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Brexit and the European financial system: mapping markets, players and jobs

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Executive summary

LONDON IS AN international financial centre, serving European and global clients. A hard Brexit would lead to a partial migration of financial firms from London to the EU27 (EU minus UK) to ensure they can continue to serve their EU27 clients.

FOUR MAJOR CITIES will host most of the new EU27 wholesale markets: Frankfurt, Paris, Dublin and Amsterdam. These cities have far fewer people employed in finance than London. Moreover, they host the European headquarters of fewer large companies. The partial migration of financial firms will thus have a major impact on these cities and their infrastructures.

BANKS ARE THE key players in wholesale markets. United States and Swiss investment banks, together with one large German and three large French banks, will make up the core of the new EU27 wholesale markets. Some Dutch, Italian and Spanish banks are in the second tier.

THE FOREX, SECURITIES and derivatives trading markets are now in London. We map the current, limited market share of the four major cities that might host the EU27 client business. The expected migration of financial trading will lead to a large increase in trading capacity (eg bank trading floors).

CLEARING IS THE backbone of modern financial markets. A comparative overview of clearing facilities in the EU27 shows that Germany and France have some clearing capacity, but this will need to be expanded. The ownership of clearing is often intertwined with stock exchanges. Were the planned LSE-Deutsche Börse merger to go ahead, LSE would sell the Paris subsidiary of its clearinghouse.

IN TERMS OF legal systems, there is an expectation that trading activities will be able to continue under English contract law, also in the EU27. A particular challenge is to develop FinTech (financial technology) in the EU27, as this innovative part of the market is currently based in London.

WE ESTIMATE THAT some 30,000 jobs might move from London to the EU27. This will put pressure on the facilities (infrastructure, offices, residential housing) in the recipient cities. The more the European Union market for financial services is integrated, the less need there will be for financial firms to move to one location, reducing the pressure for all facilities to be in one city (see Sapir *et al*, 2017, which is a companion piece to this paper).

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1 Introduction

London is Europe's financial hub, providing corporate and investment banking services to the European Union's 28 member countries and beyond. When the United Kingdom will leave the EU and its single market by the spring of 2019, UK-based financial firms lose their passport to do direct business with EU27 clients[1]. Brexit thus leads to a partial migration of financial firms from London to the EU27 (EU minus the UK[2]) so that they could continue to serve their customers there.

We provide a comparison between London and four major cities that together will host most of the new EU27 wholesale market: Frankfurt, Paris, Dublin and Amsterdam. We also give a detailed picture of the wholesale markets (foreign exchange, securities and derivatives trading), the largest players in these markets (the major banks) and the underlying clearing infrastructure. Finally, we provide data on professional services (consulting, legal and auditing) and innovation (financial technology, FinTech).

Separately, in Sapir *et al* (2017), we discuss the policy challenges the EU27 faces in building an integrated wholesale market. Sapir *et al* (2017) also estimates that about 35 percent of current wholesale market activities might move from London to the EU27.

2 Comparison of major cities

As some 35 percent of wholesale market activities might migrate from London to other major cities in the EU, it is instructive to compare the current 'capacity' of cities in terms of the size of their current financial market activities and their ability to host incoming activities from London. In section 5, we estimate that some 30,000 people might relocate from London to the EU27: 10,000 related to core wholesale banking and 18,000 to 20,000 related to professional services.

Table 1 on the next page shows the differences in the size of the financial sectors in London and other European financial centres – Frankfurt, Paris, Dublin and Amsterdam. Where data for the city is not available, Table 1 gives country data. These numbers help us to understand capacity constraints when considering a partial relocation of the financial sector.

All five cities have strong financial sectors. The cities' shares of gross value added from their country's financial sector ranges from 23 and 25 percent in Paris and Amsterdam to 52 percent in London and 80 percent in Dublin. London and Dublin in particular offer international financial services. While all five cities host a large number of domestically registered monetary financial institutions (MFIs), London dwarves the other cities in terms of foreign-registered MFIs. This shows London's pre-eminent position as the international financial hub in the EU. This finding is supported by the fact that London also hosts the largest number of headquarters of top companies.

In terms of characteristics of the financial sector, London outweighs the other cities by an even greater margin. The UK financial sector trade balance, to which London contributes the biggest share, is greater than that of France, Germany, Ireland and Amsterdam by a factor of more than 10. Tax revenues from the UK financial sector are more than 100 times greater than, for example, in Germany.

In terms of banking, the UK hosts more assets, capital and reserves than any other EU country. However, the proportion of finance staff to total population is lower in London than

1 We refer here to EU27 clients without access to international markets. Some large corporates can, for example, issue bonds in New York or London (even after Brexit).

