow job vacancies. The additional advantage of this component of the indicator is that it shows which groups within the unemployed population find a job and which do not.

Ratio unemployment rate / job vacancy rate (uv-ratio)

The confrontation between the unemployment rate and the job vacancy rate is a very common analysis. The unemployment rate is the share of the unemployed within the total working population. The definition of the job vacancy rate is found above. The most common analysis is the analysis through time, which is a variant of the Beveridge-analysis.

Ratio unemployment rate / job finders rate

See ratio unemployment rate / job vacancy rate.

V. Business cycle analysis

Time series of job vacancy indicators and economic growth (change GDP, change employment)

VI. Performance indicators recruitment channels

Job vacancy market penetration

The job vacancy market penetration encompasses the number of companies that reports job vacancies at the public employment service in a specific period, set off against all companies (in a region or sector). This is mostly inflow information. See for example the case of Ireland (Fox, 2009). Not always stock data is used but outflow information, because the process of recruitment is completed and all the facts are known. Analysis of breakdowns by sector and region gives an insight into opportunities for acquisition of new job vacancies. The job vacancy penetration is comparable to the zero job vacancy rate.

Job vacancy market range

The market range of job vacancies is the number of job vacancies that is reported at the labour market intermediary, set off against the total number of job vacancies (see also Beveridge, 1944; Pissarides, 1979; Muysken, 1994). Stock data are used, but flow data are also used.

Job vacancy filling rate

Just like the market share the job vacancy filling rate relates to the labour market intermediaries. The job vacancy filling rate is calculated by dividing the number of job vacancies filled by the intermediary by the total outflow of job vacancies during a specific period. The outflow may be the total outflow (administratively processed) or only the filled job vacancies (filled by the intermediary or a third party). These are always outflow data in which the numerator is a subset of the denominator. The job vacancy filling rate indicates the degree to which a labour market intermediary has been able to fill job vacancies.

Job vacancy market share

The job vacancy market share is the number of job vacancies that is filled by a labour market intermediary (like public employment services), set off against the total number of filled job vacancies. By definition, this is outflow information. The job vacancy market share can be calculated by multiplying the job vacancy range and the job vacancy filling rate. If the filling rate is calculated on the basis of job vacancy share and job vacancy range, the job vacancy range and the job vacancy share would, strictly speaking, have to be defined as outflow data (Donker van Heel and Dekker, 1987).

VII. Prognosis

Prognosis of job vacancies

Job vacancy flow figures can be estimated on the basis of expansion induced job vacancies and replacement vacancies. Expansion induced job vacancies are calculated on the basis of the expansion of employment. Replacement job vacancies are calculated as a percentage of employment according to characteristics. New stock figures follow from the flow figures and the stock of the basic year. Job vacancy prognoses are made on the basis of time series and for example regression analyses (UWV WERKbedrijf, 2011).

Prognosis of job openings

Forecasts of new demand for labour are often related to job openings (Cedefop, 2010). A job opening is not the same as job vacancy. In general speech the term job opening is sometimes used as a synonym for job vacancy. However, in the domain of labour market research — and to be more specific, in forecasts dealing with the demand for labour — these notions are different entities. Generally an estimation of the number of job openings is not concerned with job vacancies at the level of the individual company. It does in fact concern the replacement and expansion demand at the aggregated level of a specific sector, like an economic sector, an occupational group or an educational sector. The job openings constitute the net demand for labour per sector, with the exclusion of the internal filling of job vacancies within the sector. For this reason the number of job openings is always smaller than the number of (filled) job vacancies within the same population. However, job openings can be measured on the level of an individual company and in that case a job opening equals a job vacancy.

Annex 6 Measurement instruments in the Netherlands

In the Netherlands various instruments provide a picture of the total national job vacancy market: first the *Survey Economic Structure* (Structuur-enquête), including the *Job Vacancy Statistics* (Vacature-enquête) and the *Labour Force Survey* (Enquête Beroepsbevolking) of SN. The *Job Vacancy Statistics* and *Labour Force Survey* are more or less comparable to the same instruments in other European countries, because they are based on a common methodology, in accordance with agreements made within Eurostat. Then supplementary instruments provide a picture of the Netherlands as a whole: *Job Vacancies in the Netherlands* (Vacatures in Nederland) of UWV, the *Panel Demand for Labour* (Vraagpanel) of OSA/SCP and the *Policy Register* (Polisadministratie) of UWV. The *System of Social statistical Datasets* (Social Statistisch Bestand) is not a measurement on its own, but it links the *Policy Register* and the *Labour Force Survey*.

The first job vacancy surveys of SN date back to 1952, but in the beginning they did not involve all sectors. The *Job Vacancy Statistics* deals with all private companies in the Netherlands from 1969 onwards. From 1994 the government sector is included. The *Job Vacancy Statistics* is held each quarter, comprising the open, created (inflow) and filled job vacancies. The *Job Vacancy Statistics* provides a snapshot of the number of open job vacancies at the end of each quarter. It is noteworthy that internal job vacancies and job vacancies at temporary work agencies are included in the counting. No distinction is made between job vacancies for occupied and unoccupied jobs.

The *Survey Economic Structure* started in 1992. It concerns a partly written, partly online questionnaire among 21,000 companies and 900 government institutions. From 1992 up to 2004 it was carried out annually and after 2004 bi-annually. The *Job Vacancy Statistics* is part of the *Survey Economic Structure* and is separately carried out each quarter. The *Survey Economic Structure* contains breakdowns of open job vacancies into sector, occupational category, region, required educational level, school leavers yes/no, hours per week, occupied position yes/no, job vacancy duration, placement of ad, registers of the public employment service and hard to fill job vacancies. After 2008 SN terminated the *Survey Economic Structure*.

The *Labour Force Survey* of SN is a population survey measuring the total work force and also the number of job finders. The *Labour Force Survey* is a population survey. It provides information on the number of job finders, which is an indicator of the number of hires. The *Labour Force Survey* slightly underestimates the actual number of job finders, because it does not take into account the individuals who are unemployed at the moment of the survey, although prior to the survey they had a job that lasted less than three months.

The employer survey *Job Vacancies in the Netherlands* started in 1984 on behalf of the UWV (the public employment service). It is conducted once a year by specialised private research bureaus. In 2006-2010 the survey involved 7,500-8,500 companies (net figure) who were interviewed by telephone. The questions contained in this employer survey deal with open job vacancies, created job vacancies and hires (filled job vacancies). The background characteristics of filled job vacancies include sector, order of magnitude and region of companies, required occupation, education, competencies, experience, type of employment contract, hard to fill job vacancies according to the employer, recruitment and hiring channels, and the characteristics of hired persons, such as age, sex, education, labour history (working, unemployed, school-leaver) and ethnic background. This questionnaire takes into account the companies without job vacancies, thus allowing a representative picture all companies and institutions in the Netherlands through weighting and estimating population totals. A special feature of the CATI version of the questionnaire is the 'randomiser' that selectively asks further questions about two to three job vacancies per respondent, resulting in detailed information on more than 20,000 hires per survey.

The *Panel Demand for Labour* of OSA/SCP is a survey of firms with a minimum of five employees. It provides information on the number of open job vacancies, hard to fill job vacancies and the job vacancy rate. This survey, published once every two years, hardly provides any breakdowns. In view of the relatively small sample of companies (a net figure of almost 3,000 companies) the margins of this survey are wide. The publications of the study only provide percentages and no absolute figures. The last survey took place in 2008, after which the OSA was liquidated.

The *Policy Register* of UWV is a register connected with the implementation of social security, containing detailed information on companies and employees, including new transactions. A new contractual relation is called '*inkomstenverhouding*'. The administration contains information of 17 million '*inkomstenverhoudingen*' in 2011.

When looking at the labour market intermediaries acting as a source for job vacancy information, the main instruments are the registers of notified job vacancies at public employment services, the *Survey Inflow of Temporary Agency Workers* (ABU), registration of open online job vacancies at Randstad, *Job Feed* (Textkernel) and — to a lesser extent — *Twitterbaan.nl*.

Various organisations in the Netherlands conduct sector-specific labour market research. Of the 95 sectoral job vacancy studies in the Netherlands available in JVS-E 45 were carried out by social partners, 20 by the temporary work agency branch, 20 by educational institutions in vocational education, five by the government, two by the public employment services, one by an employer organisation and one by a private research institute. In 69 out of 95 cases the research was financed from private funds. Part of the research in vocational education was also financed from private funds (public private financing). Examples include agriculture and animal fodder, horticulture, metal, maritime sector (shipping, interior shipping, fishery and offshore), logistics and transport, and the pharmacy sector. These are mostly occasional surveys. In a number of cases the survey is conducted annually or once every two years, and some time series are available, for example in horticulture (Wit et al, 2011) and transport (Hazebroek et al, 2009). Some regional labour market surveys include sectoral components. However, this does not involve the collection of job vacancy data, but only the processing of existing data.

Annex 7 Codebook (structure of JVS)

Variable group	Variables	Values
A. Type document	Name	text
	Year	date
	Year subnr	text
	Database	1. JVS-A: Academic literature job vacancies
		2. JVS-E-I: Instruments most recent
	3. JVS-E-S: Secondary research job vacancies	
	9. JVS-E-I: Instruments older years	
B. Type of analysis	I. size	1. yes
	II. Bottlenecks	1. yes
	III. Dynamics	1. yes
	IV. Mismatch	1. yes
	V. Bussiness cycle	1. yes
	VI. Performance	1. yes
	VII. Prognosis	1. yes
C. Geographic coverage	Geo	Netherlands
		Austria
		Belgium
		Bulgaria
		Croatia
		Cyprus
		Czech Republic
		Denmark
		Estonia
		Finland
		France
		Germany
		Greece
		Hungary
		Iceland
		Ireland
		Italy
		Latvia
		Liechtenstein
		Lithuania
		Luxembourg
Malta		
Netherlands		
Norway		
Poland		
Portugal		
Romania		

Variable group	Variables	Values
		Slovakia
		Slovenia
		Spain
		Sweden
		Switzerland
		United Kingdom
		Europe
D. Type of source	Producer	1. government
		2. employers organisation
		3. employees organisation
		4. social partners
		5. public employment services
		6. temporary work agencies (private services
		7. online recruitment services
		8. education
		9. NSO and public research institutions
		10. private research institutions
		11. municipality
		12. tripartite
		13. international organisation
		14. other (Chamber of Commerce)
		15. science
	Type organisations	1. international
		2. national
		3. regional
		4. local
		5. sectoral
Concept	1. unmet demand	
	2. job vacancies	
	3. employment dynamics	
	4. turnover	
	5. job openings	
	6. unclear	
Topic	1. economic policy	
	2. labour market policy	
	3. social insurance	
	4. education, including training of employees	
	5. other	
E. Method	Data collection	1. survey
		2. register
		blank: unclear
	Source	1. national
		2. intermediary
		blank: unclear
	Respondents	1. company

Variable group	Variables	Values
		2. person (individual)
		blank: unclear
	Type of method	I. company survey labour market
		II. company survey intermediaries
		lia. company survey PES
		lib. company survey TWA
		III. company registration labour market
		IV. company registration intermediaries
		Iva. PES registration
		Ivb. TWA registration
		Ivc. ORS registration
		Ivd. advertisements registration
		V. household survey labour market
		VI. household survey intermediaries
		VII. household registration labour market
		VIII. household registration intermediaries
		X. other
F. Assessment criteria		
content criteria	1. Recruitment domain	1. distinction internal and external demand
	2. Search activity	1. active search is clear
	3. Occupancy job	1. occupancy actually measured
	4. Work available	1. explicitly measured
		2. implicitly measured
		blank: not measured
	5. Contract available	1. explicitly measured
		2. implicitly measured
		blank: not measured
	6. Status	1. flow data
data criteria	7. Delineation	1. national
		2. sector
		3. region or local
	8. Characteristics	1. all characteristics (four groups)
	9. Detail	1. level individual job vacancy
		2. aggregated
		blank: unclear
	10. Frequency (of the publication)	1. once a year or less often
		2. once a quarter
		3. once a month
		4. once a week
		5. every day
		blank: unclear
	11. Time perspective	1. current
		2. retrospective
		3. prospective
		blank: unclear

Variable group	Variables	Values
methodological criteria (only if database=2)	12. representativeness	1. no selectivity
	13. validity	1. measuring job vacancies or unmet demand
		2. proxy (job finders etc)
	14. reliability	1. registers, excluding ORS
	15. sensitive to mistakes	1. registers, including ORS (less sensitive)
	16. costs	1. survey (less costs)
	17. response burden	1. ORS or ads (less burden)
		2. registers
		3. surveys
	18. timeliness	1. real time
		2. within 6 months
		3. after 6 months
		blank: unclear

Annex 8. Codes JVS-E

Study	database	I. Size	II. Bottlenecks	III. Dynamic	IV. Mismatch	V. Businesscycle	VI. Performance	VII. Prognosis	Geo	Producer	Type organisations	Concept	Topic	Data collection	Source	Respondent	Type of method	Recruitment domain	Search activity	Occupancy job	Work available	Contract available	Status	Delineation	Characteristics	Detail	Frequency	time perspective	representativeness	validity	reliability	sensitive to mistakes	costs	response burden	timeliness
A+O Fonds Gemeenten (2011)	2	1							Netherlands	4. Social partners	5. Sectoral	2. job vacancies	2. Labour market policy	1	1	1	I. Company survey labour market	1	1				1	2	1	2	1	1				1	3	2	
A+O Fonds Metalektro(2011)	2	1	1						Netherlands	4. Social partners	5. Sectoral	2. job vacancies	2. Labour market policy	1	1	1	I. Company survey labour market	1	1	2	2	1	2		2	1	2	1	1			1	3	2	
Van der Aa, Donker van Heel, Van Polanen Petel, C. Peeters, Vandendriessche, Webers and Otten (1997a)	3	1							Netherlands	1. Government	5. Sectoral	2. job vacancies	2. Labour market policy	1	1	1	I. Company survey labour market	1						2		2	1	2							
Van der Aa, Donker van Heel, Van Polanen Petel, C. Peeters, Vandendriessche, Webers and Otten (1997b)	3	1							Netherlands	1. Government	5. Sectoral	2. job vacancies	2. Labour market policy	1	1	1	I. Company survey labour market	1						2		2	1	2							
Van der Aa, Van der Ende, Van Polanen Petel and Donker van Heel (1999)	2	1			1				Netherlands	4. Social partners	5. Sectoral	2. job vacancies	4. Education	1	1	1	I. Company survey labour market	1	1		2	2	1	2		2	1	2	1	1			1	3	2
Van der Aa, Van der Ende, Donker van Heel, Kans and Van Nuland (2008)	2	1							Netherlands	1. Government	5. Sectoral	2. job vacancies	2. Labour market policy	1	1	1	I. Company survey labour market	1	1		2	2	1	2		2	1	2	1	1			1	3	2
ABU (2012)	3	1				1			Netherlands	6. PRES	5. Sectoral	2. job vacancies	2. Labour market policy	1	1	1	I. Company survey labour market	1						2		2	3	1							
Adecco (2011)	2	1				1			Germany	6. PRES	1. International	2. job vacancies	2. Labour market policy	2	2	1	Ivc. ORS registration		1				1	1		1	3	1		1		1		2	1
Aequor (2010)	2	1	1		1				Netherlands	4. Social partners	5. Sectoral	2. job vacancies	4. Education	1	1	1	I. Company survey labour market	1	1		2	2	1	2		2	1	2	1	1			1	3	2
Ailenei, Bobre, Marinas and Hrebenciuc (2011)	3	1	1		1				Romania	9. NSO and public research institutions	2. National	1. unmet demand	2. Labour market policy	1	1	1	I. Company survey labour market	1						1		2	1	2							
AMT für Statistik (2010)	3	1							Liechtenstein	5. PES	2. National	2. job vacancies	2. Labour market policy	2	2	1	Iva. PES registration							1		1	1	1							
Anghel (2008a)	3	1							Romania	9. NSO and public research institutions	2. National	1. unmet demand	2. Labour market policy	1	1	1	I. Company survey labour market	1						1		2	1	1							
Arbeidsvoorziening (1991)	9	1	1			1	1		Netherlands	5. PES	2. National	2. job vacancies	2. Labour market policy	1	1	1	I. Company survey labour market	1					1	1	1	2	1	2							
Arbeidsvoorziening (1992)	9	1	1			1	1		Netherlands	5. PES	2. National	2. job vacancies	2. Labour market policy	1	1	1	I. Company survey labour market	1					1	1	1	2	1	2							
Arbeidsvoorziening (1993)	9	1	1			1	1		Netherlands	5. PES	2. National	2. job vacancies	2. Labour market policy	1	1	1	I. Company survey labour market	1					1	1	1	2	1	2							
Arbeidsvoorziening (1994)	9	1	1			1	1		Netherlands	5. PES	2. National	2. job vacancies	2. Labour market policy	1	1	1	I. Company survey labour market	1					1	1	1	2	1	2							
Arbeidsvoorziening (1995)	9	1	1			1	1		Netherlands	5. PES	2. National	2. job vacancies	2. Labour market policy	1	1	1	I. Company survey labour market	1					1	1	1	2	1	2							

