JOSÉ ALEXANDRE ALBUQUERQUE DE SOUSA

International stock markets

Essays on the determinants and consequences of financial market development

International stock markets:

Essays on the determinants and consequences of financial market development

International stock markets:
Essays on the determinants and consequences of financial market development

Internationale aandelenmarkten:
Essays over de determinanten en consequenties van
de ontwikkeling van financiële markten

Thesis

to obtain the degree of Doctor from the
Erasmus University Rotterdam
by command of the
rector magnificus

Prof. dr. R.C.M.E. Engels

and in accordance with the decision of the Doctorate Board.

The public defence shall be held on
Thursday 02 May 2019 at 13:30 hours

by

JOSÉ ALEXANDRE ALBUQUERQUE DE SOUSA
born in Porto, Portugal

Erasmus University Rotterdam

Doctoral Committee

Doctoral dissertation supervisors:
Prof. dr. M.A. van Dijk
Prof. dr. P.A.G. van Bergeijk

Other members:
Prof. dr. T. Beck
Dr. Egemen Genc
Prof. dr. D. Schoenmaker

Erasmus Research Institute of Management – ERIM
The joint research institute of the Rotterdam School of Management (RSM)
and the Erasmus School of Economics (ESE) at the Erasmus University Rotterdam
Internet: www.erim.eur.nl

ERIM Electronic Series Portal: repub.eur.nl/

ERIM PhD Series in Research in Management, 465
ERIM reference number: EPS-2019-465-F&A
ISBN 978-90-5892-542-8

Design: PanArt, www.panart.nl

This publication (cover and interior) is printed by Tuijtel on recycled paper, BalanceSilk®
The ink used is produced from renewable resources and alcohol free fountain solution.
Certifications for the paper and the printing production process: Recycle, EU Ecolabel, FSC®, ISO14001.
More info: www.tuijtel.com


In memory of my father

Acknowledgements

"We don't exist unless there is someone who can see us existing, what we say has no meaning until someone can understand, while to be surrounded by friends is constantly to have our identity confirmed; their knowledge and care for us have the power to pull us from our numbness."

Alain de Botton, "The Consolations of Philosophy"

I owe sincere and earnest thankfulness to those who acknowledged my existence during the process of writing this dissertation.

Prof. Mathijs van Dijk helped me initiate this journey by hiring me as a research assistant during my Master studies. Mathijs showed me the pleasure of doing research, and his contagious enthusiasm inspired me to pursue this career path. Mathijs, thank you for all the time you have devoted to helping me become a better researcher. Your dedication, patience, open-mindedness, attention to detail, and especially you trust and investment in my development will remain in my memory for many years to come. Another enormous source of inspiration was my second promotor, Prof. Peter van Bergeijk. Peter, thank you for your always kind guidance in the past four years. I cherish the moments in which you caught me off guard by your astute observations. Above all, I truly admire your free-spirited attitude.

I would also like to thank the members of my doctoral committee, Prof. Thorsten Beck, Dr. Egemen Genc, and Prof. Dirk Schoenmaker for the valuable insights, suggestions, and comments on my work. Besides being part of my doctoral committee and co-author of one of the papers in this dissertation, Prof. Thorsten Beck also offered me the opportunity to work on the project "Long-term financing for Africa", commissioned by the Financial Sector Deepening in Africa. Through this opportunity I was able to experience the joy of having a real impact in the financial world. Thorsten, I am truly inspired by your energy, passion, and drive to make things happen.

The RSM Finance department offered me an excellent working environment. I would like to thank all the present and past members that I came across during my studies: Mark van Achter, Dion Bongaerts, Hoyong Choi, Mathijs Cosemans, Sarah Draus, Li He, Abe de Jong, Thomas Lambert, Mancy Luo, Arjen Mulder, Peter Neuteboom, Anjana Rajamani, Peter Roosenboom, Frederik Schlingemann, Claus Schmitt, Elvira Sojli, Fabrizio Spargoli, Marta Szymanowska, Ben Tims, Francisco Urzúa Infante, Marno Verbeek, and Wolf Wagner. To our office manager and secretary, Myra Lissenberg-van der Pennen and Flora van Oosterom-Pos: your help and conviviality were much appreciated! A special thank you to my colleague and friend Arjan Osté, who I assisted for the Bachelor Course Financiële Processen. Arjan, your integrity and dedication make you a role model not only for me, but also for all the students that are lucky enough to have you as a teacher.

I am grateful to my fellow PhD students, who put up with me the most during the past four years: Aleksandrina, Dominik, Eden, Georgi, Stefan, Rómulo, Rogier, Roy, Taavi, Vlado, and especially my roommates Gelly, Lennard, Lingtian, and Marina. Being around you was not only a great experience, but also fun!

I express my gratitude to Prof. Gustavo Manso, who hosted my research visit to the Haas School of Business, University of California at Berkeley, and the PhD students Carlos, Paulo, and Petra, for the great conversations about the Finance discipline during the lunch and coffee breaks.