2 The single market also includes non-EU countries of the European Economic Area. We use 'EU27' as shorthand for all single market countries.

in Frankfurt, Dublin or Amsterdam. Finally, London has a leading role in forex and interest rate over-the-counter (OTC) derivatives turnover.

3 Banks

The large investment banks from the US and the large universal banks from Europe are essential players in the wholesale markets. These banks bring together the suppliers of capital (investors) and those with a need for capital (corporates, governments and households). In this way, these banks are the gatekeepers of the EU Capital Markets Union, which aims to improve access to funding, allocation of capital and better savings rates for savers. Investment bank league tables rank investment banks by market share and typically cover four major segments: mergers and acquisitions, equity, bonds and loans (ie syndicated loans). Table 2 on the next page shows the top 20 banks, representing about 80 percent of the European investment banking market (Goodhart and Schoenmaker, 2016).

Table 1: Comparative overview of the financial sectors, selected cities

Financial services		London (UK)	Paris (France)	Frankfurt (Germany)	Dublin (Ireland)	Amsterdam (Netherlands)	Source
Population ('000)		8,256	6,695	691	1,261	1,021	Eurostat
Financial sector	GVA (% of country financial sector GVA)	52	23		80	25	Europe Economics (2011), ONS (2015)
	Trade balance (€bns)	87.1	6.1	7.4	6.7	0.7	UNCTAD (2015)
	Tax revenue (€bns)	28.71	-	0.27	1.53		Europe Economics (2011)
Banking	Number of MFIs (domestically registered)	132	166	60	104	28	ECB (2015)
	Number of MFIs (foreign registered)	123	39	63	30	34	ECB (2015)
	Capital and reserves (€bns)	792	524	464	110	121	European Banking Federation (2015)
Banking assets	Total assets (€bns)	10,223	6,940	6,955	482	2,528	ECB (2016)
	Wholesale (€bns)	5,205					Sapir *et al* (2017)
	Retail (€bns)	5,018					Sapir *et al* (2017)
Employment	Finance (000s)	352	270	76	20	54	Europe Economics (2011)
	Domestic credit institutions (000s)	398	408	646	27	90	ECB Structural Financial Indicators (2016)
IR derivatives market	Forex turnover (% of global)	37	2.8	1.8	-	1.3	BIS (2016)
	IR OTC derivatives turnover (% of global)	39	4.7	1.0	-	0.7	BIS (2016)
	Clearing	LCH Ltd, CME, LME, ICE	LCH SA	Eurex		LCH SA, Euro CCP NV	BIS payment clearing and settlement statistics
Headquarters of top 250 companies*		40%	8%	2% (Munich)	-	2.5%	TheCityUK (2016a)

Source: Bruegel based on ONS (2015) Regional Gross Value Added; Eurostat, statistics on European cities; UNCTAD (2015) exports and imports by service category; ECB (2015) List of MFIs; European Banking Federation, Facts and Figures for 2015; ECB, Structural Financial Indicators 2016; BIS, Triennial Survey; BIS, payment, clearing and settlement statistics. For other sources, see the References (page 13). Note: Numbers in red are country-level data, black indicates city level. * Headquarters location of top 250 companies with global or regional headquarters in Europe.

There are broadly speaking three groups of banks in the league table: 1) US and Swiss investment banks; 2) UK universal banks; and 3) euro-area universal banks. We examine the first and third groups in more detail below.

Table 2: European Investment Banking, top 20 banks, mid-2016

Rank	Bank	Country of origin	Fees (US $ million)	Market share (%)
1	JP Morgan	US	549	6.1%
2	Goldman Sachs and Co	US	483	5.4%
3	Morgan Stanley	US	462	5.1%
4	Barclays	UK	432	4.8%
5	BNP Paribas SA	Euro area	400	4.4%
6	Deutsche Bank	Euro area	373	4.1%
7	Citi	US	358	4.0%
8	Bank of America Merrill Lynch	US	338	3.7%
9	HSBC Holdings PLC	UK	329	3.7%
10	Rothschild	UK	246	2.7%
11	Société Générale	Euro area	212	2.4%
12	Crédit Agricole CIB	Euro area	209	2.3%
13	UBS	Switzerland	194	2.2%
14	Lazard	US	192	2.1%
15	UniCredit	Euro area	184	2.0%
16	Credit Suisse	Switzerland	151	1.7%
17	ING	Euro area	137	1.5%
18	Evercore Partners	US	129	1.4%
19	Santander	Euro area	116	1.3%
20	Natixis	Euro area	112	1.2%

Source: Bruegel based on Thomson Reuters (2016), Investment Banking League Tables.