Study	database	I. Size	II. Bottlenecks	III. Dynamic	IV. Mismatch	V. Businesscycle	VI. Performance	VII. Prognosis	Geo	Producer	Type organisations	Concept	Topic	Data collection	Source	Respondent	Type of method	Recruitment domain	Search activity	Occupancy job	Work available	Contract available	Status	Delineation	Characteristics	Detail	Frequency	time perspective	representativeness	validity	reliability	sensitive to mistakes	costs	response burden	timeliness			
Arbeidsvoorziening (1996)	9	1	1			1	1		Netherlands	5. PES	2. National	2. job vacancies	2. Labour market policy	1	1	1	I. Company survey labour market	1					1	1	1	2	1	2										
Arbeidsvoorziening (1997)	9	1	1			1	1		Netherlands	5. PES	2. National	2. job vacancies	2. Labour market policy	1	1	1	I. Company survey labour market	1					1	1	1	2	1	2										
Arbeidsvoorziening (1998)	9	1	1			1	1		Netherlands	5. PES	2. National	2. job vacancies	2. Labour market policy	1	1	1	I. Company survey labour market	1					1	1	1	2	1	2										
Arbeidsvoorziening (1999)	9	1	1			1	1		Netherlands	5. PES	2. National	2. job vacancies	2. Labour market policy	1	1	1	I. Company survey labour market	1					1	1	1	2	1	2										
Arbeidsvoorziening (2000)	9	1	1			1	1		Netherlands	5. PES	2. National	2. job vacancies	2. Labour market policy	1	1	1	I. Company survey labour market	1					1	1	1	2	1	2										
AMS Österreich (2011)	3		1				1		Austria	5. PES	2. National	2. job vacancies	2. Labour market policy	2	2	1	Iva. PES registration							1		1	1	1										
AMS Österreich (2012)	3	1			1				Austria	5. PES	2. National	2. job vacancies	2. Labour market policy	2	2	1	Iva. PES registration							1		1	1	1										
Arent and Donker van Heel (1997)	3	1				1			Netherlands	6. PRES	5. Sectoral	2. job vacancies	2. Labour market policy	1	2	2	VI. Household survey intermediaries	1					1	2		2	1	2										
Arents, van Polanen Petel and Donker van Heel (1998)	3	1				1			Netherlands	6. PRES	5. Sectoral	2. job vacancies	2. Labour market policy	1	2	2	VI. Household survey intermediaries	1					1	2		2	1	2										
Baldi, Bellisai, Fivizzani and Sorrentino (2008)	3	1							Italy	9. NSO and public research institutions	2. National	1. unmet demand	2. Labour market policy	1	1	1	I. Company survey labour market	1						1		2	1	2										
Baldi and Sorrentino (2009)	3	1		1					Italy	9. NSO and public research institutions	2. National	1. unmet demand	2. Labour market policy	1	1	1	I. Company survey labour market	1						1		2	1	2										
Bas, van der Wagt and Donker van Heel (2011)	2	1			1				Netherlands	2. Employers organisation	3. Regional	2. job vacancies	2. Labour market policy	1	1	1	I. Company survey labour market	1	1		2	2	1	3		2	1	2	1	1			1	3	2			
Behan and Shally (2010)	3							1	Ireland	5. PES	2. National	3. employment dynamics	2. Labour market policy	1	1	1	I. Company survey labour market	1						1		2	1	3										
Bemanningsföretäen/Swedish retail Institute (HUI) (2011a)	3	1		1					Sweden	6. PRES	5. Sectoral	4. turnover	2. Labour market policy	2	2	1	Ivb. TWA registration							2		1	2	1										
Bemanningsföretäen/Swedish retail Institute (HUI) (2011b)	3	1		1					Sweden	6. PRES	5. Sectoral	4. turnover	2. Labour market policy	2	2	1	Ivb. TWA registration							2		1	1	1										
Bliem, Weiss and Grün (2011)	3				1				Austria	5. PES	2. National	2. job vacancies	4. Education	1	1	1	I. Company survey labour market	1						1		2	1	2										
Bokhoven and Donker van Heel (1994)	3	1				1			Netherlands	6. PRES	5. Sectoral	2. job vacancies	2. Labour market policy	1	2	2	VI. Household survey intermediaries	1					1	2		2	1	2										
Bokhoven, Donker van Heel, De Koning, Nijhuis and DeVoogd (1995)	3	1					1		Netherlands	5. PES	5. Sectoral	2. job vacancies	2. Labour market policy				X. Other						1	2			1	2										
Bokhoven and Donker van Heel (1996)	3	1				1			Netherlands	6. PRES	5. Sectoral	2. job vacancies	2. Labour market policy	1	2	2	VI. Household survey intermediaries	1					1	2		2	1	2										

Study	database	I. Size	II. Bottlenecks	III. Dynamic	IV. Mismatch	V. Businesscycle	VI. Performance	VII. Prognosis	Geo	Producer	Type organisations	Concept	Topic	Data collection	Source	Respondent	Type of method	Recruitment domain	Search activity	Occupancy job	Work available	Contract available	Status	Delineation	Characteristics	Detail	Frequency	time perspective	representativeness	validity	reliability	sensitive to mistakes	costs	response burden	timeliness	
Bolkbas and Donker van Heel (1994)	3	1					1		Netherlands	5. PES	2. National	2. job vacancies	2. Labour market policy	2	2	1	Iva. PES registration						1	1		1	1	1								
Van der Boom, Donker van Heel, Van de Vlasakker and Verton (2009)	3	1		1	1				Dutch Carriben	1. Government	3. Regional	2. job vacancies	4. Education	1	1	1	I. Company survey labour market						1	3			1	2								
Bosma (1993)	3	1					1		Netherlands	5. PES	3. Regional	2. job vacancies	2. Labour market policy	2	2	1	Iva. PES registration						1	3		1	1	1								
Brnot (2009)	3	1							Slovenia	5. PES	2. National	1. unmet demand	2. Labour market policy	1	1	1	I. Company survey labour market	1						1		2	1	1								
Brnot (2011)	3	1							Slovenia	9. NSO and public research institutions	2. National	2. job vacancies	2. Labour market policy	2	2	1	Iva. PES registration							1		1	1	1								
Brusse and Donker van Heel (2003)	3	1				1			Netherlands	6. PRES	5. Sectoral	2. job vacancies	2. Labour market policy	1	2	2	VI. Household survey intermediaries	1					1	2		2	1	2								
Brusse, Donker van Heel and Van der Ende (2003)	3	1				1			Netherlands	6. PRES	5. Sectoral	2. job vacancies	2. Labour market policy	1	2	2	VI. Household survey intermediaries	1					1	2		2	1	2								
Brussels Observatorium voor de Werkgelegenheid (2010)	3		1		1		1		Belgium	9. NSO and public research institutions	2. National	2. job vacancies	2. Labour market policy	2	2	1	Iva. PES registration						1	1		1	1	1								
Bundesagentur für Arbeit (2011a)	3	1				1			Germany	5. PES	2. National	2. job vacancies	2. Labour market policy	2	2	1	Iva. PES registration							1		1	1	1								
Bundesagentur für Arbeit (2011b)	3	1	1		1				Germany	5. PES	2. National	2. job vacancies	2. Labour market policy	2	2	1	Iva. PES registration							1		1	1	1								
Bundesagentur für Arbeit (2012a)	3	1							Germany	5. PES	2. National	2. job vacancies	2. Labour market policy	2	1	2	VII. Household registration labour market							1		1	1	1								
Bundesagentur für Arbeit (2012b)	3	1		1					Germany	1. Government	2. National	2. job vacancies	2. Labour market policy	2	1	1	III. Company registration labour market							1		1	1	1								
Bureau of Labor Statistics (2011)	3	1				1			US	9. NSO and public research institutions	2. National	1. unmet demand	2. Labour market policy	1	1	1	I. Company survey labour market	1						1		2	1	1								
Burgh, van der, and Van Santen (1991)	2	1							Netherlands	2. Employers organisation	5. Sectoral	2. job vacancies	2. Labour market policy	1	1	1	I. Company survey labour market	1	1		2	2	1	2		2	1	2	1	1			1	3	2	
Calibris (2011a)	3	1	1		1				Netherlands	8. Education	5. Sectoral	2. job vacancies	4. Education	1	1	1	I. Company survey labour market	1						2		2	1	2								
Calibris (2011b)	3	1	1		1				Netherlands	8. Education	5. Sectoral	2. job vacancies	4. Education	1	1	1	I. Company survey labour market	1						2		2	1	2								
CBS (2011a)	3	1							Netherlands	9. NSO and public research institutions	2. National	2. job vacancies	3. Social insurance	2	1	1	VII. Household registration labour market						1	1		1	1	2								
CBS (2011c)	2	1	1	1		1			Netherlands	9. NSO and public research institutions	2. National	2. job vacancies	1. Economicpolicy	1	1	1	I. Company survey labour market	1	1				1	1		2	1	2	1	1			1	3	3	

Study	database	I. Size	II. Bottlenecks	III. Dynamic	IV. Mismatch	V. Businesscycle	VI. Performance	VII. Prognosis	Geo	Producer	Type organisations	Concept	Topic	Data collection	Source	Respondent	Type of method	Recruitment domain	Search activity	Occupancy job	Work available	Contract available	Status	Delineation	Characteristics	Detail	Frequency	time perspective	representativeness	validity	reliability	sensitive to mistakes	costs	response burden	timeliness
CBS (2011d)	2	1	1	1		1			Netherlands	9. NSO and public research institutions	2. National	1. unmet demand	1. Economicpolicy	1	1	1	I. Company survey labour market							1		2	1	1	1				1	3	2
Cedefop (2010)	3	1			1		1		Luxembourg	9. NSO and public research institutions	1. International	5. job openings	4. Education	2									1	1		2	1	3							
CBSI (2011)	3	1				1			Israel	1. Government	2. National	1. unmet demand	2. Labour market policy	1	1	1	I. Company survey labour market	1						1		2	1	2							
CIPD (2011)	3	1	1						UK	2. Employers organisation	2. National	2. job vacancies	2. Labour market policy	1	1	1	I. Company survey labour market	1						1		2	1	2							
Clement and Thomas (2010)	3	1				1			Luxembourg	6. PRES	5. Sectoral	2. job vacancies	2. Labour market policy	2	2	1	Ivb. TWA registration							2		1	1	1							
Conway and Fox (2007)	3	1					1		Ireland	5. PES	2. National	2. job vacancies	2. Labour market policy	1	1	1	I. Company survey labour market	1						1		1	1	1							
CWI (2001)	9	1	1			1	1		Netherlands	5. PES	2. National	2. job vacancies	2. Labour market policy	1	1	1	I. Company survey labour market	1						1	1	1	1	1	2						
CWI (2002)	9	1	1			1	1		Netherlands	5. PES	2. National	2. job vacancies	2. Labour market policy	1	1	1	I. Company survey labour market	1						1	1	1	1	1	2						
CWI (2003)	9	1	1			1	1		Netherlands	5. PES	2. National	2. job vacancies	2. Labour market policy	1	1	1	I. Company survey labour market	1						1	1	1	1	1	2						
CWI (2004)	9	1	1			1	1		Netherlands	5. PES	2. National	2. job vacancies	2. Labour market policy	1	1	1	I. Company survey labour market	1						1	1	1	1	1	2						
CWI (2005)	9	1	1			1	1		Netherlands	5. PES	2. National	2. job vacancies	2. Labour market policy	1	1	1	I. Company survey labour market	1						1	1	1	1	1	2						
CWI (2006a)	9	1	1				1		Netherlands	5. PES	2. National	2. job vacancies	2. Labour market policy	1	1	1	I. Company survey labour market	1						1	1	1	2	1	2						
CWI (2006b)	9	1	1		1	1	1		Netherlands	5. PES	2. National	2. job vacancies	2. Labour market policy	1	1	1	I. Company survey labour market	1						1	1	1	2	1	2						
CWI (2007)	9	1	1		1	1	1		Netherlands	5. PES	2. National	2. job vacancies	2. Labour market policy	1	1	1	I. Company survey labour market	1						1	1	1	2	1	2						
CWI (2008)	9	1	1		1	1	1		Netherlands	5. PES	2. National	2. job vacancies	2. Labour market policy	1	1	1	I. Company survey labour market	1						1	1	1	2	1	2						
Dekker, Donker van Heel, Derksen, Schoenmaker and Marinus (1992)	3	1			1		1		Netherlands	1. Government	2. National	2. job vacancies	2. Labour market policy	2	2	1	Iva. PES registration							1	1		1	1	2						
Delmotte, Van Hootegem and Dejonckheer (2001)	9																																		
Denolf and Denys (1997)	9	1	1				1		Belgium	5. PES	2. National	2. job vacancies	2. Labour market policy	1	1	1	I. Company survey labour market	1						1	1		2	1	2						

Study	database	I. Size	II. Bottlenecks	III. Dynamic	IV. Mismatch	V. Businesscycle	VI. Performance	VII. Prognosis	Geo	Producer	Type organisations	Concept	Topic	Data collection	Source	Respondent	Type of method	Recruitment domain	Search activity	Occupancy job	Work available	Contract available	Status	Delineation	Characteristics	Detail	Frequency	time perspective	representativeness	validity	reliability	sensitive to mistakes	costs	response burden	timeliness	
Denolf, Denys and Simoens (1999)	2	1	1				1		Belgium	5. PES	2. National	2. job vacancies	2. Labour market policy	1	1	1	I. Company survey labour market	1	1		2	2	1	1		2	1	2	1	1			1	3	2	
Derksen and Donker van Heel (1992)	3	1						1	Netherlands	5. PES	2. National	2. job vacancies	2. Labour market policy				X. Other							1		1	2									
Deutscher Gewerkschaftsbund (2009)	3	1							Germany	3. Employees organisation	5. Sectoral	2. job vacancies	2. Labour market policy	2	1	1	III. Company registration labour market							2		1	1	1								
Dickmann, de Ridder, de Voogd and Donker van Heel (2000)	3	1							Netherlands	4. Social partners	5. Sectoral	2. job vacancies	2. Labour market policy	2	1	1	III. Company registration labour market							2		1	1	1								
Dickmann and Jansen (2001)	3	1							Netherlands	9. NSO and public research institutions	1. International	3. employment dynamics	1. Economic policy	1	1	1	I. Company survey labour market	1						1		2	1	1								
Donker van Heel (1986)	3	1					1		Netherlands	5. PES	2. National	2. job vacancies	2. Labour market policy	2	2	1	Iva. PES registration						1	1		1	1	1								
Donker van Heel and Dekker (1987)	3	1					1		Netherlands	5. PES	2. National	2. job vacancies	2. Labour market policy	2	2	1	Iva. PES registration						1	1	1	1	1	2								
Donker van Heel (1987)	3	1					1		Netherlands	5. PES	2. National	2. job vacancies	2. Labour market policy	2	2	1	Iva. PES registration						1	1		1	1	1								
Donker van Heel and Dekker (1988)	3	1					1		Netherlands	5. PES	2. National	2. job vacancies	2. Labour market policy	2	2	1	Iva. PES registration						1	1		1	1	2								
Donker van Heel and Breukhoven (1988)	2	1					1		Netherlands	5. PES	3. Regional	2. job vacancies	2. Labour market policy	1	1	1	I. Company survey labour market	1	1		2	2	1	3		2	1	2	1	1			1	3	2	
Donker van Heel (1988a)	3	1			1				Netherlands	6. PRES	2. National	2. job vacancies	2. Labour market policy				X. Other						1	1			1	1								
Donker van Heel (1988b)	3	1					1		Netherlands	6. PRES	2. National	2. job vacancies	2. Labour market policy				X. Other						1	1			1	2								
Donker van Heel and Dekker (1989a)	2	1					1		Netherlands	5. PES	4. Local	2. job vacancies	2. Labour market policy	2	2	1	Ivd. Advertisements registration		1		2	2	1	3		1	1	1		1		1		1	2	
Donker van Heel and Detmar (1989b)	3	1			1				Netherlands	2. Employers organisation	5. Sectoral	2. job vacancies	2. Labour market policy	1	1	1	I. Company survey labour market	1						2		2	1	2								
Donker van Heel and De Beurs (1989c)	2	1	1				1		Netherlands	5. PES	2. National	2. job vacancies	2. Labour market policy	2	2	1	Iva. PES registration		1		2	2	1	1		1	2	1		1	1			2	2	
Donker van Heel (1989d)	2	1					1		Netherlands	5. PES	2. National	2. job vacancies	2. Labour market policy	1	1	1	I. Company survey labour market	1	1		2	2	1	1	1	2	1	2	1	1			1	3	2	
Donker van Heel (1991a)	3	1			1		1		Netherlands	5. PES	4. Local	2. job vacancies	2. Labour market policy	1	1	1	I. Company survey labour market	1						3		2	1	2								
Donker van Heel (1991b)	3	1					1		Netherlands	6. PRES	3. Regional	2. job vacancies	2. Labour market policy				X. Other						1	3			1	2								
Donker van Heel (1991c)	3	1			1		1		Netherlands	5. PES	4. Local	2. job vacancies	2. Labour market policy	2	2	1	Iva. PES registration							3		1	1	1								
Donker van Heel and Beentjes (1992a)	3	1				1			Netherlands	6. PRES	5. Sectoral	2. job vacancies	2. Labour market policy	1	2	2	VI. Household survey intermediaries	1						1	2		2	1	2							
Donker van Heel (1992b)	3	1				1			Netherlands	6. PRES	2. National	2. job vacancies	2. Labour market policy	2	1	2	VI. Household survey intermediaries							1	1		2	1	2							