Finally, I would like to thank my family and friends, particularly Jan, Trees, and Pedro, for their unconditional support. I am indebted the most to the two people who daily manifest their care for me: my mother and Sai.

Obrigado, mamã, pelo teu carinho e apoio. Orgulho-me de ser teu filho!

Lieve Sai, jouw aanwezigheid maakt me gelukkig! 我愛你。

Table of contents

List of tables

List of figures

Chapter 1.

Introduction

The creation of the stock exchange has been an important innovation in financial history, and it is inseparably linked to the creation of the business corporation, a legal entity owned by multiple stockholders. Although the exact origin of the business corporation is subject to debate[1] , the Dutch East India Company (VOC), founded in 1602, is generally seen as the world's first formally listed public company (Gelderblom, De Jong, and Jonker, 2013). Separation of ownership and control, limited liability for shareholders and directors, and the creation of tradable shares are the key features of the VOC that propelled the development of financial markets (Hansmann and Kraakman, 2004). The Amsterdam Stock Exchange, where shares of the VOC were traded, is regarded as the first formal stock exchange. Before that, no considerable secondary market existed for trading stocks of corporations (Neal, 1997).

Stock exchanges have steadily spread worldwide over the past four centuries, and financial markets have now become one the most important sources of financing for firms. According to the World Bank (2018), the worldwide market capitalization of

[1] Some authors argue that companies with transferable shares date back to the medieval commenda (Ekelund and Tollison, 1980, Gower, 1969, Kindleberger, 1984) or found its origins even earlier, in the ancient Roman societas publicanorum (Malmendier 2009).

publicly listed companies was 79.2 trillion US$ in 2017, which corresponds to 112% of the world's GDP in the same year. The number of countries with at least one stock market has more than tripled since 1975 (from 53 to 165), indicating that the pace at which new stock exchanges are established has increased over the past decades. Although there are still 49 countries without a stock exchange, stock exchanges now exist in all five continents of the world. These figures highlight the importance of stock markets in today's worldwide economy. It is thus not surprising that academic researchers and policy makers devote considerable attention to the analysis of the determinants and consequences of stock market development.

Remarkably, the key features that enabled the development of financial markets (separation of ownership and control, limited liability for shareholders and directors, and the creation of tradable shares) also generate important barriers to a company's access to capital. These barriers arise not only due to information asymmetry and agency problems between shareholders and managers of the company, whose interests are not always aligned (Ackerlof, 1970; Jensen and Meckling, 1976), but also due to the free-rider problem among dispersed owners of a company (Berle and Means, 1932; Shleifer and Vishny, 1986), which is responsible for a reduction of the incentives of each individual owner to monitor the firm.

Important governance mechanisms designed to overcome these problems include managerial compensation, boards of directors, the market for corporate control, and ownership concentration (Shleifer and Vishny, 1997). Besides these governance mechanisms, the legal protection of (minority) shareholders plays an important role in alleviating this type of problems. The existing literature shows that financial development is negatively affected by the lack of such governance mechanisms and legal protection. Countries in which investor protection is poor also have less developed financial markets (La Porta, Lopez-de-Silanes, Shleifer, and Vishny, 1997).

The law and finance literature highlights the importance of strong legal institutions in determining a country's level of financial development. The more recent political economy literature, on the other hand, argues that political institutions come first in

the hierarchy of institutions that explain financial development because politicians are responsible for setting other institutions, including legal institutions, and because political institutions are more difficult to change and change more slowly than other types of institutions (see Lambert and Volpin, 2017, for an overview).

Besides "policy factors", also "structural factors" such as the demographic and geographic structure of a country (Beck and Feyen, 2013; De La Torre, Feyen, and Ize, 2013), its social capital (Guiso, Sapienza, and Zingales, 2004), and macroeconomic fundamentals (Boyd, Levine, and Smith, 2001) are known to affect a country's level of financial development.

Studying the determinants of financial development is important because financial market development has important economic consequences: the finance and growth literature highlights the importance of well-functioning financial markets for economic growth (Levine 1997, 2005), due to stimulation of accumulation of capital in the economy (e.g., Morck, Yavuz, and Yeung, 2011), and more efficient allocation of capital to its greatest value use (e.g., Schumpeter, 1934, Wurgler, 2000). Despite recent evidence of non-linearities in the relation between financial and economic development (e.g., Arcand, Berkes and Panizza, 2015), there is increasing consensus on the critical role of financial sector development for economic growth in low- and middle-income countries (Claessens and Feyen, 2006). Financial markets also fulfill other important roles, such as promoting risk sharing among investors (Pagano, 1993a), providing a form of investment that insulates firms and investors from liquidity shocks (Bencivenga and Smith, 1991), and enabling households, firms, and governments to reallocate their consumption and investments over time, - which is particularly relevant for developing countries that often face high income volatility (Morduch, 1995).

In this dissertation, I contribute to the literature on the determinants and consequences of financial development by analyzing the determinants of success and failure of newly established stock markets around the world (Chapter 2), the political consequences of opening a stock exchange in Africa (Chapter 3), and the importance

of different types of institutional investors in the governance of listed firms in the U.S. (Chapter 4).