An overwhelming share of investment banks' turnover and employment is located in the UK, highlighting the UK's role as a gateway to the continental European financial markets

Detailed data on the investment banks shows that an overwhelming share of their turnover and employment is located in the UK, highlighting the UK's role as a gateway to the continental European financial markets for third-country large financial firms. About 90 percent of the total EU turnover of the largest US and Swiss investment banks[3], and about an equal share of their EU staff, is located in the UK (Table 3). In the EU27, there is no single location where the largest third-country investment banks concentrate their activities. In general their activities are scattered. Nevertheless, we see some concentration in Frankfurt, Paris, Dublin and Amsterdam. Luxembourg is important for asset management, but that is outside the scope of this paper.

The activities that third-country investment banks already carry out in the EU27 are a good indicator of the location of their clients in the EU27. Assuming that the third-country investment banks will relocate mainly to where their clients are located[4], they will be likely to expand their existing activities in the EU27. Ireland and Germany have large shares of the turnover and employment of Bank of America Merrill Lynch. Some of the largest operations of Citigroup are in France, Germany and Spain. For Goldman Sachs, the Netherlands is significant in terms of turnover and Germany in terms of employment. The highest shares of JP

3 Unfortunately, we could not trace detailed data for UBS, so of the Swiss investment banks, only Credit Suisse is included.

4 For detailed conclusions see Sapir *et al* (2017).

Morgan's EU27 turnover are in Luxembourg and Germany, and the highest shares of employment are in Ireland, Luxembourg and Germany. The largest shares of Morgan Stanley's EU27 operations are in France and to a lesser extent Italy. Lastly, Credit Suisse operates mainly through two UK-based entities, Credit Suisse International and Credit Suisse Securities Ltd. The largest Credit Suisse EU27 branches are in France and Germany, which represent larger shares in terms of turnover than in terms of staff.

Table 3: Turnover and employees of the UK operations of the largest US and Swiss investment banks, end-2014

Turnover	BAML	Citigroup	Goldman Sachs	JP Morgan	Morgan Stanley	Credit Suisse
Belgium	0.00%	0.00%	0.00%	0.28%	0.00%	0.00%
Denmark	0.00%	0.00%	0.00%	0.25%	0.00%	0.00%
France	0.01%	2.41%	0.00%	0.54%	3.86%	4.84%
Germany	1.02%	9.79%	0.70%	2.49%	0.06%	1.46%
Greece	0.00%	0.00%	0.00%	0.00%	0.04%	0.00%
Ireland	1.72%	0.47%	0.03%	1.87%	0.00%	0.75%
Italy	0.37%	0.64%	0.56%	1.36%	0.98%	0.59%
Luxembourg	0.00%	0.00%	0.02%	4.66%	0.02%	0.00%
Netherlands	0.30%	0.00%	1.14%	0.00%	0.31%	0.34%
Poland	0.00%	0.00%	0.06%	0.00%	0.10%	0.06%
Spain	0.00%	1.14%	0.92%	0.50%	0.21%	0.34%
Sweden	0.12%	0.45%	0.04%	0.25%	0.00%	0.19%
UK	95.78%	84.62%	96.59%	87.31%	93.14%	91.43%
Other EMEA non EU	0.68%	0.48%	0.95%	0.48%	1.29%	0.00%
Total EMEA	100%	100%	100%	100%	100%	100%

Employees	BAML	Citigroup	Goldman Sachs	JP Morgan	Morgan Stanley	Credit Suisse
Belgium	0.00%	0.00%	0.00%	0.13%	0.00%	0.00%
Denmark	0.00%	0.00%	0.00%	0.42%	0.00%	0.00%
France	0.00%	1.70%	0.00%	0.27%	2.12%	1.72%
Germany	1.19%	6.48%	0.72%	6.39%	0.12%	1.38%
Greece	0.00%	0.00%	0.00%	0.00%	0.02%	0.00%
Ireland	9.52%	0.32%	0.04%	9.33%	0.00%	0.73%
Italy	0.99%	0.92%	0.45%	2.17%	1.66%	0.26%
Luxembourg	0.00%	0.00%	0.00%	9.16%	0.31%	0.00%
Netherlands	0.17%	0.00%	0.09%	0.00%	0.12%	0.24%
Poland	0.00%	0.00%	0.54%	0.00%	0.10%	0.03%
Spain	0.00%	2.11%	0.43%	1.00%	0.00%	0.13%
Sweden	0.09%	1.07%	0.07%	0.46%	0.00%	0.08%
UK	87.06%	83.84%	96.68%	69.78%	94.19%	95.43%
Other EMEA non EU	0.97%	3.57%	0.99%	0.88%	1.36%	0.00%
Total EMEA	100%	100%	100%	100%	100%	100%

Source: Bruegel based on Goodhart and Schoenmaker (2016) and EU Capital Requirements Directive (CRD IV) country-by-country reports.
Note: The data refers to the banks' investment banking activities in Europe, Middle East and Africa (EMEA).