Study	database	I. Size	II. Bottlenecks	III. Dynamic	IV. Mismatch	V. Businesscycle	VI. Performance	VII. Prognosis	Geo	Producer	Type organisations	Concept	Topic	Data collection	Source	Respondent	Type of method	Recruitment domain	Search activity	Occupancy job	Work available	Contract available	Status	Delineation	Characteristics	Detail	Frequency	time perspective	representativeness	validity	reliability	sensitive to mistakes	costs	response burden	timeliness
Donker van Heel (1992c)	3	1	1						Netherlands	2. Employers organisation	3. Regional	2. job vacancies	2. Labour market policy	1	1	1	I. Company survey labour market	1					1	3		2	1	2							
Donker van Heel (1992d)	3	1					1		Netherlands	10. Private research institutions	2. National	2. job vacancies	2. Labour market policy	2	2	1	Iva. PES registration						1	1		1	1	1							
Donker van Heel (1992e)	3	1	1	1	1		1		Austria	1. Government	2. National	2. job vacancies	2. Labour market policy	2	2	1	Iva. PES registration						1	1		1	1	1							
Donker van Heel, e.a. (1992f)	3	1			1				Netherlands	4. Social partners	5. Sectoral	2. job vacancies	4. Education	1	1	1	I. Company survey labour market	1					1	2		2	1	2							
Donker van Heel, van den Ende, de Vries, Zwart, van Nieuwenhof and van Wettum (1992)	2	1	1				1		Netherlands	4. Social partners	2. National	2. job vacancies	2. Labour market policy	1	1	1	I. Company survey labour market	1	1		2	2	1	1		2	1	2	1	1			1	3	2
Donker van Heel (1992g)	3	1	1						Netherlands	2. Employers organisation	3. Regional	2. job vacancies	2. Labour market policy	1	1	1	I. Company survey labour market	1					1	3		2	1	2							
Donker van Heel (1992h)	3	1			1		1		Netherlands	5. PES	4. Local	2. job vacancies	2. Labour market policy	2	2	1	Iva. PES registration						1	3		1	1	1							
Donker van Heel (1992i)	3	1					1		Netherlands	5. PES	4. Local	2. job vacancies	2. Labour market policy				X. Other						1	3			1	1							
Donker van Heel and Derksen (1993)	3	1			1				Netherlands	5. PES	3. Regional	2. job vacancies	2. Labour market policy	2	2	1	Iva. PES registration						1	3		1	1	1							
Donker van Heel and De Koning (1993)	3	1			1				Netherlands	5. PES	3. Regional	2. job vacancies	2. Labour market policy	2	2	1	Iva. PES registration						3		1	1	1								
Donker van Heel and Van Hummel (1993)	2	1			1		1		Netherlands	5. PES	2. National	2. job vacancies	2. Labour market policy	2	2	1	Iva. PES registration		1		2	2	1	1		1	1	1	1	1	1	1		2	2
Donker van Heel (1993a)	3	1			1		1		Netherlands	10. Private research institutions	2. National	2. job vacancies	2. Labour market policy	2	2	1	Iva. PES registration						1	1		1	1	1							
Donker van Heel (1993b)	3	1			1		1		Netherlands	5. PES	3. Regional	2. job vacancies	2. Labour market policy	2	2	1	Iva. PES registration						1	3		1	1	1							
Donker van Heel (1993c)	3	1							Netherlands	5. PES	3. Regional	2. job vacancies	2. Labour market policy	2	2	1	Iva. PES registration						1	3		1	1	1							
Donker van Heel, e.a. (1993d)	2	1							Netherlands	2. Employers organisation	3. Regional	2. job vacancies	2. Labour market policy	1	1	1	I. Company survey labour market	1	1		2	2	1	3		2	1	2	1	1			1	3	2
Donker van Heel, e.a. (1993 ^e)	3	1							Netherlands	5. PES	4. Local	2. job vacancies	2. Labour market policy	2	2	1	Iva. PES registration						1	3		1	1	1							
Donker van Heel (1993f)	3	1			1		1		Netherlands	5. PES	3. Regional	2. job vacancies	2. Labour market policy	2	2	1	Iva. PES registration						1	3		1	1	1							
Donker van Heel (1993g)	3	1			1		1		Netherlands	5. PES	3. Regional	2. job vacancies	2. Labour market policy	2	2	1	Iva. PES registration						1	3		1	1	1							
Donker van Heel (1993h)	3	1			1		1		Netherlands	5. PES	3. Regional	2. job vacancies	2. Labour market policy	2	2	1	Iva. PES registration						1	3		1	1	1							
Donker van Heel (1993i)	3	1			1		1		Netherlands	5. PES	3. Regional	2. job vacancies	2. Labour market policy	2	2	1	Iva. PES registration						1	3		1	1	1							
Donker van Heel (1993j)	3	1			1		1		Netherlands	5. PES	2. National	2. job vacancies	2. Labour market policy	2	2	1	Iva. PES registration						1	1		1	1	1							
Donker van Heel (1993k)	3						1		Netherlands	5. PES	3. Regional	2. job vacancies	2. Labour market policy				X. Other						1	3			1	1							
Donker van Heel (1994)	3	1	1		1		1		Netherlands	5. PES	3. Regional	2. job vacancies	2. Labour market policy	2	2	1	Iva. PES registration						1	3		1	2	1							

Study	database	I. Size	II. Bottlenecks	III. Dynamic	IV. Mismatch	V. Businesscycle	VI. Performance	VII. Prognosis	Geo	Producer	Type organisations	Concept	Topic	Data collection	Source	Respondent	Type of method	Recruitment domain	Search activity	Occupancy job	Work available	Contract available	Status	Delineation	Characteristics	Detail	Frequency	time perspective	representativeness	validity	reliability	sensitive to mistakes	costs	response burden	timeliness	
Donker van Heel, Gravesteijn, van Bokhoven, Nijhuis and de Koning (1994)	3	1				1			Netherlands	5. PES	2. National	2. job vacancies	2. Labour market policy	1	1	1	I. Company survey labour market	1							2	1	2									
Donker van Heel (1994b)	3	1		1		1			Netherlands	5. PES	3. Regional	2. job vacancies	2. Labour market policy	2	2	1	Iva. PES registration						1	3		1	1	1								
Donker van Heel (1994c)	3	1				1			Netherlands	6. PRES	5. Sectoral	2. job vacancies	2. Labour market policy	2	2	1	Iva. PES registration						1	2		1	1	1								
Donker van Heel, Zandvliet and Stotijn (1996)	3	1				1			Netherlands	5. PES	5. Sectoral	2. job vacancies	2. Labour market policy	2	2	1	Iva. PES registration							2		1	1	1								
Donker van Heel and Frerichs (1998)	3	1		1		1			Netherlands	4. Social partners	5. Sectoral	2. job vacancies	2. Labour market policy	2	2	1	Iva. PES registration							2		1	1	1								
Donker van Heel, van der Aa and Melissen (1998)	2	1		1					Netherlands	3. Employees organisation	5. Sectoral	2. job vacancies	4. Education	1	1	1	I. Company survey labour market	1	1		2	2	1	2		2	1	2	1	1			1	3	2	
Donker van Heel and Te Velthuis (1999)	2	1							Netherlands	4. Social partners	5. Sectoral	2. job vacancies	2. Labour market policy	1	1	1	I. Company survey labour market	1	1		2	2	1	2		2	1	2	1	1			1	3	2	
Donker van Heel and Hu (1999)	3	1							Netherlands	6. PRES	2. National	2. job vacancies	2. Labour market policy	1	2	2	VI. Household survey intermediaries	1					1	1		2	1	2								
Donker van Heel and Dorenbos (1999)	3	1							Netherlands	4. Social partners	5. Sectoral	2. job vacancies	3. Social insurance	2	2	1	Iva. PES registration							2		1	1	1								
Donker van Heel, Pille, Arents and van der Ende (1999)	3	1				1			Netherlands	6. PRES	5. Sectoral	2. job vacancies	2. Labour market policy	1	2	2	VI. Household survey intermediaries	1					1	2		2	1	2								
Donker van Heel (2000b)	3	1				1			Netherlands	6. PRES	2. National	2. job vacancies	2. Labour market policy	1	2	2	VI. Household survey intermediaries	1					1	1		2	1	2								
Donker van Heel, Hu, van der Ende and van Velden (2000)	3	1				1			Netherlands	6. PRES	5. Sectoral	2. job vacancies	2. Labour market policy	1	2	2	VI. Household survey intermediaries	1					1	2		2	1	2								
Donker van Heel (2002)	2	1	1			1			Netherlands	5. PES	5. Sectoral	2. job vacancies	2. Labour market policy	2	2	1	Iva. PES registration		1		2	2	1	2		1	1	1		1	1	1		2	2	
Donker van Heel, Arents and Colard (2002)	3	1							Netherlands	6. PRES	2. National	2. job vacancies	2. Labour market policy	1	2	2	VI. Household survey intermediaries	1						1		2	1	2								
Donker van Heel, Versantvoort, de Voogd, Brusse, van Zutphen and Stuijvenberg (2002)	3	1							Netherlands	6. PRES	1. International	2. job vacancies	2. Labour market policy				X. Other							1	1		1	2								
Donker van Heel, Versantvoort, Colard, van Winden, van der Ende, Dorenbos, Jansen, van Riel, Werkhoven and Arents(2002)	3	1							Netherlands	6. PRES	2. National	2. job vacancies	2. Labour market policy				X. Other							1	1		1	1								
Donker van Heel, Vogelaar, Nauta, van Velden and van Zutphen (2003)	3	1				1			Netherlands	5. PES	2. National	2. job vacancies	2. Labour market policy	2	2	1	Iva. PES registration							1	1		1	1								

Study	database	I. Size	II. Bottlenecks	III. Dynamic	IV. Mismatch	V. Businesscycle	VI. Performance	VII. Prognosis	Geo	Producer	Type organisations	Concept	Topic	Data collection	Source	Respondent	Type of method	Recruitment domain	Search activity	Occupancy job	Work available	Contract available	Status	Delineation	Characteristics	Detail	Frequency	time perspective	representativeness	validity	reliability	sensitive to mistakes	costs	response burden	timeliness		
Donker van Heel and Van Nuland (2005)	3	1							Netherlands	6. PRES	5. Sectoral	2. job vacancies	2. Labour market policy	1	2	2	VI. Household survey intermediaries	1					1	2		2	1	2									
Donker van Heel and Nauta (2005)	3	1					1		Netherlands	6. PRES	5. Sectoral	2. job vacancies	2. Labour market policy	1	2	2	VI. Household survey intermediaries	1					1	2		2	1	3									
Donker van Heel, Jansen, Zoon and Nauta (2005)	3	1							Netherlands	5. PES	2. National	2. job vacancies	2. Labour market policy				X. Other						1	1			1	2									
Donker van Heel (2005a)	3	1							Netherlands	4. Social partners	5. Sectoral	2. job vacancies	2. Labour market policy	1	1	1	I. Company survey labour market	1						2		2	1	2									
Donker van Heel, Arent, Nauta and Zoon (2005b)	2	1					1		Netherlands	1. Government	2. National	2. job vacancies	2. Labour market policy	2	2	1	Iva. PES registration	1	1		2	2	1	1		1	1	1	1	1	1	1	2	2			
Donker van Heel (2006)	3	1				1			Netherlands	6. PRES	5. Sectoral	2. job vacancies	2. Labour market policy	1	2	2	VI. Household survey intermediaries	1					1	2		2	1	2									
Donker van Heel, Van Hulst, Thio, Koot and Van Nuland (2007)	3	1					1		Netherlands	1. Government	5. Sectoral	2. job vacancies	2. Labour market policy	2	1	1	III. Company registration labour market						1	2		1	1	3									
Donker van Heel, van Nuland and van der Ende (2007)	3	1				1			Netherlands	6. PRES	5. Sectoral	2. job vacancies	2. Labour market policy	1	2	2	VI. Household survey intermediaries	1					1	2		2	1	2									
Donker van Heel and Van Nuland (2008)	2	1							Netherlands	6. PRES	5. Sectoral	2. job vacancies	2. Labour market policy	1	2	1	lib. Company survey TWA	1	1		2	2	1	2		2	1	2				1	3	2			
Donker van Heel, van Nuland, Kans and de Kogel (2008)	2	1	1	1					Netherlands	8. Education	5. Sectoral	2. job vacancies	4. Education	1	1	1	I. Company survey labour market	1	1		2	2	1	2		2	1	2	1	1			1	3	2		
Donker van Heel, Kans, van Nuland and de Kogel (2008)	3	1	1	1	1				Netherlands	8. Education	5. Sectoral	2. job vacancies	4. Education	1	1	1	I. Company survey labour market	1					1	2		2	1	2									
Donker van Heel, Kans, Siegert and Hazebroek (2008)	3	1			1				Netherlands	8. education	5. Sectoral	2. job vacancies	4. Education	1	1	1	I. Company survey labour market	1					1	2		2	1	2									
Donker van Heel, van der Ende and Culenear (2008)	3	1	1						Netherlands	8. Education	5. Sectoral	2. job vacancies	4. Education	1	1	1	I. Company survey labour market	1					1	2		2	1	2									
Donker van Heel, Legerstee and Van der Ende (2008)	3	1					1		Netherlands	10. Private research institutions	2. National	2. job vacancies	2. Labour market policy	1	1	1	I. Company survey labour market	1					1	1		2	1	2									
Donker van Heel and Van der Ende (2009)	2	1				1			Netherlands	6. PRES	2. National	2. job vacancies	2. Labour market policy	1	2	2	VI. Household survey intermediaries	1	1				1	1		2	1	2	2			1	3	2			
Donker van Heel, van Nuland, Hazebroek, Li and Wilkens (2009)	3	1	1						Netherlands	4. Social partners	5. Sectoral	2. job vacancies	2. Labour market policy	1	1	1	I. Company survey labour market	1					1	2	1	2	1	2									
Donker van Heel, van der Ende and Li (2009)	3	1				1			Netherlands	6. PRES	2. National	2. job vacancies	2. Labour market policy	1	2	2	VI. Household survey intermediaries	1					1	1		2	1	2									

Study	database	I. Size	II. Bottlenecks	III. Dynamic	IV. Mismatch	V. Businesscycle	VI. Performance	VII. Prognosis	Geo	Producer	Type organisations	Concept	Topic	Data collection	Source	Respondent	Type of method	Recruitment domain	Search activity	Occupancy job	Work available	Contract available	Status	Delineation	Characteristics	Detail	Frequency	time perspective	representativeness	validity	reliability	sensitive to mistakes	costs	response burden	timeliness		
Donker van Heel, van der Ende, Li and Groen (2009)	3	1							Netherlands	4. Social partners	5. Sectoral	2. job vacancies	4. Education	1	1	1	I. Company survey labour market	1					1	2		2	1	2									
Donker van Heel, van der Ende, Li and Van de Vlasakker (2009)	3	1	1		1	1	1		Netherlands	4. Social partners	5. Sectoral	2. job vacancies	4. Education	1	1	1	I. Company survey labour market	1					1	2		2	1	2									
Donker van Heel, Li, Van der Ende, Manshanden and Wilkens (2009)	3	1	1	1	1				Netherlands	4. Social partners	5. Sectoral	2. job vacancies	4. Education	1	1	1	I. Company survey labour market	1					1	2		2	1	2									
Donker van Heel, Canoy, van der Ende, Hazebroek and Thio (2009)	3	1				1			Netherlands	6. PRES	2. National	2. job vacancies	2. Labour market policy	1	2	2	VI. Household survey intermediaries	1					1	1		2	1	2									
Donker van Heel (ed.) (2010)	3	1				1			Netherlands	10. Private research institutions	2. National	2. job vacancies	2. Labour market policy	1	1	1	I. Company survey labour market	1					1	1	1	2	1	2									
Donker van Heel and Hazebroek (2010)	3	1			1		1		Netherlands	5. PES	4. Local	2. job vacancies	2. Labour market policy	2	2	1	Iva. PES registration						1	3		1	2	2									
Donker van Heel, Deckers, Wilkens, Li and Kans (2010)	2	1			1				Netherlands	8. education	5. Sectoral	2. job vacancies	4. Education	1	1	1	I. Company survey labour market	1	1		2	2	1	2		2	1	2	1	1			1	3	2		
Donker van Heel and De Wit (2011a)	3	1					1		Netherlands	12. Tripartite	2. National	2. job vacancies	2. Labour market policy				X. Other	1					1	1			1	2									
Donker van Heel and De Wit (2011b)	3	1					1		Netherlands	12. Tripartite	2. National	2. job vacancies	2. Labour market policy				X. Other										1	2									
Donker van Heel and De Wit (2011c)	2	1							Netherlands	6. PRES	2. National	2. job vacancies	2. Labour market policy	1	2	2	VI. Household survey intermediaries	1	1				1	1		2	1	2		2			1	3	2		
Dror and Nokrian (2009)	3	1				1			Israel	9. NSO and public research institutions	2. National	1. unmet demand	2. Labour market policy	1	1	1	I. Company survey labour market	1						1		2	1	2									
ECABO (2011)	3	1	1		1				Netherlands	8. Education	5. Sectoral	2. job vacancies	4. Education	1	1	1	I. Company survey labour market	1						2		2	1	2									
EIB (2011)	3	1	1						Netherlands	10. Private research institutions	5. Sectoral	2. job vacancies	2. Labour market policy	1	1	1	I. Company survey labour market	1						2		2	1	2									
Employment and Training Corporation (2009)	3	1					1		Malta	8. Education	2. National	2. job vacancies	2. Labour market policy	2	2	1	Iva. PES registration						1		1	1	1										
Van der Ende, Hu, Vogelaar and Donker van Heel (2002a)	3	1				1			Netherlands	6. PRES	5. Sectoral	2. job vacancies	2. Labour market policy	1	2	2	VI. Household survey intermediaries	1					1	2		2	1	2									
Van der Ende, Donker van Heel, Koene and Nauta (2002b)	3	1				1			Netherlands	6. PRES	5. Sectoral	2. job vacancies	2. Labour market policy	1	2	2	VI. Household survey intermediaries	1					1	2		2	1	2									
Van der Ende, Hazebroek, Wilkens and Donker van Heel (2010)	2	1	1						Netherlands	1. Government	2. National	2. job vacancies	2. Labour market policy	1	1	1	I. Company survey labour market	1	1		2	2	1	1		2	1	2	1	1			1	3	2		
EURES (2011)	3	1							Austria	5. PES	1. International	2. job vacancies	2. Labour market policy	2	2	1	Iva. PES registration							1		1	5	1									
Eurociett (2007)	3	1					1		Europe	13. International organisation	1. International	2. job vacancies	2. Labour market policy	2	1			1						1		2	1	1									
Eurociett (2012)	3																										1										

Study	database	I. Size	II. Bottlenecks	III. Dynamic	IV. Mismatch	V. Businesscycle	VI. Performance	VII. Prognosis	Geo	Producer	Type organisations	Concept	Topic	Data collection	Source	Respondent	Type of method	Recruitment domain	Search activity	Occupancy job	Work available	Contract available	Status	Delineation	Characteristics	Detail	Frequency	time perspective	representativeness	validity	reliability	sensitive to mistakes	costs	response burden	timeliness	
European Commission (2010)	3	1	1	1	1	1			Netherlands	13. International organisation	1. International	1. unmet demand	2. Labour market policy	1	1	2	V. Household survey labour market	1					1	1		2	2	2								
European Commission (2011a)	3	1	1	1	1	1			Netherlands	13. International organisation	1. International	1. unmet demand	2. Labour market policy	1	1	2	V. Household survey labour market	1					1	1		2	2	2								
European Commission (2011b)	3	1	1	1	1	1			Netherlands	13. International organisation	1. International	1. unmet demand	2. Labour market policy	1	1	2	V. Household survey labour market	1					1	1		2	2	2								
European Commission (2011c)	3	1	1	1	1	1			Netherlands	13. International organisation	1. International	1. unmet demand	2. Labour market policy	1	1	2	V. Household survey labour market	1					1	1		2	2	2								
European Commission (2012a)	3																																			
European Commission (2012b)	3	1	1	1	1	1			Netherlands	13. International organisation	1. International	1. unmet demand	2. Labour market policy	1	1	2	V. Household survey labour market	1					1	1		2	2	2								
Eurostat (2011a)	2	1		1	1	1	1		Romania	9. NSO and public research institutions	1. International	2. job vacancies	2. Labour market policy	1	1	2	V. Household survey labour market	1					1	1		2	2	2	1	2			1	3	2	
Eurostat (2011b)	2	1		1		1			Austria	9. NSO and public research institutions	1. International	1. unmet demand	2. Labour market policy	1	1	1	I. Company survey labour market	1	1	1	1			1		2	2	1	1	1			1	3	2	
Eurostat (2011c)	2	1		1		1			Belgium	9. NSO and public research institutions	1. International	1. unmet demand	2. Labour market policy	2	1	1	VII. Household registration labour market	1						1		2	2	1	1	2				2	2	
Eurostat (2011d)	2	1		1		1			Bulgaria	9. NSO and public research institutions	1. International	1. unmet demand	2. Labour market policy	1	1	1	I. Company survey labour market	1	1	1	1			1		2	2	1	1	1			1	3	2	
Eurostat (2011e)	2	1		1		1			Cyprus	9. NSO and public research institutions	1. International	1. unmet demand	2. Labour market policy	1	1	1	I. Company survey labour market	1	1	1	1			1		2	2	1	1	1			1	3	2	
Eurostat (2011f)	2	1		1		1			Czech Republic	9. NSO and public research institutions	1. International	1. unmet demand	2. Labour market policy	2	1	1	VII. Household registration labour market	1						1		2	2	1	1	2				2	2	
Eurostat (2011g)	2	1		1		1			Denmark	9. NSO and public research institutions	1. International	1. unmet demand	2. Labour market policy	1	1	1	I. Company survey labour market	1	1	1	1			1		2	2	1	1	1			1	3	2	
Eurostat (2011h)	2	1		1		1			Estonia	9. NSO and public research institutions	1. International	1. unmet demand	2. Labour market policy	1	1	1	I. Company survey labour market	1	1	1	1			1		2	2	1	1	1			1	3	2	
Eurostat (2011i)	2	1		1		1			Finland	9. NSO and public research institutions	1. International	1. unmet demand	2. Labour market policy	1	1	1	I. Company survey labour market	1	1	1	1			1		2	2	1	1	1			1	3	2	
Eurostat (2011j)	2	1		1		1			Germany	9. NSO and public research institutions	1. International	1. unmet demand	2. Labour market policy	1	1	1	I. Company survey labour market	1	1	1	1			1		2	2	1	1	1			1	3	2	
Eurostat (2011k)	2	1		1		1			Greece	9. NSO and public research institutions	1. International	1. unmet demand	2. Labour market policy	1	1	1	I. Company survey labour market	1	1	1	1			1		2	2	1	1	1			1	3	2	
Eurostat (2011l)	2	1		1		1			Hungary	9. NSO and public research institutions	1. International	1. unmet demand	2. Labour market policy	1	1	1	I. Company survey labour market	1	1	1	1			1		2	2	1	1	1			1	3	2	

Study	database	I. Size	II. Bottlenecks	III. Dynamic	IV. Mismatch	V. Businesscycle	VI. Performance	VII. Prognosis	Geo	Producer	Type organisations	Concept	Topic	Data collection	Source	Respondent	Type of method	Recruitment domain	Search activity	Occupancy job	Work available	Contract available	Status	Delineation	Characteristics	Detail	Frequency	time perspective	representativeness	validity	reliability	sensitive to mistakes	costs	response burden	timeliness		
Eurostat (2011m)	2	1		1		1			Latvia	9. NSO and public research institutions	1. International	1. unmet demand	2. Labour market policy	1	1	1	I. Company survey labour market	1	1	1	1				2	2	1	1	1				1	3	2		
Eurostat (2011n)	2	1		1		1			Lithuania	9. NSO and public research institutions	1. International	1. unmet demand	2. Labour market policy	1	1	1	I. Company survey labour market	1	1	1	1			1		2	2	1	1	1				1	3	2	
Eurostat (2011o)	2	1		1		1			Luxembourg	9. NSO and public research institutions	1. International	1. unmet demand	2. Labour market policy	2	1	1	VII. Household registration labour market	1						1		2	2	1	1	2				2	2		
Eurostat (2011p)	2	1		1		1			Netherlands	9. NSO and public research institutions	1. International	1. unmet demand	2. Labour market policy	1	1	1	I. Company survey labour market	1	1	1	1			1		2	2	1	1	1				1	3	2	
Eurostat (2011q)	2	1		1		1			Norway	9. NSO and public research institutions	1. International	1. unmet demand	2. Labour market policy	1	1	1	I. Company survey labour market	1	1	1	1			1		2	2	1	1	1				1	3	2	
Eurostat (2011r)	2	1		1		1			Poland	9. NSO and public research institutions	1. International	1. unmet demand	2. Labour market policy	1	1	1	I. Company survey labour market	1	1	1	1			1		2	2	1	1	1				1	3	2	
Eurostat (2011s)	2	1		1		1			Portugal	9. NSO and public research institutions	1. International	1. unmet demand	2. Labour market policy	1	1	1	I. Company survey labour market	1	1	1	1			1		2	2	1	1	1				1	3	2	
Eurostat (2011t)	2	1		1		1			Romania	9. NSO and public research institutions	1. International	1. unmet demand	2. Labour market policy	1	1	1	I. Company survey labour market	1	1	1	1			1		2	2	1	1	1				1	3	2	
Eurostat (2011u)	2	1		1		1			Slovakia	9. NSO and public research institutions	1. International	1. unmet demand	2. Labour market policy	1	1	1	I. Company survey labour market	1	1	1	1			1		2	2	1	1	1				1	3	2	
Eurostat (2011v)	2	1		1		1			Slovenia	9. NSO and public research institutions	1. International	1. unmet demand	2. Labour market policy	2	1	1	VII. Household registration labour market	1						1		2	2	1	1	2				2	2		
Eurostat (2011w)	2	1		1		1			Spain	9. NSO and public research institutions	1. International	1. unmet demand	2. Labour market policy	1	1	1	I. Company survey labour market	1	1	1	1			1		2	2	1	1	1				1	3	2	
Eurostat (2011x)	2	1		1		1			Sweden	9. NSO and public research institutions	1. International	1. unmet demand	2. Labour market policy	1	1	1	I. Company survey labour market	1	1	1	1			1		2	2	1	1	1				1	3	2	
Eurostat (2011y)	2	1		1		1			UK	9. NSO and public research institutions	1. International	1. unmet demand	2. Labour market policy	1	1	1	I. Company survey labour market	1	1	1	1			1		2	2	1	1	1				1	3	2	
Eurostat (2011z)	2	1		1	1	1	1		Slovakia	9. NSO and public research institutions	1. International	2. job vacancies	2. Labour market policy	1	1	2	V. Household survey labour market	1						1	1		2	2	2	1	2				1	3	2
Eurostat (2011aa)	2	1		1	1	1	1		Austria	9. NSO and public research institutions	1. International	2. job vacancies	2. Labour market policy	1	1	2	V. Household survey labour market	1						1	1		2	2	2	1	2				1	3	2
Eurostat (2011bb)	2	1		1	1	1	1		Spain	9. NSO and public research institutions	1. International	2. job vacancies	2. Labour market policy	1	1	2	V. Household survey labour market	1						1	1		2	2	2	1	2				1	3	2
Eurostat (2011cc)	2	1		1	1	1	1		Belgium	9. NSO and public research institutions	1. International	2. job vacancies	2. Labour market policy	1	1	2	V. Household survey labour market	1						1	1		2	2	2	1	2				1	3	2
Eurostat (2011dd)	2	1		1	1	1	1		France	9. NSO and public research institutions	1. International	2. job vacancies	2. Labour market policy	1	1	2	V. Household survey labour market	1						1	1		2	2	2	1	2				1	3	2

Study	database	I. Size	II. Bottlenecks	III. Dynamic	IV. Mismatch	V. Businesscycle	VI. Performance	VII. Prognosis	Geo	Producer	Type organisations	Concept	Topic	Data collection	Source	Respondent	Type of method	Recruitment domain	Search activity	Occupancy job	Work available	Contract available	Status	Delineation	Characteristics	Detail	Frequency	time perspective	representativeness	validity	reliability	sensitive to mistakes	costs	response burden	timeliness
Eurostat (2011ee)	2	1		1	1	1	1		Portugal	9. NSO and public research institutions	1. International	2. job vacancies	2. Labour market policy	1	1	2	V. Household survey labour market	1					1	1		2	2	2	1	2			1	3	2
Eurostat (2011ff)	2	1		1	1	1	1		Luxembourg	9. NSO and public research institutions	1. International	2. job vacancies	2. Labour market policy	1	1	2	V. Household survey labour market	1					1	1		2	2	2	1	2			1	3	2
Eurostat (2011gg)	2	1		1	1	1	1		Germany	9. NSO and public research institutions	1. International	2. job vacancies	2. Labour market policy	1	1	2	V. Household survey labour market	1					1	1		2	2	2	1	2			1	3	2
Eurostat (2011hh)	2	1		1	1	1	1		Bulgaria	9. NSO and public research institutions	1. International	2. job vacancies	2. Labour market policy	1	1	2	V. Household survey labour market	1					1	1		2	2	2	1	2			1	3	2
Eurostat (2011ii)	2	1		1	1	1	1		Cyprus	9. NSO and public research institutions	1. International	2. job vacancies	2. Labour market policy	1	1	2	V. Household survey labour market	1					1	1		2	2	2	1	2			1	3	2
Eurostat (2011jj)	2	1		1	1	1	1		Czech Republic	9. NSO and public research institutions	1. International	2. job vacancies	2. Labour market policy	1	1	2	V. Household survey labour market	1					1	1		2	2	2	1	2			1	3	2
Eurostat (2011kk)	2	1		1	1	1	1		Denmark	9. NSO and public research institutions	1. International	2. job vacancies	2. Labour market policy	1	1	2	V. Household survey labour market	1					1	1		2	2	2	1	2			1	3	2
Eurostat (2011ll)	2	1		1	1	1	1		Estonia	9. NSO and public research institutions	1. International	2. job vacancies	2. Labour market policy	1	1	2	V. Household survey labour market	1					1	1		2	2	2	1	2			1	3	2
Eurostat (2011mm)	2	1		1	1	1	1		Finland	9. NSO and public research institutions	1. International	2. job vacancies	2. Labour market policy	1	1	2	V. Household survey labour market	1					1	1		2	2	2	1	2			1	3	2
Eurostat (2011nn)	2	1		1	1	1	1		Greece	9. NSO and public research institutions	1. International	2. job vacancies	2. Labour market policy	1	1	2	V. Household survey labour market	1					1	1		2	2	2	1	2			1	3	2
Eurostat (2011oo)	2	1		1	1	1	1		Hungary	9. NSO and public research institutions	1. International	2. job vacancies	2. Labour market policy	1	1	2	V. Household survey labour market	1					1	1		2	2	2	1	2			1	3	2
Eurostat (2011pp)	2	1		1	1	1	1		Ireland	9. NSO and public research institutions	1. International	2. job vacancies	2. Labour market policy	1	1	2	V. Household survey labour market	1					1	1		2	2	2	1	2			1	3	2
Eurostat (2011qq)	2	1		1	1	1	1		Italy	9. NSO and public research institutions	1. International	2. job vacancies	2. Labour market policy	1	1	2	V. Household survey labour market	1					1	1		2	2	2	1	2			1	3	2
Eurostat (2011rr)	2	1		1	1	1	1		Latvia	9. NSO and public research institutions	1. International	2. job vacancies	2. Labour market policy	1	1	2	V. Household survey labour market	1					1	1		2	2	2	1	2			1	3	2
Eurostat (2011ss)	2	1		1	1	1	1		Lithuania	9. NSO and public research institutions	1. International	2. job vacancies	2. Labour market policy	1	1	2	V. Household survey labour market	1					1	1		2	2	2	1	2			1	3	2
Eurostat (2011tt)	2	1		1	1	1	1		Malta	9. NSO and public research institutions	1. International	2. job vacancies	2. Labour market policy	1	1	2	V. Household survey labour market	1					1	1		2	2	2	1	2			1	3	2
Eurostat (2011uu)	2	1		1	1	1	1		Netherlands	9. NSO and public research institutions	1. International	2. job vacancies	2. Labour market policy	1	1	2	V. Household survey labour market	1					1	1		2	2	2	1	2			1	3	2
Eurostat (2011vv)	2	1		1	1	1	1		Poland	9. NSO and public research institutions	1. International	2. job vacancies	2. Labour market policy	1	1	2	V. Household survey labour market	1					1	1		2	2	2	1	2			1	3	2

Study	database	I. Size	II. Bottlenecks	III. Dynamic	IV. Mismatch	V. Businesscycle	VI. Performance	VII. Prognosis	Geo	Producer	Type organisations	Concept	Topic	Data collection	Source	Respondent	Type of method	Recruitment domain	Search activity	Occupancy job	Work available	Contract available	Status	Delineation	Characteristics	Detail	Frequency	time perspective	representativeness	validity	reliability	sensitive to mistakes	costs	response burden	timeliness	
Eurostat (2011ww)	2	1		1	1	1	1		Slovenia	9. NSO and public research institutions	1. International	2. job vacancies	2. Labour market policy	1	1	2	V. Household survey labour market	1					1	1		2	2	2	1	2			1	3	2	
Eurostat (2011xx)	2	1		1	1	1	1		Sweden	9. NSO and public research institutions	1. International	2. job vacancies	2. Labour market policy	1	1	2	V. Household survey labour market	1					1	1		2	2	2	1	2			1	3	2	
Eurostat (2011yy)	2	1		1	1	1	1		UK	9. NSO and public research institutions	1. International	2. job vacancies	2. Labour market policy	1	1	2	V. Household survey labour market	1					1	1		2	2	2	1	2			1	3	2	
FAS Expert Group on Future Skills (2010)	3	1							Ireland	5. PES	2. National	2. job vacancies	2. Labour market policy	2	2	1	Iva. PES registration							1		1	1	1								
FAS Expert Group on Future Skills (2011)	3	1	1						Ireland	5. PES	2. National	2. job vacancies	2. Labour market policy	2	2	1	Iva. PES registration							1		1	1	1								
Federgon (2010)	3	1					1		Belgium	2. Employers organisation	2. National	2. job vacancies	2. Labour market policy	1	1	1	I. Company survey labour market	1					1	1		2	1	2								
Fox (2009)	3	1					1		Ireland	5. PES	2. National	1. unmet demand	2. Labour market policy	2	2	1	Iva. PES registration								1		1	1	1							
Fundeon (2011)	3	1	1		1				Netherlands	8. Education	5. Sectoral	2. job vacancies	4. Education	1	1	1	I. Company survey labour market	1							2		2	1	2							
Gaubitsch and Luger (2011)	2	1	1						Austria	5. PES	2. National	2. job vacancies	2. Labour market policy	1	1	1	I. Company survey labour market	1	1		2	2	1	1		2	1	2	1	1			1	3	2	
Gevers and Peeters (2006)	2	1	1				1		Belgium	6. PRES	2. National	2. job vacancies	2. Labour market policy	1	1	1	I. Company survey labour market	1	1		2	2	1	1	1	2	1	2	1	1			1	3	2	
GfK Austria (2010)	2	1					1		Austria	5. PES	2. National	2. job vacancies	2. Labour market policy	2	2	1	Ivd. Advertisements registration		1				1	1		1	1	1		1		1		1	2	
Gottenbos, Donker van Heel and Dekker (1987)	3	1	1				1		Netherlands	5. PES	2. National	2. job vacancies	2. Labour market policy	2	2	1	Iva. PES registration						1	1		1	1	1								
Gottenbos, Donker van Heel and Dekker (1989b)	2	1					1		Netherlands	5. PES	4. Local	2. job vacancies	2. Labour market policy	2	2	1	Ivd. Advertisements registration	1						1	3		1	1	1	1		1		1	2	
Hämällinen and Tuomaala (2007)	3	1			1				Finland	9. NSO and public research institutions	2. National	2. job vacancies	2. Labour market policy	1	1	1	I. Company survey labour market	1						1		2	1	2								
Hazebroek, Kans, van der Aa and Donker van Heel (2009)	3	1	1	1	1				Netherlands	8. Education	5. Sectoral	2. job vacancies	4. Education	1	1	1	I. Company survey labour market	1					1	2		2	1	2								
Hazebroek and Donker van Heel (2010)	3	1			1		1		Netherlands	5. PES	4. Local	2. job vacancies	2. Labour market policy	2	2	1	Iva. PES registration						1	3		1	1	1								
Hazebroek and Kans (2011)	3	1	1	1	1				Netherlands	8. Education	5. Sectoral	2. job vacancies	4. Education	1	1	1	I. Company survey labour market	1					1	2		2	1	2								
Heckmann (2009)	3	1					1		Germany	9. NSO and public research institutions	2. National	1. unmet demand	2. Labour market policy	1	1	1	I. Company survey labour market	1						1	1	2	1	2								
Heckmann, Kettner and Rebien (2011)	3	1							Germany	5. PES	2. National	1. unmet demand	2. Labour market policy	1	1	1	I. Company survey labour market	1						1	1	2	1	2								
Heere, Donker van Heel and Dekker (1986)	2	1					1		Netherlands	5. PES	4. Local	2. job vacancies	2. Labour market policy	1	1	1	I. Company survey labour market	1	1		2	2	1	3		2	1	2	1	1			1	3	2	