Table 4: Geographic split and wholesale versus retail split of top 13 systematically important banks (SIBs) in the euro area, end-2015

	Geographic split				
	Assets (€bns)	Home	Other euro area	EU non-euro area	Non-EU
BNP Paribas	1,994	25%	36%	11%	28%
Crédit Agricole	1,699	81%	8%	2%	8%
Deutsche Bank	1,629	26%	19%	9%	46%
Santander	1,340	28%	11%	31%	29%
Société Générale	1,334	72%	8%	10%	11%
BPCE	1,167	91%	2%	1%	6%
UniCredit	860	40%	35%	22%	3%
ING	842	36%	38%	9%	17%
BBVA	750	39%	10%	4%	47%
Crédit Mutuel	707	89%	8%	1%	3%
Intesa Sanpaolo	676	85%	5%	6%	5%
Rabobank	670	74%	5%	2%	20%
Commerzbank	533	52%	19%	16%	13%

	Wholesale and retail banking split				
	Corporate & global	Asset management	Retail	Other	Reporting
BNP Paribas	54.4%	0.9%	30.1%	14.6%	Total assets
Crédit Agricole	51.1%	5.3%	13.3%	30.4%	Total assets
Deutsche Bank	76.4%	5.5%	15.8%	2.3%	Total assets
Santander	11.6%	0.0%	88.4%	0.0%	Operating income
Société Générale	56.6%	9.8%	24.6%	9.0%	Total assets
BPCE	40.3%	0.0%	59.2%	0.5%	Total assets
UniCredit	15.8%	6.2%	77.6%	0.4%	Operating income
ING	33.3%	0.0%	66.7%	0.0%	Operating income
BBVA	8.7%	0.0%	91.3%	0.0%	Loans
Crédit Mutuel	9.1%	2.1%	71.4%	17.4%	Operating income
Intesa Sanpaolo	17.3%	13.5%	63.1%	6.1%	Total assets
Commerzbank	33.2%	31.2%	21.0%	14.6%	Total assets

Source: Bruegel based on SNL financials and annual reports of banks. Note: Data split for Rabobank is not available. Insurance activities of banks are included in others. Data for Commerzbank is for 2014, instead of 2015.

Table 4 lists the largest euro-area banks with assets over €500 billion (Schoenmaker and Véron, 2016), and lists the geographical segmentation of their assets by home country, other euro-area countries, non-euro EU countries (mainly the UK) and non-EU countries. Most of the large euro-area banks appear to have a substantial presence in London[5]. Table 4 further highlights that the large French banks (BNP Paribas, Crédit Agricole and Société Générale) and Deutsche Bank have substantial wholesale market activities (shown as corporate and global banking in Table 4). These activities cover more than 50 percent of their total business. It is thus no surprise to find these universal banks in the top 12 of the investment bank league

5 Only Santander (with 31 percent in EU non-EA) has both a retail and wholesale presence in the UK.

table (Table 2). It should be noted that not all of the corporate and global banking covered by the first column of Table 4 relates to wholesale markets (eg corporate lending is not regarded as wholesale market activity).

The next group of euro-area banks is more scattered, with a combination of retail and wholesale activities. Wholesale market activities account for between 10 percent and 40 percent of the business of BPCE, ING, Commerzbank, Intesa Sanpaolo, UniCredit and Santander. Only UniCredit, ING and Santander are part of the top 20 investment bank league (Table 2). The remaining euro-area banks have a predominantly retail focus.