Study	database	I. Size	II. Bottlenecks	III. Dynamic	IV. Mismatch	V. Businesscycle	VI. Performance	VII. Prognosis	Geo	Producer	Type organisations	Concept	Topic	Data collection	Source	Respondent	Type of method	Recruitment domain	Search activity	Occupancy job	Work available	Contract available	Status	Delineation	Characteristics	Detail	Frequency	time perspective	representativeness	validity	reliability	sensitive to mistakes	costs	response burden	timeliness			
Hiteq (2011)	3	1	1		1				Netherlands	8. Education	5. Sectoral	2. job vacancies	4. Education	1	1	1	I. Company survey labour market	1						2		2	1	2										
Hoen, 't and Donker van Heel (1995)	3	1			1		1		Netherlands	5. PES	2. National	2. job vacancies	2. Labour market policy	2	2	1	Iva. PES registration							1		1	1	1										
Hulst, Koolmees and Donker van Heel (2003)	3	1							Netherlands	2. Employers organisation	5. Sectoral	2. job vacancies	1. Economicpolicy				X. Other						1	2		1	1											
Hulst, Nauta and Donker van Heel (2004)	3	1							Netherlands	2. Employers organisation	5. Sectoral	2. job vacancies	1. Economicpolicy				X. Other						1	2		1	1											
Hulst and Donker van Heel (2005)	2	1							Netherlands	2. Employers organisation	5. Sectoral	2. job vacancies	1. Economicpolicy	2	1	1	III. Company registration labour market	1					1	2		1	1			1	1		2	2				
Hungarian Chamber of Commerce (2010)	2	1					1		Hungary	1. Government	2. National	2. job vacancies	2. Labour market policy	1	1	1	I. Company survey labour market	1	1		2	2	1	1		2	1	2	1	1			1	3	2			
Hynninen (2007)	3	1			1				Finland	9. NSO and public research institutions	2. National	2. job vacancies	2. Labour market policy	1	1	1	I. Company survey labour market	1					1		2	1	2											
Ignatovic (2011)	3	1					1		Slovenia	5. PES	2. National	2. job vacancies	2. Labour market policy	2	2	1	Iva. PES registration						1		1	1	1											
INNOVAM (2011)	3	1	1		1				Netherlands	8. Education	5. Sectoral	2. job vacancies	4. Education	1	1	1	I. Company survey labour market	1						2		2	1	2										
Institut fur Arbeit- und Berufsforschung (2010)	3	1					1		Germany	9. NSO and public research institutions	2. National	1. unmet demand	2. Labour market policy	1	1	1	I. Company survey labour market	1					1		2	1	2											
Istat (2011)	3	1	1						Italy	9. NSO and public research institutions	2. National	2. job vacancies	2. Labour market policy	1	2	1	lib. Company survey TWA	1					1		2	1	2											
Jansen, Donker van Heel, Nauta and Wijnveen (2005)	3	1	1						Netherlands	6. PRES	5. Sectoral	2. job vacancies	2. Labour market policy				X. Other							2		1	1											
Johannesson (2011)	3	1							Sweden	9. NSO and public research institutions	2. National	1. unmet demand	2. Labour market policy	1	1	1	I. Company survey labour market	1					1		2	1	2											
Josten, Vlasblom and De Voogd-Hamelink (2012)	9	1							Netherlands	9. NSO and public research institutions	2. National	2. job vacancies	2. Labour market policy	1	1	1	I. Company survey labour market	1					1	1		2	1	2										
Kalizna (2008)	3	1			1				Slovakia	5. PES	2. National	2. job vacancies	2. Labour market policy	2	2	1	Iva. PES registration						1		1	1	1											
Kans, Vossen and Jansen (2007)	3	1	1						Netherlands	4. Social partners	5. Sectoral	2. job vacancies	2. Labour market policy	1	1	1	I. Company survey labour market	1					1	2	1	2	1	2										
Kans and Donker van Heel (2011a)	3	1	1	1	1				Netherlands	8. education	5. Sectoral	2. job vacancies	4. Education	1	1	1	I. Company survey labour market	1					1	2		2	1	2										
Kans, Biesma, Van der Ende and Donker van Heel (2011)	3	1	1	1	1				Netherlands	8. education	5. Sectoral	2. job vacancies	4. Education	1	1	1	I. Company survey labour market	1					1	2		2	1	2										
Kans and Donker van Heel (2011b)	3	1							Netherlands	8. education	5. Sectoral	2. job vacancies	4. Education	1	1	1	I. Company survey labour market	1					1	2		2	1	2										
KCH (2011)	3	1	1		1				Netherlands	8. Education	5. Sectoral	2. job vacancies	4. Education	1	1	1	I. Company survey labour market	1						2		2	1	2										

Study	database	I. Size	II. Bottlenecks	III. Dynamic	IV. Mismatch	V. Businesscycle	VI. Performance	VII. Prognosis	Geo	Producer	Type organisations	Concept	Topic	Data collection	Source	Respondent	Type of method	Recruitment domain	Search activity	Occupancy job	Work available	Contract available	Status	Delineation	Characteristics	Detail	Frequency	time perspective	representativeness	validity	reliability	sensitive to mistakes	costs	response burden	timeliness	
Keinänen (2006)	3	1	1						Finland	9. NSO and public research institutions	2. National	2. job vacancies	2. Labour market policy	1	1	1	I. Company survey labour market	1						1		2	1	1								
Kenteq (2010)	2	1	1		1				Netherlands	8. Education	5. Sectoral	2. job vacancies	4. Education	1	1	1	I. Company survey labour market	1		2	2			2		2	1	2	1	1			1	3	2	
Kenwerk (2011)	3	1	1		1				Netherlands	8. Education	5. Sectoral	2. job vacancies	4. Education	1	1	1	I. Company survey labour market	1						2		2	1	2								
Kettner (2006)	3	1	1						Germany	9. NSO and public research institutions	2. National	1. unmet demand	2. Labour market policy	1	1	1	I. Company survey labour market	1						1		2	1	1								
Kettner (2007)	3	1	1						Germany	9. NSO and public research institutions	2. National	1. unmet demand	2. Labour market policy	1	1	1	I. Company survey labour market	1						1		2	1	1								
Kettner and Vogler-Ludwig (2008a)	3	1							Germany	9. NSO and public research institutions	2. National	1. unmet demand	2. Labour market policy	1	1	1	I. Company survey labour market	1						1		2	1	1								
Kettner and Vogler-Ludwig (2008b)	3	1		1					Germany	9. NSO and public research institutions	2. National	1. unmet demand	2. Labour market policy	1	1	1	I. Company survey labour market	1						1		2	1	1								
Kettner (2008c)	3	1							Germany	5. PES	2. National	1. unmet demand	2. Labour market policy	1	1	1	I. Company survey labour market	1						1		2	1	1								
Kettner (2008d)	3	1		1					Germany	9. NSO and public research institutions	2. National	1. unmet demand	2. Labour market policy	1	1	1	I. Company survey labour market	1						1		2	1	1								
Kettner (2009)	3	1				1			Germany	9. NSO and public research institutions	2. National	1. unmet demand	2. Labour market policy	1	1	1	I. Company survey labour market	1						1		2	1	1								
Kettner (2011)	3	1	1						Germany	9. NSO and public research institutions	2. National	1. unmet demand	2. Labour market policy	1	1	1	I. Company survey labour market	1						1		2	1	1								
Klaver and Sprangers (1990)	3	1							Netherlands	9. NSO and public research institutions	2. National	1. unmet demand	1. Economicpolicy	1	1	1	I. Company survey labour market	1					1	1		2	1	1								
KOC (2010)	3	1	1		1				Netherlands	8. Education	5. Sectoral	2. job vacancies	4. Education	1	1	1	I. Company survey labour market	1						2		2	1	2								
Koning, de, and Donker van Heel (1994)	3	1		1			1		Netherlands	5. PES	2. National	2. job vacancies	2. Labour market policy	2	2	1	Iva. PES registration						1	1		1	1	1								
Koning, de, Donker van Heel, Gelderblom, van Nes and Zandvliet (1995)	3	1	1		1	1	1		Netherlands	1. Government	2. National	2. job vacancies	2. Labour market policy	2	2	1	Iva. PES registration						1	1	1	1	1	1								
Koning, de, Donker van Heel, Pelle, Stotijn and van Velden (1997)	3	1	1						Netherlands	1. Government	2. National	2. job vacancies	1. Economicpolicy	1	1	1	I. Company survey labour market	1						1		2	1	2								
Koning, de, van Nes, Donker van Heel, Olieman and Zandvliet (1997)	3	1							Netherlands	4. Social partners	5. Sectoral	2. job vacancies	2. Labour market policy				X. Other							2			1	2								
Koning, de (1997)	3	1	1						Netherlands	4. Social partners	5. Sectoral	2. job vacancies	2. Labour market policy				X. Other							2			1	2								
Koolmees, Donker van Heel and Patoir (2001)	3	1							Netherlands	2. Employers organisation	5. Sectoral	2. job vacancies	1. Economicpolicy				X. Other						1	2			1	1								

Study	database	I. Size	II. Bottlenecks	III. Dynamic	IV. Mismatch	V. Businesscycle	VI. Performance	VII. Prognosis	Geo	Producer	Type organisations	Concept	Topic	Data collection	Source	Respondent	Type of method	Recruitment domain	Search activity	Occupancy job	Work available	Contract available	Status	Delineation	Characteristics	Detail	Frequency	time perspective	representativeness	validity	reliability	sensitive to mistakes	costs	response burden	timeliness	
Koolmees, Patoir, Vogelaar, Nauta and Donker van Heel (2002)	3	1							Netherlands	2. Employers organisation	5. Sectoral	2. job vacancies	1. Economicpolicy				X. Other						1	2			1	1								
Koolmees, Vogelaar, Nauta, van Hulst, Davies and Donker van Heel (2002)	3	1							Netherlands	2. Employers organisation	5. Sectoral	2. job vacancies	1. Economicpolicy				X. Other						1	2			1	1								
Legerstee (2008)	3	1	1						Netherlands	10. Private research institutions	2. National	2. job vacancies	2. Labour market policy	1	1	1	I. Company survey labour market	1					1	1		2	1	2								
Legerstee, Donker van Heel and van der Ende (2008)	3	1	1						Netherlands	14. Other	2. National	2. job vacancies	1. Economicpolicy	1	1	1	I. Company survey labour market	1					1	1		2	1	2								
Li, van der Ende and Donker van Heel (2009)	3	1	1						Netherlands	4. Social partners	5. Sectoral	2. job vacancies	2. Labour market policy	1	1	1	I. Company survey labour market	1					1	2		2	1	2								
Li and Donker van Heel (2010)	3	1				1			Netherlands	10. Private research institutions	2. National	2. job vacancies	2. Labour market policy	1	1	1	I. Company survey labour market	1					1	1		2	1	2								
Lithuanian Labour Exchange (2010)	3	1							Lithuania	1. Government	2. National	2. job vacancies	2. Labour market policy	2	1	1	III. Company registration labour market						1		1	1	1									
Van Loon, Huvers, Donker van Heel and de Koning (1996)	3	1					1		Netherlands	5. PES	2. National	2. job vacancies	2. Labour market policy				X. Other						1			1	2									
Machin (2003)	3	1							UK	9. NSO and public research institutions	2. National	2. job vacancies	2. Labour market policy	1	1	1	I. Company survey labour market	1					1		2	1	2									
Mair (2010)	3				1				Austria	10. Private research institutions	3. Regional	2. job vacancies	4. Education	2	2	1	Ivd. Advertisements registration						3		1	1	1									
Manpower (2010a)	2	1				1			Austria	6. PRES	1. International	2. job vacancies	2. Labour market policy	1	1	1	I. Company survey labour market	1	1			2	2	1		2	2	1	1	1			1	3	2	
Manpower (2010b)	2	1				1			Belgium	6. PRES	1. International	2. job vacancies	2. Labour market policy	1	1	1	I. Company survey labour market	1	1			2	2	1		2	2	1	1	1			1	3	2	
Manpower (2010c)	2	1				1			Czech Republic	6. PRES	1. International	2. job vacancies	2. Labour market policy	1	1	1	I. Company survey labour market	1	1			2	2	1		2	2	1	1	1			1	3	2	
Manpower (2010d)	2	1				1			France	6. PRES	1. International	2. job vacancies	2. Labour market policy	1	1	1	I. Company survey labour market	1	1			2	2	1		2	2	1	1	1			1	3	2	
Manpower (2010e)	2	1				1			Germany	6. PRES	1. International	2. job vacancies	2. Labour market policy	1	1	1	I. Company survey labour market	1	1			2	2	1		2	2	1	1	1			1	3	2	
Manpower (2010f)	2	1				1			Greece	6. PRES	1. International	2. job vacancies	2. Labour market policy	1	1	1	I. Company survey labour market	1	1			2	2	1		2	2	1	1	1			1	3	2	
Manpower (2010g)	2	1				1			Ireland	6. PRES	1. International	2. job vacancies	2. Labour market policy	1	1	1	I. Company survey labour market	1	1			2	2	1		2	2	1	1	1			1	3	2	
Manpower (2010h)	2	1				1			Italy	6. PRES	1. International	2. job vacancies	2. Labour market policy	1	1	1	I. Company survey labour market	1	1			2	2	1		2	2	1	1	1			1	3	2	

Study	database	I. Size	II. Bottlenecks	III. Dynamic	IV. Mismatch	V. Businesscycle	VI. Performance	VII. Prognosis	Geo	Producer	Type organisations	Concept	Topic	Data collection	Source	Respondent	Type of method	Recruitment domain	Search activity	Occupancy job	Work available	Contract available	Status	Delineation	Characteristics	Detail	Frequency	time perspective	representativeness	validity	reliability	sensitive to mistakes	costs	response burden	timeliness
Manpower (2010i)	2	1				1			Netherlands	6. PRES	1. International	2. job vacancies	2. Labour market policy	1	1	1	I. Company survey labour market	1	1		2	2		1		2	2	1	1	1			1	3	2
Manpower (2010j)	2	1				1			Poland	6. PRES	1. International	2. job vacancies	2. Labour market policy	1	1	1	I. Company survey labour market	1	1		2	2		1		2	2	1	1	1			1	3	2
Manpower (2010k)	2	1				1			Romania	6. PRES	1. International	2. job vacancies	2. Labour market policy	1	1	1	I. Company survey labour market	1	1		2	2		1		2	2	1	1	1			1	3	2
Manpower (2010l)	2	1				1			Spain	6. PRES	1. International	2. job vacancies	2. Labour market policy	1	1	1	I. Company survey labour market	1	1		2	2		1		2	2	1	1	1			1	3	2
Manpower (2010m)	2	1				1			Sweden	6. PRES	1. International	2. job vacancies	2. Labour market policy	1	1	1	I. Company survey labour market	1	1		2	2		1		2	2	1	1	1			1	3	2
Manpower (2010n)	2	1				1			UK	6. PRES	1. International	2. job vacancies	2. Labour market policy	1	1	1	I. Company survey labour market	1	1		2	2		1		2	1	1	1	1			1	3	2
Markit/REC/KPMG (2007)	3	1				1			UK	10. Private research institutions	5. Sectoral	2. job vacancies	2. Labour market policy				X. Other							2			1	1							
Martikainen (2008)	3	1							Finland	9. NSO and public research institutions	2. National	1. unmet demand	2. Labour market policy	1	1	1	I. Company survey labour market	1						1		2	1	1							
Matusiaka, e.a. (2009)	3	1							Poland	9. NSO and public research institutions	2. National	2. job vacancies	2. Labour market policy	1	1	1	I. Company survey labour market	1						1		2	1	1							
Methodological Centre for Vocational Education and Training (2008)	3	1			1				Lithuania	5. PES	2. National	2. job vacancies	2. Labour market policy	2	2	1	Iva. PES registration							1		1	2	1							
Ministerio de Empleo Seguridad Social (2011)	2	1							Spain	1. Government	2. National	2. job vacancies	3. Social insurance	2	1	1	VII. Household registration labour market							1	1	1	1	1	1	2	1	1		2	
Ministerie van Onderwijs en Wetenschappen (2011)	2	1			1				Netherlands	1. Government	5. Sectoral	2. job vacancies	2. Labour market policy	1	1	1	I. Company survey labour market	1	1		2	2	1	2		2	1	2	1	1			1	3	2
Ministry of Labour Finland (2006)	3						1		Finland	9. NSO and public research institutions	2. National	3. employment dynamics	2. Labour market policy	1	1	1	I. Company survey labour market	1						1		2	1	3							
Ministry of Social Affairs and Employment (1985)	9	1	1			1	1		Netherlands	5. PES	2. National	2. job vacancies	2. Labour market policy	1	1	1	I. Company survey labour market	1						1	1	1	2	1	2						
Ministry of Social Affairs and Employment (1986)	9	1	1			1	1		Netherlands	5. PES	2. National	2. job vacancies	2. Labour market policy	1	1	1	I. Company survey labour market	1						1	1	1	2	1	2						
Ministry of Social Affairs and Employment (1987)	9	1	1			1	1		Netherlands	5. PES	2. National	2. job vacancies	2. Labour market policy	1	1	1	I. Company survey labour market	1						1	1	1	2	1	2						
Ministry of Social Affairs and Employment (1988)	9	1	1			1	1		Netherlands	5. PES	2. National	2. job vacancies	2. Labour market policy	1	1	1	I. Company survey labour market	1						1	1	1	2	1	2						
Ministry of Social Affairs and Employment (1989)	9	1	1			1	1		Netherlands	5. PES	2. National	2. job vacancies	2. Labour market policy	1	1	1	I. Company survey labour market	1						1	1	1	2	1	2						