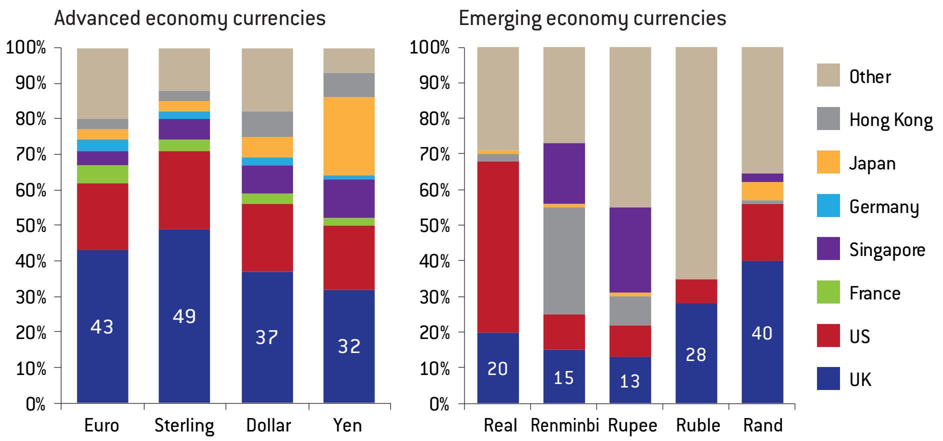
From this review, we conclude that the core group of banks, which will contribute to the building up of the EU27 wholesale markets, comprises the five US and two Swiss investment banks, two large UK banks (Barclays and HSBC), the top three French banks and the biggest German bank. In the second circle, there are some Italian, Dutch and Spanish banks.

4 Markets

London is a global player and a European hub for trading in terms of the size and diversity of its markets. It has an unparalleled position in terms of over-the-counter (OTC) foreign exchange and interest rate derivatives trading, particularly in the euro market and to a great extent the US dollar market. In terms of foreign exchange trading, the electronic nature of the transactions and the UK's dominant position in the market lead us to believe that the UK's position in forex trading will largely remain unchanged after Brexit. Moreover, forex trading in London is settled through Continuous Linked Settlement (CLS), a global multi-currency settlement system, and it is not dependent on London's access to Target2, the ECB's settlement system, if the access to Target2 is disrupted after Brexit (Schoenmaker, 2017).

Almost half (43 percent) of the daily foreign exchange spot transactions in euros takes place in the UK (Figure 1) followed by US (19 percent), France (5 percent), Singapore (4 percent) and Germany (3 percent). Moreover, the UK is one of the biggest trading centres for major emerging countries' currencies and it is the most important destination for renminbi trading outside of Hong Kong.

Figure 1: OTC daily foreign exchange spot transactions, share of the market, %



Source: Bruegel based on BIS Triennial Survey, 2016.

The UK's share of total forex derivatives turnover (all countries and all products) was about 40 percent in 2013, declining to about 37 percent in 2016. For the three major currencies (dollar, euro and yen), the UK remains the largest market, more than twice the size of the US market (Table 5). In the EU27, France has the biggest share of the market (2.8 percent) ahead of Germany (1.7 percent). Both France and Germany increased their shares of euro-denominated forex trading from 2013 to 2016.

OTC interest-rate derivatives represent more than two-thirds of the overall OTC derivatives market globally. The UK is the market leader in interest-rate derivatives denominated in euro (75 percent) and pound sterling (95 percent), while the US is the market leader in US dollar denominated interest-rate derivatives (78 percent). Both the UK and the US have increased their shares since 2013 (Table 6). Almost half of the UK's trade in OTC interest-rate derivatives is denominated in euros (48.6 percent) compared to transactions in pound sterling (4.7 percent) and US dollars (5.4 percent). In terms of interest-rate derivatives trading in the EU27, France has the biggest share of euro-denominated trading with 13.2 percent

Table 5: Global OTC foreign exchange derivatives turnover in April 2013 and 2016 (daily averages in $ millions)

Panel A April 2013	France		Germany		United Kingdom		United States		Total
	Amount	Share of total, %	Amount	Share of total, %	Amount	Share of total, %	Amount	Share of total, %	Amount
Euro	106,782	4.8%	65,593	2.9%	1,009,345	45.1%	395,495	17.7%	2,238,028
Pound	27,815	3.6%	15,892	2.1%	424,918	55.0%	134,812	17.5%	772,070
US Dollar	162,172	2.8%	88,176	1.5%	2,397,494	41.2%	1,119,964	19.2%	5,824,625
Total	*189,878*	*2.8%*	*110,882*	*1.7%*	*2,725,993*	*40.9%*	*1,262,799*	*18.9%*	*6,671,446*

Panel B April 2016	France		Germany		United Kingdom		United States		Total
	Amount	Share of total, %	Amount	Share of total, %	Amount	Share of total, %	Amount	Share of total, %	Amount
Euro	103,519	5.1%	67,701	3.3%	884,912	43.4%	395,675	19.4%	2,040,979
Pound	24,918	3.1%	14,989	1.9%	399,200	49.5%	179,670	22.3%	805,791
US Dollar	154,244	2.7%	95,562	1.7%	2,143,395	37.3%	1,101,746	19.2%	5,742,241
Total	*180,600*	*2.8%*	*116,381*	*1.8%*	*2,406,301*	*36.9%*	*1,272,122*	*19.5%*	*6,515,396*

Source: Bruegel based on BIS Triennial Survey, 2013 and 2016. Note: Foreign exchange derivatives include spot transactions, outright forwards, foreign exchange swaps, currency options and other products.