Study	database	I. Size	II. Bottlenecks	III. Dynamic	IV. Mismatch	V. Businesscycle	VI. Performance	VII. Prognosis	Geo	Producer	Type organisations	Concept	Topic	Data collection	Source	Respondent	Type of method	Recruitment domain	Search activity	Occupancy job	Work available	Contract available	Status	Delineation	Characteristics	Detail	Frequency	time perspective	representativeness	validity	reliability	sensitive to mistakes	costs	response burden	timeliness		
Ministry of Social Affairs and Employment (1990)	9	1	1			1	1		Netherlands	5. PES	2. National	2. job vacancies	2. Labour market policy	1	1	1	I. Company survey labour market	1					1	1	1	2	1	2									
Monsterboard (2010a)	2	1				1			Belgium	7. ORS	1. International	2. job vacancies	2. Labour market policy	2	2	1	Ivc. ORS registration	1						1		1	2	1		1		1		1	1		
Monsterboard (2010b)	2	1				1			France	7. ORS	1. International	2. job vacancies	2. Labour market policy	2	2	1	Ivc. ORS registration	1						1		1	2	1		1		1		1	1		
Monsterboard (2010c)	2	1				1			Germany	7. ORS	1. International	2. job vacancies	2. Labour market policy	2	2	1	Ivc. ORS registration	1						1		1	2	1		1		1		1	1		
Monsterboard (2010d)	2	1				1			Italy	7. ORS	1. International	2. job vacancies	2. Labour market policy	2	2	1	Ivc. ORS registration	1						1		1	2	1		1		1		1	1		
Monsterboard (2010e)	2	1				1			Netherlands	7. ORS	1. International	2. job vacancies	2. Labour market policy	2	2	1	Ivc. ORS registration	1						1		1	2	1		1		1		1	1		
Monsterboard (2010f)	2	1				1			Sweden	7. ORS	1. International	2. job vacancies	2. Labour market policy	2	2	1	Ivc. ORS registration	1						1		1	2	1		1		1		1	1		
Monsterboard (2010g)	2	1				1			UK	7. ORS	1. International	2. job vacancies	2. Labour market policy	2	2	1	Ivc. ORS registration	1						1		1	2	1		1		1		1	1		
National Institute of Economic Research (2011)	3	1	1						Sweden	6. PRES	5. Sectoral	2. job vacancies	2. Labour market policy	2	2	1	Ivb. TWA registration							2		1	1	1									
Nauta and Donker van Heel (2005)	3	1				1			Netherlands	6. PRES	5. Sectoral	2. job vacancies	2. Labour market policy	1	2	2	VI. Household survey intermediaries	1						1	2	2	1	2									
Nauta, Koot and Donker van Heel (2005)	3	1					1		Netherlands	6. PRES	2. National	2. job vacancies	2. Labour market policy	1	2	2	VI. Household survey intermediaries	1						1	1	2	1	3									
Nes, Donker van Heel and Arents (1995)	3	1							Netherlands	6. PRES	2. National	2. job vacancies	2. Labour market policy	1	1	1	I. Company survey labour market	1						1	1	2	1	2									
Nes, Donker van Heel and Huvers (1997)	3	1							Netherlands	5. PES	2. National	2. job vacancies	2. Labour market policy				X. Other							1	1	1	2										
Nijhuis and Donker van Heel (1994)	3	1					1		Netherlands	5. PES	3. Regional	2. job vacancies	2. Labour market policy	2	2	1	Iva. PES registration							1	3	1	1	1									
OOM (2011)	3	1	1						Netherlands	4. Social partners	5. Sectoral	2. job vacancies	2. Labour market policy	1	1	1	I. Company survey labour market	1							2	2	1	2									
OSA (1994)	3	1	1	1					Netherlands	9. NSO and public research institutions	2. National	2. job vacancies	2. Labour market policy	1	1	1	I. Company survey labour market	1						1	1	2	1	2									
OSA (1996)	3	1	1	1					Netherlands	9. NSO and public research institutions	2. National	2. job vacancies	2. Labour market policy	1	1	1	I. Company survey labour market	1						1	1	2	1	2									
OSA (1998)	3	1	1	1					Netherlands	9. NSO and public research institutions	2. National	2. job vacancies	2. Labour market policy	1	1	1	I. Company survey labour market	1						1	1	2	1	2									
OSA (2000)	3	1	1	1					Netherlands	9. NSO and public research institutions	2. National	2. job vacancies	2. Labour market policy	1	1	1	I. Company survey labour market	1						1	1	2	1	2									
OSA (2002)	3	1	1	1					Netherlands	9. NSO and public research institutions	2. National	2. job vacancies	2. Labour market policy	1	1	1	I. Company survey labour market	1						1	1	2	1	2									
OSA (2004)	3	1	1	1					Netherlands	9. NSO and public research institutions	2. National	2. job vacancies	2. Labour market policy	1	1	1	I. Company survey labour market	1						1	1	2	1	2									

Study	database	I. Size	II. Bottlenecks	III. Dynamic	IV. Mismatch	V. Businesscycle	VI. Performance	VII. Prognosis	Geo	Producer	Type organisations	Concept	Topic	Data collection	Source	Respondent	Type of method	Recruitment domain	Search activity	Occupancy job	Work available	Contract available	Status	Delineation	Characteristics	Detail	Frequency	time perspective	representativeness	validity	reliability	sensitive to mistakes	costs	response burden	timeliness
OSA (2006)	3	1	1	1					Netherlands	9. NSO and public research institutions	2. National	2. job vacancies	2. Labour market policy	1	1	1	I. Company survey labour market	1					1	1		2	1	2							
OSA (2008)	2	1	1	1					Netherlands	9. NSO and public research institutions	2. National	2. job vacancies	2. Labour market policy	1	1	1	I. Company survey labour market	1	1	2	2	1	1		2	1	2	1	1			1	3	2	
Van Polanen Petel, Tollenaar, Van der Aa and Donker van Heel (1998)	2	1	1						Netherlands	4. Social partners	5. Sectoral	2. job vacancies	4. Education	1	1	1	I. Company survey labour market	1	1	2	2	1	2		2	1	2	1	1			1	3	2	
Porovnanie Slovakia (2012)	3																										1								
Public Employment Services Finland (2011)	3	1			1				Finland	9. NSO and public research institutions	2. National	1. unmet demand	2. Labour market policy	1	1	1	I. Company survey labour market	1					1		2	1	2								
Public Employment Services Lithuania (2011)	3	1			1				Lithuania	5. PES	2. National	2. job vacancies	2. Labour market policy	2	2	1	Iva. PES registration						1		1	1	1								
Public employment services Lithuania (2011)	3	1							Lithuania	5. PES	2. National	2. job vacancies	2. Labour market policy	1	1	1	I. Company survey labour market	1					1		2	1	2								
Public Employment Services Sweden (2011)	3	1	1						Sweden	5. PES	2. National	2. job vacancies	2. Labour market policy	1	2	1	lia. Company survey PES	1					1		2	1	2								
Public Employment Services Sweden (2011)	3	1	1						Sweden	5. PES	2. National	2. job vacancies	2. Labour market policy				X. Other						1			1	1								
Public Employment Services (2012a)	2	1	1		1	1	1		Austria	5. PES	1. International	2. job vacancies	2. Labour market policy	2	2	1	Iva. PES registration	1	1	2	2	1	1		1	2	1		1	1	1		2	1	
Public Employment Services (2012b)	2	1	1		1	1	1		Belgium	5. PES	1. International	2. job vacancies	2. Labour market policy	2	2	1	Iva. PES registration		1	2	2	1	1		1	2	1		1	1	1		2	1	
Public Employment Services (2012c)	2	1	1		1	1	1		Cyprus	5. PES	1. International	2. job vacancies	2. Labour market policy	2	2	1	Iva. PES registration	1	1	2	2	1	1		1	2	1		1	1	1		2	1	
Public Employment Services (2012d)	2	1	1		1	1	1		Czech Republic	5. PES	1. International	2. job vacancies	2. Labour market policy	2	2	1	Iva. PES registration		1	2	2	1	1		1	2	1		1	1	1		2	1	
Public Employment Services (2012e)	2	1	1		1	1	1		Denmark	5. PES	1. International	2. job vacancies	2. Labour market policy	2	2	1	Iva. PES registration	1	1	2	2	1	1		1	2	1		1	1	1		2	1	
Public Employment Services (2012f)	2	1	1		1	1	1		Estonia	5. PES	1. International	2. job vacancies	2. Labour market policy	2	2	1	Iva. PES registration	1	1	2	2	1	1		1	2	1		1	1	1		2	1	
Public Employment Services (2012g)	2	1	1		1	1	1		Finland	5. PES	1. International	2. job vacancies	2. Labour market policy	2	2	1	Iva. PES registration	1	1	2	2	1	1		1	2	1		1	1	1		2	1	
Public Employment Services (2012h)	2	1	1		1	1	1		Germany	5. PES	1. International	2. job vacancies	2. Labour market policy	2	2	1	Iva. PES registration	1	1	2	2	1	1		1	2	1		1	1	1		2	1	
Public Employment Services (2012i)	2	1	1		1	1	1		Hungary	5. PES	1. International	2. job vacancies	2. Labour market policy	2	2	1	Iva. PES registration	1	1	2	2	1	1		1	2	1		1	1	1		2	1	
Public Employment Services (2012j)	2	1	1		1	1	1		Ireland	5. PES	1. International	2. job vacancies	2. Labour market policy	2	2	1	Iva. PES registration	1	1	2	2	1	1		1	2	1		1	1	1		2	1	
Public Employment Services (2012k)	2	1	1		1	1	1		Latvia	5. PES	1. International	2. job vacancies	2. Labour market policy	2	2	1	Iva. PES registration	1	1	2	2	1	1		1	2	1		1	1	1		2	1	
Public Employment Services (2012l)	2	1	1		1	1	1		Lithuania	5. PES	1. International	2. job vacancies	2. Labour market policy	2	2	1	Iva. PES registration	1	1	2	2	1	1		1	2	1		1	1	1		2	1	
Public Employment Services (2012m)	2	1	1		1	1	1		Netherlands	5. PES	1. International	2. job vacancies	2. Labour market policy	2	2	1	Iva. PES registration		1	2	2	1	1		1	2	1		1	1	1		2	1	
Public Employment Services (2012n)	2	1	1		1	1	1		Portugal	5. PES	1. International	2. job vacancies	2. Labour market policy	2	2	1	Iva. PES registration	1	1	2	2	1	1		1	2	1		1	1	1		2	1	
Public Employment Services (2012o)	2	1	1		1	1	1		Romania	5. PES	1. International	2. job vacancies	2. Labour market policy	2	2	1	Iva. PES registration	1	1	2	2	1	1		1	2	1		1	1	1		2	1	

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Public Employment Services (2012p)	2	1	1		1	1	1		Slovakia	5. PES	1. International	2. job vacancies	2. Labour market policy	2	2	1	Iva. PES registration	1	1		2	2	1	1		1	2	1		1	1	1		2	1	
Public Employment Services (2012q)	2	1	1		1	1	1		Slovenia	5. PES	1. International	2. job vacancies	2. Labour market policy	2	2	1	Iva. PES registration	1	1		2	2	1	1		1	2	1		1	1	1		2	1	
Public Employment Services (2012r)	2	1	1		1	1	1		Spain	5. PES	1. International	2. job vacancies	2. Labour market policy	2	2	1	Iva. PES registration	1	1		2	2	1	1		1	2	1		1	1	1		2	1	
Public Employment Services (2012s)	2	1	1		1	1	1		Sweden	5. PES	1. International	2. job vacancies	2. Labour market policy	2	2	1	Iva. PES registration	1	1		2	2	1	1		1	2	1		1	1	1		2	1	
Räsänen (2004)	3	1					1		Finland	9. NSO and public research institutions	2. National	1. unmet demand	2. Labour market policy	1	1	1	I. Company survey labour market	1						1		2	1	2								
Randstad (2011a)	2	1				1			France	7. ORS	1. International	2. job vacancies	2. Labour market policy	2	2	1	Ivc. ORS registration		1		2	2		1		1	2	1		1		1		1	1	
Randstad (2011b)	2	1				1			Germany	7. ORS	1. International	2. job vacancies	2. Labour market policy	2	2	1	Ivc. ORS registration		1		2	2		1		1	2	1		1		1		1	1	
Randstad (2011c)	2	1				1			Netherlands	7. ORS	1. International	2. job vacancies	2. Labour market policy	2	2	1	Ivc. ORS registration		1		2	2		1		1	2	1		1		1		1	1	
Randstad (2011d)	2	1				1			Spain	7. ORS	1. International	2. job vacancies	2. Labour market policy	2	2	1	Ivc. ORS registration		1		2	2		1		1	2	1		1		1		1	1	
Randstad (2011e)	2	1				1			UK	7. ORS	1. International	2. job vacancies	2. Labour market policy	2	2	1	Ivc. ORS registration		1		2	2		1		1	2	1		1		1		1	1	
Bundesagentur für Arbeit (2011f)	2	1							Germany	1. Government	2. National	2. job vacancies	3. Social insurance	2	1	1	VII. Household registration labour market						1	1		1	1	1	1	2	1	1		2	1	
Research voor Beleid (1990)	2	1			1		1		Netherlands	1. Government	2. National	2. job vacancies	2. Labour market policy	1	1	1	I. Company survey labour market	1	1		2	2	1	1		1	1	2	1	1			1	3	2	
Ridder, de, De Voogd and Donker van Heel (2000a)	3	1							Netherlands	4. Social partners	5. Sectoral	2. job vacancies	3. Social insurance	2	1	1	III. Company registration labour market							2		1	1	1								
Ridder, de, De Voogd and Donker van Heel (2000b)	3	1							Netherlands	4. Social partners	5. Sectoral	2. job vacancies	3. Social insurance	2	1	1	III. Company registration labour market							2		1	1	1								
Ridder, de, De Voogd and Donker van Heel (2000c)	3	1							Netherlands	4. Social partners	5. Sectoral	2. job vacancies	3. Social insurance	2	1	1	III. Company registration labour market							2		1	1	1								
Ridder, de, Donker van Heel, van Polanen Petel and van Velden (2001)	3	1							Netherlands	4. Social partners	5. Sectoral	2. job vacancies	3. Social insurance	2	1	1	III. Company registration labour market							2		1	1	1								
Ridder, de (2001)	3	1							Netherlands	4. Social partners	5. Sectoral	2. job vacancies	3. Social insurance	1	1	1	I. Company survey labour market	1					1	2		2	1	2								
ROA (2009)	3	1			1		1		Netherlands	1. Government	2. National	5. job openings	4. Education	2									1	1		1	1	3								
ROA (2011)	3	1			1				Netherlands	9. NSO and public research institutions	2. National	2. job vacancies	4. Education	1	1	2	V. Household survey labour market	1					1	1		2	1	2								
Saucy (2008)	3	1							Switzerland	9. NSO and public research institutions	2. National	1. unmet demand	2. Labour market policy	1	1	1	I. Company survey labour market	1						1		2	1	1								
Saucy F., and R. Neuenschwander (2009)	3	1				1			Switzerland	9. NSO and public research institutions	2. National	1. unmet demand	2. Labour market policy	1	1	1	I. Company survey labour market	1						1		2	1	1								

Study	database	I. Size	II. Bottlenecks	III. Dynamic	IV. Mismatch	V. Businesscycle	VI. Performance	VII. Prognosis	Geo	Producer	Type organisations	Concept	Topic	Data collection	Source	Respondent	Type of method	Recruitment domain	Search activity	Occupancy job	Work available	Contract available	Status	Delineation	Characteristics	Detail	Frequency	time perspective	representativeness	validity	reliability	sensitive to mistakes	costs	response burden	timeliness
Sen (2008)	2	1					1		Ireland	9. NSO and public research institutions	2. National	2. job vacancies	2. Labour market policy	1	1	1	I. Company survey labour market	1	1		2	2		1		2	1	2	1	1			1	3	2
Simoens, Denys and Denolf (1996)	2	1	1				1		Belgium	5. PES	2. National	2. job vacancies	2. Labour market policy	1	1	1	I. Company survey labour market	1	1		2	2	1	1		2	1	2	1	1			1	3	2
Simoens, Denys and Denolf (1998)	3	1	1				1		Belgium	5. PES	2. National	2. job vacancies	2. Labour market policy	1	1	1	I. Company survey labour market	1					1	1		2	1	2							
SPEE (2011)	3	1							Spain	1. Government	2. National	2. job vacancies	2. Labour market policy	2	1	1	VII. Household registration labour market							1		1	1	1							
SSWM (2010)	3	1	1						Netherlands	4. Social partners	5. Sectoral	2. job vacancies	2. Labour market policy	1	1	1	I. Company survey labour market	1						2		2	1	2							
Statistics Sweden (2009)	3	1							Sweden	9. NSO and public research institutions	2. National	1. unmet demand	2. Labour market policy	1	1	1	I. Company survey labour market	1						1		2	1	2							
Statistics Sweden (2011a)	3	1							Sweden	9. NSO and public research institutions	2. National	2. job vacancies	2. Labour market policy	1	1	2	V. Household survey labour market	1						1		2	2	1							
Statistics Sweden (2011b)	3	1	1						Sweden	5. PES	2. National	2. job vacancies	2. Labour market policy	1	1	1	I. Company survey labour market	1						1		2	2	1							
Statistics Sweden (2011c)	3	1	1						Sweden	9. NSO and public research institutions	2. National	1. unmet demand	2. Labour market policy	1	1	1	I. Company survey labour market	1						1		2	2	1							
Swiss Statistical Office (2009)	3	1							Switzerland	9. NSO and public research institutions	2. National	1. unmet demand	2. Labour market policy	1	1	1	I. Company survey labour market	1						1		2	1	2							
Textkernel (2012)	2	1				1			Netherlands	7. ORS	2. National	2. job vacancies	2. Labour market policy	2	2	1	Ivc. ORS registration		1					1		1	3	1	1		1		1	1	1
UKCES (2008)	3	1	1						UK	9. NSO and public research institutions	2. National	2. job vacancies	2. Labour market policy	1	1	1	I. Company survey labour market	1						1		2	1	1							
UKCES (2010)	3	1	1						UK	9. NSO and public research institutions	2. National	2. job vacancies	2. Labour market policy	1	1	1	I. Company survey labour market	1						1		2	1	1							
UKCES (2011a)	3	1	1						UK	9. NSO and public research institutions	2. National	2. job vacancies	2. Labour market policy	1	1	1	I. Company survey labour market	1						1		2	1	1							
UKCES (2011b)	2	1					1		UK	9. NSO and public research institutions	2. National	2. job vacancies	2. Labour market policy	1	1	1	I. Company survey labour market	1	1		2	2		1		2	1	1	1	1			1	3	2
Union Camere (2011)	2	1							Italy	14. Other	2. National	2. job vacancies	2. Labour market policy	1	1	1	I. Company survey labour market	1	1		2	2		1		2	1	1	1	1			1	3	2
UWV Werkbedrijf (2009)	9	1	1		1	1	1		Netherlands	5. PES	2. National	2. job vacancies	2. Labour market policy	1	1	1	I. Company survey labour market	1					1	1	1	2	1	2							
UWV Werkbedrijf (2010a)	9	1	1		1	1	1		Netherlands	5. PES	2. National	2. job vacancies	2. Labour market policy	1	1	1	I. Company survey labour market	1					1	1	1	2	1	2							
UWV Werkbedrijf (2010b)	3	1			1				Netherlands	5. PES	2. National	2. job vacancies	2. Labour market policy	2	2	1	Iva. PES registration							1	1	1	3	1							