Table 6: Global OTC single currency interest rate derivatives turnover in April 2013 and 2016 (daily averages in $ millions)

Panel A April 2013	France		Germany		United Kingdom		United States		Total
	Amount	Share of total, %	Amount	Share of total, %	Amount	Share of total, %	Amount	Share of total, %	Amount
Euro	141,245	10.6%	88,125	6.6%	927,840	69.4%	27,090	2.0%	1,336,075
Pound	4,746	2.3%	4,728	2.3%	189,802	91.9%	3,162	1.5%	206,643
US Dollar	52,080	6.7%	6,205	0.8%	110,235	14.2%	546,268	70.4%	776,268
Total	*202,210*	*7.3%*	*101,347*	*3.7%*	*1,347,749*	*48.9%*	*628,153*	*22.8%*	*2,758,583*

Panel B April 2016	France		Germany		United Kingdom		United States		Total
	Amount	Share of total, %	Amount	Share of total, %	Amount	Share of total, %	Amount	Share of total, %	Amount
Euro	100,648	13.2%	16,562	2.2%	573,664	75.2%	6,832	0.9%	762,494
Pound	6,648	2.5%	506	0.2%	247,489	94.8%	2,333	0.9%	261,113
US Dollar	26,833	1.8%	2,455	0.2%	215,157	14.4%	1,167,958	78.0%	1,497,627
Total	*141,215*	*4.7%*	*31,311*	*1.0%*	*1,180,246*	*39.0%*	*1,240,774*	*41.0%*	*3,028,031*

Source: Bruegel based on BIS Triennial Survey, 2013 and 2016. Note: OTC single currency interest rate derivatives include forward rate agreements, swaps, options and other products.

in 2016, an increase from 10.6 percent in 2013. Germany's share across all major currencies has declined. Most notably, Germany's share of euro-denominated interest-rate derivative trading fell from 6.6 percent in 2013 to 2.2 percent in 2016. As such, in terms of OTC interest-rate derivatives trading capacity in the EU27, France is emerging as the main player ahead of Germany.

5 Clearing

Table 7 on the next page lists the centralised counterparties (CCPs) located in the EU. All four UK-based CCPs –the London Clearing House (LCH Clearnet), London Metal Exchange (LME), CME Clear (part of the US headquartered Chicago Mercantile Exchange) and ICE Clearing Europe (part of the US headquartered Intercontinental Exchange) – are recognised by the EU and must comply with the requirements of the European Market Infrastructure Regulation (EMIR, (EU) No 648/2012)[6].

Of the four UK-based CCPs, the largest part of euro-denominated trading occurs through LCH Clearnet. LCH Clearnet Group Ltd is a wholly-owned subsidiary of the London Stock Exchange (LSE) and has a subsidiary in France called LCH SA. The UK-based LCH Ltd, unlike LCH SA, is a multi-currency clearing house with daily trading volumes of euro-denominated swaps totalling €887 billion and a monthly repo-clearing volume of €6.2 trillion (as of October 2016)[7]. LCH's volume of euro-denominated clearing and settlement far exceeds the volumes of the other CCPs that operate in both the UK and the EU27.

Is there sufficient capacity and infrastructure within the euro area to absorb the clearing business, based on existing arrangements? Table 7 shows that there is no euro-area equivalent of a large centralised clearing services provider like LCH Clearnet. Presently, the largest CCPs in the euro area are Eurex Clearing in Germany, the LCH Clearnet Group owned LCH SA in France, EuroCCP in the Netherlands and CCG in Italy. However, these large euro-area CCPs are limited in their product coverage (EuroCCP only clears securities) and in currency coverage (LCH SA France and CCG in Italy only clear euro-denominated products).

One of the main recipients of London's euro-denominated clearing business could potentially be Eurex in Germany. Eurex is a multi-currency clearing house that clears across derivatives, securities and repos, but its clearing volumes are smaller than those of LCH Clearnet. For instance, in terms of euro-denominated OTC derivatives, LCH Clearnet's notional outstanding clearing volumes are more than five times those of Eurex[8]. Moreover, the OTC derivatives market in Germany is quite limited: of the global euro-denominated OTC derivatives market, only 2 percent is located in Germany compared to 13 percent in France (Table 6, panel B). In terms of the repo market, the monthly clearing volume at Eurex is between €4.5 trillion and €6 trillion per month, coming close to the level of cleared repo trades at LCH SA in Paris.