Study	database	I. Size	II. Bottlenecks	III. Dynamic	IV. Mismatch	V. Businesscycle	VI. Performance	VII. Prognosis	Geo	Producer	Type organisations	Concept	Topic	Data collection	Source	Respondent	Type of method	Recruitment domain	Search activity	Occupancy job	Work available	Contract available	Status	Delineation	Characteristics	Detail	Frequency	time perspective	representativeness	validity	reliability	sensitive to mistakes	costs	response burden	timeliness	
UWV Werkbedrijf (2011)	3	1						1	Netherlands	5. PES	2. National	2. job vacancies	2. Labour market policy	1	1	1	I. Company survey labour market	1					1	1		2	1	3								
UWV Werkbedrijf (2012)	2	1	1			1	1		Netherlands	5. PES	2. National	2. job vacancies	2. Labour market policy	1	1	1	I. Company survey labour market	1	1		2	2	1	1	1	2	1	2	1	1			1	3	2	
UWV (2011)	2	1							Netherlands	1. Government	2. National	2. job vacancies	3. Social insurance	2	1	1	VII. Household registration labour market						1	1		1	1	1	1	2	1	1		2	3	
Velden, van, Vossen and Donker van Heel (2007)	3	1			1		1		Netherlands	12. Tripartite	2. National	2. job vacancies	2. Labour market policy				X. Other						1	1		1	2									
Vossen and Jansen (2003)	3	1	1						Netherlands	4. Social partners	5. Sectoral	2. job vacancies	2. Labour market policy	1	1	1	I. Company survey labour market	1					1	2		2	1	2								
Vossen (2005)	3	1	1						Netherlands	4. Social partners	5. Sectoral	2. job vacancies	2. Labour market policy	1	1	1	I. Company survey labour market	1					1	2		2	1	2								
Vries, de (1992)	2	1	1						Netherlands	2. Employers organisation	5. Sectoral	2. job vacancies	2. Labour market policy	1	1	1	I. Company survey labour market	1	1		2	2	1	2		2	1	2	1	1			1	3	2	
Vries, de, and Donker van Heel (1993a)	2	1			1		1		Netherlands	5. PES	3. Regional	2. job vacancies	2. Labour market policy	1	1	1	I. Company survey labour market	1	1		2	2	1	3		2	1	2	1	1			1	3	2	
Vries, de, and Donker van Heel (1993b)	2	1	1						Netherlands	4. Social partners	5. Sectoral	2. job vacancies	2. Labour market policy	1	1	1	I. Company survey labour market	1	1		2	2	1	2		2	1	2	1	1			1	3	2	
Weitzel e.a. (2011a)	3	1	1						Germany	6. PRES	2. National	2. job vacancies	2. Labour market policy	1	1	1	I. Company survey labour market	1						1		2	1	2								
Weitzel e.a. (2011b)	3	1	1						Germany	6. PRES	2. National	2. job vacancies	2. Labour market policy	1	1	1	I. Company survey labour market	1						1		2	1	2								
Wilkins, Li, Donker van Heel and Deckers (2010)	3	1	1	1					Netherlands	4. Social partners	5. Sectoral	2. job vacancies	2. Labour market policy	1	1	1	I. Company survey labour market	1					1	2		2	1	2								
Wilkins and Donker van Heel (2011)	2	1	1		1		1		Netherlands	12. Tripartite	2. National	2. job vacancies	2. Labour market policy	1	1	1	I. Company survey labour market	1	1		2	2	1	1		2	1	2	1	1			1	3	2	
Wilkins and Donker van Heel (2011a)	2	1	1						Netherlands	4. Social partners	5. Sectoral	2. job vacancies	2. Labour market policy	1	1	1	I. Company survey labour market	1	1		2	2	1	2	1	2	1	2	1	1			1	3	2	
Wilkins, de Wit and Donker van Heel (2011b)	2	1	1	1					Netherlands	4. Social partners	5. Sectoral	2. job vacancies	2. Labour market policy	1	1	1	I. Company survey labour market	1	1		2	2	1	2		2	1	2	1	1			1	3	2	
Wilkins, de Wit and Donker van Heel (2011c)	2	1	1						Netherlands	4. Social partners	5. Sectoral	2. job vacancies	2. Labour market policy	1	1	1	I. Company survey labour market	1	1		2	2	1	2		2	1	2	1	1			1	3	2	
Wilkins and Donker van Heel (2012)	2	1							Netherlands	4. Social partners	5. Sectoral	2. job vacancies	2. Labour market policy	1	1	1	I. Company survey labour market	1	1		2	2	1	2		2	1	2	1	1			1	3	2	
Wit, de, Kans and Donker van Heel (2011)	3	1							Netherlands	4. Social partners	5. Sectoral	2. job vacancies	4. Education				X. Other						1	2		1										
Wolf, de, and Donker van Heel (1991)	2	1			1				Netherlands	5. PES	3. Regional	2. job vacancies	2. Labour market policy	1	1	1	I. Company survey labour market	1	1		2	2	1	3		2	1	2	1	1			1	3	2	

Annex 9. Samenvatting (Summary in Dutch)

1. Vraagstelling en aanpak van het onderzoek

Er bestaat bij beleidmakers en onderzoekers grote behoefte aan betrouwbare vacaturedata en vacaturestatistieken. De academische literatuur over vacatures is echter schaars. Dit geldt in het bijzonder voor de literatuur over het definiëren en meten van vacatures. In mijn bijna dertigjarige loopbaan als arbeidsmarktonderzoeker is mij opgevallen dat belangrijke beleidsbeslissingen soms moeten worden genomen op basis van fragiele vacaturestatistieken (zie ook Hoffmann, 1992). En onderzoekers moeten voor hun analyses soms gebruik maken van ontoereikende vacaturedata. Zo is bij mij de behoefte ontstaan om zelf nader onderzoek te doen naar de kwaliteit van vacaturegegevens. Dat ben ik gaan doen door te onderzoeken wat de beste manier is om vacatures te definiëren en te meten. Het leek mij daarbij zinvol te komen tot een programma voor vervolgonderzoek. Ik hoop hiermee een bijdrage te leveren aan de verbetering van de kwaliteit van vacaturegegevens en in het verlengde daarvan de kwaliteit van het arbeidsmarktbeleid.

Ik ben specifiek geïnteresseerd om vacatures te bestuderen in dynamisch perspectief. Dat houdt in een studie van vacaturestromen en niet alleen de stand van openstaande vacatures. De huidige definities en statistieken hebben vooral betrekking op openstaande vacatures, wat een statische benadering is. Onderkend moet worden dat een openstaande vacature ooit ontstaan is en ooit zal ophouden te bestaan. Vacatures die in een bepaalde periode ontstaan wordt aangeduid met de instroom van vacatures en vacatures die in een bepaalde periode verdwijnen wordt aangeduid met de uitstroom van vacatures. Al vanaf de eerste publicaties over vacatures komt er in de academische literatuur een duidelijke behoefte aan stroomcijfers van vacatures naar voren (Holt and David, 1966; Ferber and Ford, 1966; Boschan, 1966; Myers and Creamer, 1967; Sharir, 1971; Pissarides, 1979; Frumermann, 1979; Verhage et al, 1997; Fenwick, 1994; Wegerif, 1994; Mortensen and Pissarides, 1994; Davis and Haltiwanger, 1998; Hoffmann, 2000; Theeuwes, 2003; Farm, 2004). Om vacaturestromen te kunnen meten is een algemene en precieze operationele definitie nodig. Daarnaast dient het meetinstrumentarium aan een kritische analyse te worden onderworpen.

Waarom is het belangrijk om vacatures in dynamisch perspectief te bestuderen? Standcijfers zijn belangrijk voor arbeidsbemiddeling, maar voor arbeidsmarktbeleid, onderwijsplanning en beroeps- en studiekeuzeadvies zijn vooral stroomcijfers nodig (Frumermann, 1979). De reden om stroomcijfers te gebruiken is dat deze de werkelijkheid beter weergeven dan standcijfers. De economie en de arbeidsmarkt staan niet stil, maar zijn continu in beweging. De stromen in de economie en de arbeidsmarkt zijn met elkaar verbonden: 'zij voeden elkaar'. Bedrijven en individuen zijn met elkaar verbonden in een dynamische context (Theeuwes, 2003). Volgens Frumermann (1979) zou het meten van vacaturestromen kunnen leiden tot een geheel nieuw perspectief op het concept en de definitie van vacatures. Het beeld dat Frumermann hiermee oproept is voor mij het wenkende perspectief voor mijn proefschrift.

De centrale probleemstelling van mijn onderzoek luidt als volgt:

Hoe zijn vacatures te definiëren en te meten in een dynamisch perspectief en welk vervolgonderzoek is nodig teneinde een beter inzicht te krijgen in vacatures?

De basis van mijn onderzoek wordt gevormd door drie zelf ontwikkelde databases. De eerste database bestaat uit 537 vacaturestudies uit 35 landen, door mij voorzien van diverse codes (JVS). De tweede database bestaat uit statistieken van vacatures uit 27 Europese landen (JVD). De derde is een database met 268 experts en gebruikers van vacatureinformatie uit 14 verschillende landen met wie ik face to face gesprekken heb gevoerd

(hoofdstuk 1). Literatuuronderzoek heeft geleid tot een algemene definitie en een operationele definitie van vacatures (hoofdstuk 2). De volgende stap is een onderzoek naar methoden om vacatures te meten. Centraal hierin staat een beoordeling van 154 unieke meetinstrumenten uit 28 Europese landen (27 EU-landen en Noorwegen), aan de hand van de ontwikkelde operationele definitie en algemene methodologische criteria. Dit onderdeel mondt uit in een voorstel voor een optimale meetmethode (hoofdstuk 3). Een analyse van vacaturestatistieken in Europa laat een aantal belangrijke lacunes zien in vacaturemetingen (hoofdstuk 4). Een casestudie van Nederland betreft een vergelijking (van tijdreeksen) van vacaturestatistieken, wat verschillende nieuwe onderzoeksvragen oplevert (hoofdstuk 5). Het laatste hoofdstuk 6 bevat de aanbevelingen voor vervolgonderzoek op het gebied van vacatures.

2. De definitie van vacatures

Onderzoeksvraag: Welke concepten van vacatures kunnen worden onderscheiden en hoe zou een algemene en een operationele definitie van vacatures kunnen luiden?

Op basis van literatuuronderzoek is mijn conclusie dat er twee concepten van vacatures zijn te onderscheiden: het concept van onvervulde vraag (*unmet demand*) en het matchingsconcept (*job matching*). Het eerste concept betreft een economisch theoretische benadering op macroniveau, hetgeen een statisch beeld oplevert van openstaande vacatures (standcijfers). Er worden hierbij stricte criteria gesteld aan de definitie van vacatures. In dit concept wordt een vacature bepaald aan de hand van de vraag of er wel of niet productie wordt geleverd, uitgaande van een specifieke arbeidsplaats. Het tweede concept is een sociologisch empirische benadering op microniveau, wat een dynamisch beeld oplevert (stand- en stroomcijfers). Er worden hierbij nauwelijks criteria gesteld aan de definitie van vacatures. In dit vacatureconcept gaat het om baankansen voor werkzoekenden. De definitie van vacatures volgens het concept van *unmet demand* wordt gespiegeld aan de definitie van werkloosheid. Een definitie volgens het concept van *job matching* kan gespiegeld worden aan een definitie van werkzoekenden (zie ook Verhage, et al., 1997). De beide concepten lopen in literatuur, onderzoek en beleid door elkaar heen, waardoor verwarring optreedt. Het eerste concept wordt bijvoorbeeld gebruikt voor metingen op microniveau, terwijl dat mijns inziens volgens de huidige specificaties en onderzoeksmethoden niet goed mogelijk is.

De in Europa door Eurostat en de Europese Commissie gehanteerde definitie van vacatures is te herleiden naar de literatuur over vacatures in de Verenigde Staten in de periode 1960-1980. Deze definitie past geheel in het concept van *unmet demand*:

A job vacancy shall mean a paid post that is newly created, unoccupied, or about to become vacant, (a) for which the employer is taking active steps and is prepared to take further steps to find a suitable candidate from outside the enterprise concerned and (b) which the employer intends to fill either immediately or within a specific period of time (Eurostat, 2008).

Deze definitie van vacatures heeft een aantal tekortkomingen: a) metingen die hierop gebaseerd zijn geven een onderschatting van het aantal baankansen voor werkzoekenden, b) het komt niet tegemoet aan de percepties van bedrijven, werkzoekenden en arbeidsmarktintermediairs die zich met vacatures bezighouden, c) het vormt geen solide basis voor vacaturemetingen, d) het geeft alleen een momentopname terwijl de arbeidsmarkt zeer dynamisch is en e) het is niet synchroon met andere definities die internationaal worden gehanteerd, specifiek de definitie van een baan.

Vacatures in het perspectief van het *job matching* passen niet in deze definitie. Ik heb daarom gezocht naar een algemene en een operationele definitie waarin beide vacatureconcepten een plaats hebben. Dat is mogelijk door uit te gaan van de internationaal geaccepteerde definitie van een baan volgens *System of National Accounts*

(SNA 1993) van de Verenigde Naties en *European System of Accounts (ESA 1995)* van de Europese Commissie en Eurostat:

A job is an explicit or implicit contract between a person and a resident institutional unit to perform work for compensation for a defined period or until further notice (United Nations, 1993).

A job is defined as an explicit or implicit contract (relating to the provision of labour input, not to supplying output of a good or service) between a person and a resident institutional unit to perform work (activities which contribute to the production of goods or services within the production boundary) in return for compensation (including mixed income of self-employed persons) for a defined period or until further notice (Eurostat, 1995).

Er bestaat een directe relatie tussen vacatures en banen. Vanaf het moment dat een vacature ontstaat is er sprake van een potentiële baan en zolang de vacature niet wordt vervuld blijft dat zo. Uiteindelijk gaat de vacature over in een baan. De definitie van banen biedt dan ook de opstap voor mijn eigen definitie van vacatures.

A job vacancy is an opportunity for an explicit or implicit contract between a person and a resident institutional unit to perform work for compensation.

De kern van mijn eigen definitie is dat een vacature wordt gezien als een potentieel arbeidscontract. In de literatuur is hiervoor ondersteuning te vinden. Er zijn weliswaar verschillen tussen beide concepten van vacatures, maar er zijn ook duidelijke overeenkomsten en met name dat in beide concepten sprake is van een potentieel arbeidscontract.

De literatuur over de dynamiek van banen biedt goede aanknopingspunten voor de studie van vacaturestromen, ook al wordt het woord 'vacature' hierin nauwelijks genoemd. De relatie met deze literatuur kan worden gelegd via het begrip vervulde vacature. Een vervulde vacature staat niet alleen gelijk aan een aangenomen persoon of *hire*, maar is ook het equivalent van een baanvinder (Sharir, 1971; Franz and Smolny, 1994; Verhage et al., 1997). Dit is een conclusie waar ik mij bij aansluit. Een *hire* betekent een match op de arbeidsmarkt (Blanchard en Diamond, 1997), ofwel een afgesloten arbeidscontract (Schettkatt, 1996). Een baanvinder komt weer overeen met wat wordt bedoeld met het begrip *accession* (Davis en Haliwanger, 1995 en 1998). De door de twee laatstgenoemde auteurs gepresenteerde concepten baancreatie en baandestructie (standgegevens) zijn te relateren aan het concept van *unmet demand* en niet aan het concept van *job matching*.

Op basis van de literatuur in JVS laat ik zien dat het begrip vacatures in dynamisch perspectief meetbaar kan worden gemaakt door zes inhoudelijke criteria te hanteren: het wervingsgebied, de zoekactiviteit, de bezetting van de baan, de beschikbaarheid van werk, de beschikbaarheid van een arbeidscontract en de status (instroom, open, uitstroom waarvan vervuld of ingetrokken). Wanneer voor één van deze criteria geen expliciete keuze is gemaakt is niet duidelijk wat gemeten wordt. Daarnaast zijn er vijf datacriteria: afbakening van de populatie, keuze van karakteristieken (sector, beroep, opleiding, e.d.), detaillering, frequentie en tijdsdimensie (retrospectief, stand van zaken of prospectief). Deze elf criteria samen vormen de operationele definitie van vacatures.

Beide vacatureconcepten passen geheel binnen de algemene en operationele definitie in termen van contracten. Mijs inziens is het binnen deze algemene en operationele definitie zelfs mogelijk om het concept van *unmet demand* in dynamisch perspectief te plaatsen en het als zodanig te meten. Hiermee hoop ik tegemoet te zijn gekomen aan de uitdaging die Frumermann (1979) heeft gesteld.

3. Methoden om vacatures te meten

Dit onderdeel betreft een onderzoek naar methoden om vacatures te meten, dat wil zeggen een beoordeling van meetmethoden.

Onderzoeksvraag: Welke meetmethoden geven een goede meting van het aantal vacatures volgens de operationele definitie en methodologische criteria?

Een methode om vacatures te meten definieer op basis van drie dimensies: het type dataverzameling (survey of registratie), het type respondent (bedrijf of baanvinder) en het type bron (nationale statistische organisaties en wetenschappelijke onderzoeksinstituten enerzijds en arbeidsmarktintermediairs, zoals arbeidsbureaus, uitzendbureaus, vacatureadvertenties en online vacaturesites, anderzijds). De combinatie van deze drie dimensies leidt tot een typering van acht verschillende typen meetmethoden (tabel S1).