Clearing and settlement of euro-denominated trades in London was a contested issue even in the pre-Brexit environment (Batsaikhan, 2016). In 2011, the European Central Bank issued guidance that large-scale offshore CCPs should be fully incorporated in the euro area with full operational and managerial control. The UK fought this ECB 'location policy' in court and won the case on the grounds that the ECB lacks the necessary competence to regulate

6 Recognised Clearing Houses, Bank of England, http://www.bankofengland.co.uk/financialstability/Pages/fmis/supervised_sys/rch.aspx, accessed 17 January 2017.

7 LCH, http://www.lch.com/asset-classes/repoclear/volumes, accessed 19 December 2016.

8 Bruegel based on LCH (http://www.lch.com/asset-classes/otc-interest-rate-derivatives/volumes) and Eurex (http:// www.eurexclearing.com/clearing-en/markets-services/eurex-otc-clear/interest-rate-swaps/clearing-volume, http:// www.eurexchange.com/exchange-en/market-data/statistics/monthly-statistics). Note: Notional outstanding as of 20 December 2016.

Table 7: Comparative overview of CCPs in the EU, end-2015

Country / CCP	Products	Currency	No. transactions (millions)	Number of participants	Profit after tax (000s)	Headcount
Germany						
Eurex Clearing AG	Securities, Derivatives, Repo	EUR, CHF, GBP, USD	3,581.5	186	1,097	178
France						
LCH.Clearnet SA	Securities, Derivatives, Repo	EUR	459.3	110	28,200	168
Netherlands						
LCH.Clearnet SA (see France)	Securities, Derivatives, Repo	EUR	242.4	-	-	-
EuroCCP N.V.	Securities	Multi-currency (9)	1,758.8	45	6,300	44
Belgium						
LCH.Clearnet SA (see France)	Securities, Derivatives, Repo	EUR	41.4	-	-	-
Italy						
CCG	Securities, Derivatives, Repo	EUR	235.4	82		
LCH. Clearnet SA (see France)	Securities, Derivatives, Repo	EUR	2.1	NA	-	-
United Kingdom						
LCH. Clearnet Ltd	Securities, Derivatives, Repo	Multi-currency (18)	336*	154	63,800	452
ICE Clear Europe	Derivatives	Multi-currency (13)	1,136.9	79	493	-
LME Clear Limited	Derivatives	USD, EUR, JPY, GBP	0.34	42	6,107	43
CME Clearing Europe Limited	Derivatives	Multi-currency (18)	0.75	19	-	-

Source: Bruegel based on BIS and annual reports of CCPs. Note: (*) Data for 2013.

securities clearing systems[9]. Post-Brexit, the European Commission might propose that the ECB be given the necessary legal competence (Barker and Brunsden, 2016). Another suggestion is that there could be a more joint approach, as is applied currently to EU-based CCPs that operate in the US, with these CCPs supervised both by their home countries and by the US authorities. In order to limit systemic risk concerns and disruptions in the euro-clearing business both the UK and EU authorities should consider adopting a US-style approach by sharing supervisory roles for systematically important extraterritorial CCPs (Sapir et al, 2017).

In the meantime, the €24 billion merger between LSE (owner of LCH Clearnet Group) and Deutsche Börse is at the time of writing still pending. The European Commission is reviewing the case for competition concerns, with a recommendation due in March 2017. LCH Clearnet Group has agreed to sell its French subsidiary LCH SA if the merger goes ahead.

9 General Court of the European Union (2015) Judgement in Case T-496/11 United Kingdom vs. European Central Bank, http:// curia.europa.eu/jcms/upload/docs/application/pdf/2015-03/cp150029en.pdf.

When the UK exits the EU, UK-based CCPs will have to apply for equivalence from the European Commission to operate in the EU in accordance with Article 25 of EMIR. Third country CCPs applying for the right to operate in the EU must be authorised by the European Securities and Markets Authority (ESMA). As of the end of September 2016, 21 third-country CCPs from 10 countries had been authorised to carry out clearing services in the EU. Scarpetta and Booth (2016) estimate that it takes two and a half to four years to obtain authorisation, which makes it nearly impossible to aim for equivalence authorisation by the time the UK negotiations to exit the EU end[10]. Appropriate transition arrangements are therefore important.

6 Professional services

The financial sector is supported by a large professional services sector, which covers consulting, legal services and auditing. The professional services sector employs as many people as the financial sector itself. Before we turn to detailed employment figures, we discuss two issues in detail: the legal system and innovation.

The legal system

The legal documentation for trading, in particular derivatives, is made up of the ISDA (International Swaps and Derivatives Association) Master Agreements, which are based on common law (London and New York). In terms of contract law, it will have to be clarified if EU27 wholesale markets can work on the basis of ISDA agreements based on English law. Contracts under English law can be subject of judicial decisions from EU27 courts. The advantage of this solution would be that well-established legal practices (contracts and case law) can continue without disruption.

The alternative would be to base contracts on the legal system of the host country (eg Germany, France, Ireland or the Netherlands), which would minimise execution risk. As German courts, for example, are more familiar with German law. Nevertheless, market participants expect to continue to be able to use English contract law as the basis for trading documentation.

Separately, investment bankers already use local corporate law in areas such as public offerings and mergers and acquisitions. These are grounded in the corporate cultures and practices (including the corporate governance codes) of the countries of incorporation. That will not change.

Innovation and FinTech

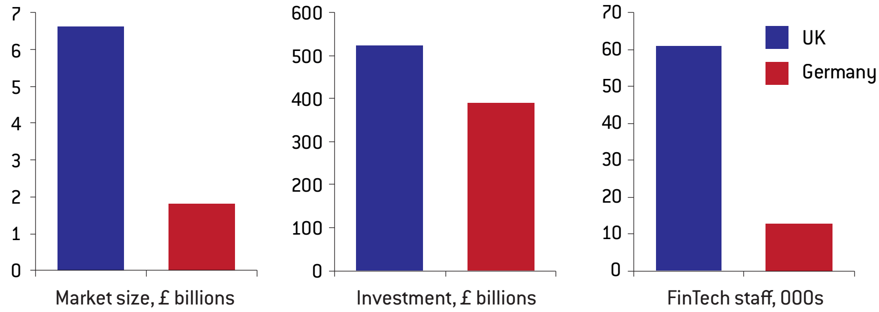
FinTech has been a central part of the UK's global competitiveness strategy. Since the Brexit vote, however, venture capital investment has declined in the UK

The UK has established its position as the biggest FinTech and financial innovation centre in Europe, followed by Germany, with other EU countries far behind (TheCityUK, 2016b). Globally, the UK leads in terms of market size and is second after the US in terms of investment and employment. The British FinTech industry employs 61,000 people, just below 6 percent of the total financial services workforce.

A growing export sector, especially for emerging markets and Association of Southeast Asian Nations (ASEAN) countries, FinTech has been a central part of the UK's global competitiveness strategy. Since the Brexit vote, however, venture capital investment has declined in the UK, while continuing to grow in Germany (KPMG, 2016). Decline in investment in the UK is partly due to political uncertainty delaying investment decisions in talent and human capital.

10 Scarpetta and Booth (2016) also claim that two years is a lower bound and that Commission was already assessing the equivalence applications before EMIR entered into force.

Figure 2: Market size, investments and staff in FinTech in 2015



Source: TheCityUK (2016b).

Employment

Around 2.2 million people were employed in the UK finance and related professional sector in 2014, with one-third of employment in London (TheCityUK, 2016b). Professional services in London, including legal services, consultancy and accounting, employ about 372,000 people, while financial services, including banking, insurance, fund management, securities and others, employ about 354,000 people. It should be noted that professional and financial services employees are highly mobile, and these services can be executed remotely. Investment bankers and consultants are, for example, used to flying out during the working week to wherever in Europe the client is based, returning to their place of residence for the weekend. Employment that will move out of London and into the EU27 therefore largely depends on the rules and regulations put into place after the negotiations.

In Sapir *et al* (2017), we estimate that 35 percent of wholesale banking activities might move to the EU27 and that 10 to 15 percent of employees might move with this volume of business (this amounts to 10,000 people in the wholesale banking sector). These estimates are based on the supervisory 'substance' requirement, which requires newly licenced investment bank entities in the EU27 to have executive and senior staff in place (see Sapir *et al*, 2017, for details).

There are no such 'substance' requirements for professional services. We therefore estimate that only about 5 percent of the professional services sector, amounting to 18,000 to 20,000 people, might move with the financial sector from London to the EU27.

Table 8: Employment and finance and related professional services in UK and in London, thousands

Sector		Total UK		London	
Employment in professional services	Legal services	314	1116	105	372
	Management consultancy	483		161	
	Accounting	319		106	
Employment in financial services	Banking	417	1061	139	354
	Insurance	309		103	
	Fund management	42		14	
	Securities	48		16	
	Other financial services	245		82	
Total		2177		726	

Source: Bruegel based on TheCityUK , ONS Business Register and Employment Survey.

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