Tabel S1. Aantal unieke instrumenten om vacatures te meten in 28 landen geclassificeerd naar meetmethode (n=154)

Type respondent	Type dataverzameling				Totaal
	Survey		Registratie		
	Bron is nationaal statistisch bureau of wetenschappelijk instituut	Bron is arbeidsmarkt-intermediar	Bron is nationaal statistisch bureau of wetenschappelijk instituut	Bron is arbeidsmarkt-intermediar	
Bedrijven	76 (49%)	1 (1%)	1 (1%)	40 (26%)	118 (77%)
Baanvinders	27 (18%)	2 (1%)	7 (5%)	0 (0%)	36 (23%)
Subtotaal	103 (67%)	3 (2%)	8 (5%)	40 (26%)	154 (100%)
Totaal	106 (69%)		48 (31%)		154 (100%)

Bron: JVS-E-I

Een meetinstrument definieer ik als de verzameling van primaire vacaturedata in een specifiek land volgens een bepaalde methode, dat wil zeggen een bepaalde combinatie van een type dataverzameling, een type respondent en het type bron. In 28 Europese landen heb ik 154 unieke meetinstrumenten kunnen traceren (27 EU-landen, inclusief Noorwegen). Het meest voorkomende instrument is de survey onder werkgevers van een nationale statistische organisatie (49% van alle instrumenten) en vervolgens de registratie van vacatures van bedrijven door intermediairs (26% van alle instrumenten).

De 154 meetinstrumenten heb ik beoordeeld aan de hand van de operationele definitie aangevuld met een aantal algemene methodologische criteria. De instrumenten zijn beoordeeld op basis van 18 beoordelingscriteria: zes inhoudelijke criteria (zie hoofdstuk 2), vijf datacriteria (zie hoofdstuk 2) en zeven methodologische criteria (representativiteit, validiteit, betrouwbaarheid, gevoeligheid voor fouten, kosten, druk voor respondenten en actualiteit). Bij de beoordeling heb ik gebruik gemaakt van de literatuur en de gesprekken met experts. Elk van de 154 instrumenten is voorzien van scores per beoordelingscriterium. Door de uitkomsten te aggregeren levert dit vervolgens een kwantitatieve en een kwalitatieve beoordeling op van de acht methoden om vacatures te meten.

Uit de beoordeling komt naar voren dat registraties meer geschikt zijn dan surveys om tegemoet te komen aan de dataeisen. Surveys bieden weer meer methodologische waarborgen dan registraties. Bedrijvenonderzoek is beter geschikt is om vacatures te meten volgens de inhoudelijke criteria dan onderzoek onder baanvinders. Vacatureinformatie van intermediairs scoort hoger dan de vacatureinformatie van nationale statistische organisaties en wetenschappelijke onderzoeksbureaus.

De combinatie van type respondent, type dataverzameling en type bron bepaalt de uiteindelijke waarde van een meetmethode. Registratie van vacatures van bedrijven door intermediairs blijkt het hoogst te scoren op de kwantitatieve criteria. Dit instrument heeft echter aanzienlijke nadelen, zoals een beperkt en selectief bereik van vacatures in een land. Bovendien is het met dit instrument niet mogelijk om vacatures te meten volgens het concept van *unmet demand*. Een survey onder bedrijven door nationale statistische organisaties en wetenschappelijke onderzoeksbureaus scoort eveneens relatief hoog. Maar ook dit instrument heeft nadelen, met name van methodologische aard (beperkingen afbakening populatie door beperkingen kwaliteit van steekproefkaders, lage frequentie, beperkingen aan de betrouwbaarheid, gevoeligheid voor menselijke fouten, belasting voor bedrijven en beperkte actualiteit).

Geen van de acht methoden is voldoende geschikt om vacatures te meten volgens de gestelde criteria. De maximale score is 12 van de 18 criteria. Om deze reden heb ik een methode ontworpen die tegemoet komt aan alle 18 beoordelingscriteria. Deze methode noem ik JVOR (*Job Vacancy Onsite Registration*). Het betreft het ontwerp van een registratieinstrument in de vorm van een geautomatiseerde applicatie die bij werkgevers kan worden geïnstalleerd. Met het instrument worden bepaalde gebeurtenissen van het gehele wervingsproces vastgelegd met datum en eventueel tijdstip. Hiermee is een exacte en continue meting van vacaturestromen op bedrijfsniveau uit te voeren volgens het concept van *unmet demand*, het concept van *job matching* en eventuele afwijkende concepten (zoals bijvoorbeeld latente vacatures). Dit is een — bij mijn weten — nog niet bestaand instrument. Vervolgens is het de uitdaging om het instrument bij een representatieve groep werkgevers te implementeren.

4. Vacaturemetingen in Europa

Dit onderdeel betreft een analyse van vacaturestatistieken in Europa en heeft tot doel na te gaan welke lacunes er zijn in vacaturemetingen. De operationele definitie is hierbij het uitgangspunt van de analyse, hetgeen betekent dat niet alleen naar metingen van openstaande vacatures zijn meegenomen, maar vooral ook metingen van vacaturestromen.

Onderzoeksvraag: Welke aanknopingspunten voor onderzoek kunnen worden geformuleerd om een beter inzicht te krijgen in de vacaturemarkt in Europa, op basis van een analyse van vacaturemetingen in 27 Europese landen?

Van de 154 meetinstrumenten zijn er 124 die in de 27 Europese landen (exclusief Noorwegen) het totaal aantal vacatures op nationaal niveau meten. De overige 30 meetinstrumenten heb ik buiten beschouwing gelaten, omdat die zich richten op een specifieke regio, of bedrijfstak. Als raamwerk voor deze analyse heb ik een inventarisatie gemaakt van zeven verschillende typen vacatureanalyses die in ben tegengekomen in de 423 vacaturestudies (JVS-E). Voor het grootste deel heb ik gebruik gemaakt van bestaande statistieken van de Europese Commissie en van Eurostat. Deze analyse levert de volgende aanknopingspunten op voor vervolgonderzoek:

- a. De meest gebruikte bron is de Job Vacancy Statistics die landen nu aan Eurostat aanleveren. Dit betreft alleen openstaande vacatures, gedefinieerd volgens het concept van *unmet demand* en op enkele uitzonderingen na gemeten door middel van een bedrijvensurvey. Uit de literatuur is gebleken dat het via surveys vrijwel niet mogelijk is om bij vacatures te meten of de betreffende baan al of niet bezet is. Dit zet een vraagteken bij de validiteit van de metingen. De Job Vacancy Statistics geeft in elk geval een (substantiële) onderschatting van de werkelijke wervingsbehoefte van werkgevers en van de baanmogelijkheden voor werkzoekenden, door vacatures buiten beschouwing te laten voor banen die nog bezet zijn. Vergelijking met het aantal openstaande vacatures (Job Vacancy Statistics) en het aantal werklozen (Labour Force Survey) kan dan misleidend zijn.

- b. Er zijn per begin 2012 geen vergelijkbare statistieken van het aantal openstaande vacatures beschikbaar in vijf van de 27 landen: Denemarken, Frankrijk, Ierland, Italië en Malta. Dit is geen onbekend gegeven, maar wel vermeldenswaardig.
- c. Er is in Europa onvoldoende informatie over vacaturestromen beschikbaar (instroom en uitstroom, c.q. vervulde vacatures). Wel levert de Labour Force Survey zeer bruikbare informatie over baanvinders, wat het equivalent is van aangenomen personen en vervulde vacatures.
- d. De informatie over openstaande vacatures en vervulde vacatures bij arbeidsbureaus zijn niet vergelijkbaar tussen landen, vanwege verschillen in administratieve procedures. Informatie over de instroom van geregistreerde vacatures bij arbeidsbureaus is wel geschikt voor vergelijking tussen landen, maar is per kwartaal en per jaar niet altijd beschikbaar voor alle landen in Europa.
- e. Het aantal vacatures van uitzendbureaus is in sommige landen (Nederland en België) even groot als het totaal aantal vacatures van alle andere werkgevers samen. Toch worden vacatures van uitzendbureaus niet of nauwelijks gemeten. Informatie over vervulde uitzendopdrachten ontbreekt in vrijwel alle landen van Europa.
- f. Er is aanleiding om te twijfelen aan de validiteit en betrouwbaarheid van statistieken die zijn gebaseerd op online vacatures. Dit heeft vooral te maken met een onduidelijke markt bereik en aan onvoldoende inzicht in de mate van ontdubbeling. De methodologie van deze statistieken is niet publiek bekend.
- g. Het aandeel ingetrokken vacatures — een belangrijke indicator voor knelpunten aan de vraagkant van de arbeidsmarkt — is vermoedelijk substantieel (mogelijk een zesde van de uitstroom), maar hiervan bestaat vrijwel geen data.
- h. Bij vacaturegerelateerde indicatoren convergeert de uitkomst naar een bepaalde waarde, uiteraard met verschillen tussen landen en verschillen in de tijd. De volgende vuistregels kunnen met enige voorzichtigheid worden gehanteerd: het aantal openstaande vacatures is ongeveer een kwart van de uitstroom van vacatures, het aandeel ingetrokken vacatures is ongeveer een zesde van de uitstroom, de vacatieduur is ongeveer drie maanden, het aandeel openstaande vacatures is ongeveer twee procent van de werkgelegenheid, het aandeel vervulde vacatures (baanvinders) is ongeveer een kwart van de werkgelegenheid, het aantal werklozen is ongeveer tien maal zo groot als het aantal openstaande vacatures (volgens de Job Vacancy Statistics), de penetratie van arbeidsbureaus op de markt van bedrijven met vacatures is ongeveer tien procent, het bereik van arbeidsbureaus op de markt van vacatures is ongeveer een derde, de vervullingsquote van arbeidsbureaus is ongeveer een kwart en het aandeel van arbeidsbureaus in het totaal aantal vervulde vacatures is ongeveer een twaalfde.

5. Case-studie Nederland

De casestudie van Nederland betreft vergelijking van vacaturestatistieken, teneinde aanknopingspunten te vinden voor vervolgonderzoek. Nederland is koploper in Europa als het gaat om het meten van vacatures, wat is gebleken uit het onderzoek naar vacaturestatistieken (hoofdstuk4).

Onderzoeksvraag: Wat is de stand van zaken in Nederland met betrekking tot het meten van standen en stromen van vacatures, en welke aanknopingspunten levert deze analyse op voor vervolgonderzoek?

In Nederland heb ik 52 verschillende meetinstrumenten gedetecteerd en met elkaar vergeleken, inclusief de meetinstrumenten die zijn gericht op een specifieke regio of bedrijfstak. Hierbij heb ik vooral gekeken naar de 11 instrumenten met een landelijk bereik.

Het is moeilijk een eenduidig beeld te krijgen van de totale vacaturemarkt in Nederland op basis van het bestaande instrumentarium. Aan de hand van een analyse van data van openstaande vacatures, de instroom van vacatures en vervulde vacatures laat ik zien dat de verschillende meetmethoden — die hetzelfde beogen te meten — veelal tot verschillende uitkomsten van aantallen vacatures leiden. De *Vacature-enquête* van het CBS

geeft substantieel lagere uitkomsten van de instroom en het aantal vervulde vacatures dan het onderzoek *Vacatures in Nederland* van UWV. Met name de arbeidsmarktintermediairs geven veel lagere aantallen, omdat zij op deelmarkten werkzaam zijn. Duidelijk is dat de bestaande vacaturemetingen het aantal baankansen voor werkzoekenden in Nederland onderschatten, doordat vacatures van uitzendbureaus onderbelicht zijn.

Uit de casestudie blijkt dat arbeidsbureaus, uitzendbureaus en online recruitment services niet representatief zijn voor de totale vacaturemarkt en dat voorzichtigheid is geboden met het gebruik van deze data voor bepaalde beleidsdoeleinden. Tevens blijkt dat de vacatureonderzoeken met een landelijk bereik ontoereikend zijn voor gebruikers in sectoren en regio's. De uitkomsten van landelijke metingen zijn onvoldoende toegesneden op sectoren en regio's en zijn onvoldoende gedetailleerd. Dit blijkt uit de vele tientallen arbeidsmarkt- en vacatureonderzoeken die in Nederland worden uitgevoerd door sociale partners en regionale samenwerkingsverbanden. Een laatste conclusie is dat exogene factoren van grote invloed kunnen zijn op de uitkomsten van vacaturemetingen, hetgeen leidt tot trendbreuken in tijdreeksen van vacatures. Het onderzoek heeft laten zien dat dit voorkomt bij veranderingen in de manier van vacatureregistratie, veranderingen in de opzet van surveys, veranderingen in de definitie en de inzet van andere onderzoeksbureaus. Bezuinigingen hebben eveneens een grote invloed op vacaturemetingen: bepaalde metingen geheel worden beëindigd, dan wel beperkt in frequentie of in vraagstelling.

6. Suggesties voor verder vacatureonderzoek

Onderzoeksvraag: welk onderzoek is nodig om een beter inzicht te krijgen in vacatures?

Het onderzoek leidt tot 36 aanbevelingen in vier categorieën: I) het concept en definitie van vacatures, II) meten van vacatures, III) vacatureanalyses en IV) coördinatie en gebruik van vacatureinformatie. De onderzoeksaanbevelingen zijn in de onderstaande tabel weergegeven.

Tabel S2. Aanbevelingen voor verder vacatureonderzoek

Categorie aanbeveling	Aanbeveling
Het concept en de definitie van vacatures (I)	1. Test de voorgestelde algemene definitie van vacatures.
	2. Test de voorgestelde operationele definitie van vacatures.
	3. Definieer de karakteristieken van vacatures.
	4. Bestudeer vacatures in niet westerse culturen en economieën.
	5. Bestudeer atypische vacatures.
	6. Bestudeer latente vacatures.
	7. Bestudeer schijnvacatures.
Meten van vacatures (II)	8. Verbeter de Job Vacancy Statistics in bepaalde landen van Europa.
	9. Meet openstaande vacatures ook voor bezette banen.
	10. Vul de Labour Force Survey aan met baanvinderonderzoek onder werklozen.
	11. Ontwikkel op Europees niveau een bedrijvensurvey om vacaturestromen te meten.
	12. Gebruik een standaard vragenlijst voor het meten van vacaturestromen.
	13. Onderzoek de mogelijkheden van nationale registraties van nieuwe arbeidscontracten.
	14. Verbeter de kwaliteit van data van vacatureregistraties van arbeidsbureaus.
	15. Verzamel data over open en vervulde vacatures (assignments) van uitzendbureaus.
	16. Publiceer over de methodologie van vacaturestatistieken van online vacaturesites.
	17. Gebruik personeels- en salarisadministraties van bedrijven als bron voor vacatureonderzoek.
	18. Ontwikkel een instrument voor registratie van vacatures voor werkgevers (JVOR).
	19. Meet onvervulde vraag (unmet demand) als deelverzameling van alle vacatures.
	20. Investeer in tijdreeksen van data van vacaturestromen.
Vacature-analyses (III)	21. Ontwikkel vergelijkbare vacatureanalyses voor arbeidsbureaus
	22. Bestudeer de effecten van moeilijk vervulbare vacatures.
	23. Bestudeer ingetrokken vacatures, als mogelijke indicator voor knelpunten aan de vraagkant van de arbeidsmarkt.
	24. Gebruik de stand-stroomverhouding als indicator voor de vacatieduur.
	25. Gebruik de baanmobiliteit (stroomgegeven) als prominente indicator en steun minder op de vacaturequote (standgegeven).
	26. Gebruik voor analyse van mismatches op de arbeidsmarkt data van vacaturestromen op de totale vacaturemarkt.
	27. Bestudeer substitutie van vacatures door andere vormen van vraagvervulling.
	28. Bestudeer de match van vacatures met de uiteindelijke baan en met de aangenomen persoon.
	29. Onderzoek in hoeverre een combinatie van vacaturedata van intermediairs gebruikt kan worden als 'early indicator' voor ontwikkelingen van economie en arbeidsmarkt.
	30. Koppel registers en surveys met vacature-informatie.
	31. Investeer in verklarend vacature-onderzoek.
	32. Bestudeer wervingsmotieven van werkgevers en achterliggende factoren.
	33. Bestudeer de invloed van instituties als context van vacatureontwikkelingen.
Coördinatie en gebruik van vacature-informatie (IV)	34. Verbeter de kwaliteit van vacatureinformatie door coördinatie.
	35. Gebruik vacature-informatie voor beleidsdoeleinden.
	36. Bestudeer de functionaliteit van verschillende typen vacatureanalyses.

Annex 10. CV Peter Donker van Heel

In 1984 I graduated from the Faculty of Social and Cultural Sciences at the University of Groningen (Netherlands). I then became a volunteer researcher at Amnesty International (Netherlands). From 1986 onwards I have worked as a labour market researcher at various private research bureaus: Research voor Beleid (project leader) from 1986-1990, Marktplan Adviesgroep (partner) from 1991-1994, Nederlands Economisch Instituut (deputy head) from 1994-1999, Ecorys (director) from 2000-2007 and senior partner from 2008-2013. At present I am employed as a researcher by Panteia (2013-present).

The main themes I dealt with as a researcher are social policy (labour-market, social security, vocational education), labour-market (mismatches, flexibility), labour market intermediaries (employment services, temporary work agencies, online recruitment services), quality of labour (collective agreements, labour conditions, labour relations) and human resources development. I have gained thorough insight into the policies, strategies, organisation and working-procedures of institutions in the social-economic field, such as ministries, employment services, organisations of employers and employees and other relevant institutions.

Since 1984 I finished almost 500 research and consultancy projects, almost always in co-operation with other researchers. In most of these studies I was project leader, responsible for the research design, the development of the instruments, the choice of the analysis and the quality of the final result. My experience includes evaluations, empirical studies, surveys with all types of data-collection, studies with questionnaire construction and statistical analyses.

My experience includes 166 job vacancy studies, e.g. the development of a job vacancy registration programme and a management information system for public employment services in the Netherlands (Ministry of Social Affairs and Employment, 1986-1989), the monitoring of assignments of temporary agency workers (ABU, 1991-2008), a representative job vacancy survey in the Netherlands (UWV, 2006-2010), the European Vacancy Monitor (European Commission, 2010-2012) and several job vacancy studies in various sectors. I was involved in the development of 35 instruments for measuring job vacancies.

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