1.1. Nascent markets: Understanding the success and failure of new stock markets (Chapter 2)[2]

Identifying the conditions for successful establishment of stock markets remains an important policy concern: several of the 49 countries without a stock market are currently planning to open a stock exchange. However, the vast majority of academic studies to date (even the "emerging markets" literature) focus on at most 50-60 mature stock markets, and thus we know little about the determinants of the development of many recently established stock markets.

The main discussion in the debate about the determinants of financial development revolves around the relative importance of "structural factors" (such as demographic and geographic structure, social capital, political system, and other "inherited" characteristics) and "policy factors" (such as contractual and informational frameworks, political institutions, macroeconomic fundamentals, technological development, and regulatory and supervisory frameworks). Chapter 2 of this dissertation provides an out-of-sample evaluation of the relative importance of structural and policy determinants of financial sector development by analyzing the success and failure of 59 newly established ("nascent") stock markets since 1975 in their first 40 years of activity.

We find that nascent markets differ markedly in their success, as measured by number of listings, market capitalization, and trading activity. Using cluster analysis based on the three success measures simultaneously, we clearly identify two clusters that represent the least and most successful markets after 20 years of trading. Necessary

[2] Based on Albuquerque de Sousa, J.A., T. Beck, P.A.G. van Bergeijk, and M.A. van Dijk, 2016, "Nascent markets: Understanding the success and failure of new stock markets." (available at https://cepr.org/active/publications/discussion_papers/dp.php?dpno=11604). I was actively involved in developing the hypotheses and methodology used in this paper. I conducted the data analyses and was responsible for a large portion of the writing.

conditional analysis (Dul, 2016) suggests that long-term success is in part determined by early success: a high initial number of listings and trading activity are necessary, though not sufficient, conditions for long-term success.

Banking sector development at the time of establishment and development of national savings over the life of the stock market are the other two most reliable predictors of success. We find little evidence that structural factors such as legal and political institutions matter. Rather, our results point to an important role of banks, demand factors, and initial success in fostering long-term stock market development.

1.2. The political consequences of financial market development: Evidence from the opening of African stock exchanges (Chapter 3)[3]

The financial development literature to date primarily focuses on the economic consequences of financial development. In Chapter 3, we contribute to the literature by examining its political consequences. Financial development could affect political institutions because it impacts competition, economic development, and resource distribution (Claessens and Perotti, 2007), thereby affecting the distribution of de facto political power within a society[4]. These changes could, in turn, lead to changes in the allocation of de jure political power and the redefinition of political institutions, since the allocation of de jure political power is ultimately determined by a country's population (Aghion, Alesina and Trebbi, 2004). Therefore, as Rajan and Zingales (2003) argue, incumbents may oppose financial development in an effort to maintain the status-quo.

[3] Based on Albuquerque de Sousa, J.A., and M.A. van Dijk, 2018, "The political consequences of financial market development: Evidence from the opening of African stock exchanges." I developed the main idea and methodology used in this paper, conducted the data analyses and was responsible for most of the writing.

[4] The political economy literature distinguishes *de jure* and *de facto* political power. *De jure* political power refers to political power originating from political institutions, such as electoral rules (e.g., heads of state and governments); *de facto* political power refers to political power possessed by interest groups as a result of their ability to organize, lobby or bribe politicians, organize contest of power, etc. (Acemoglu, Johnson, and Robinson, 2005).

We examine the political consequences of opening a stock exchange in 34 African countries over 1960-2016, by studying how opening a stock exchange affects the political survival of the incumbent leaders and the democratization of a country's political institutions. We focus on the African continent because it is comprised of a set of countries with a common colonization history, most of which only relatively recently became independent and started to develop financially. If financial development indeed leads to reallocation of political power, as proposed by the interest group theory of financial development, opening a stock exchange should be negatively related to the political survival of incumbent leaders, at least in autocracies.

We find that stock exchanges arise both in autocracies and democracies. Moreover, our analysis of 367 political leaders across the 54 countries of the African continent shows that political leaders stay longer in office when they open a stock exchange if local political institutions are autocratic. This result is surprising, because it suggests that incumbent elites may actually have incentives to support financial development, rather than opposing it.

A possible explanation is that, in autocracies, stock exchanges are a "private good" that disproportionately benefits the incumbent elite that supports the political leader. Consistent with this view, we find that opening a stock exchange in autocracies is associated with slower subsequent democratization of political institutions. Evidence exploiting heterogeneity in the number of listed companies and their industry concentration (particularly banking) further suggests that the effect is larger when the interest group benefiting from the stock exchange is likely to be smaller.

We contribute to the literature by providing evidence of a feedback channel between financial development and political institutions. We also contribute to the political science literature, which models the political survival of leaders, and the political transition to democracy (Acemoğlu and Robinson, 2001; Bueno de Mesquita, 2005, Bueno de Mesquita, and Smith, 2010; Bueno de Mesquita and Smith, 2017), as well as the literature on democratization (Barro, 1996; Friedman, 2006).

1.3. Do index funds' family ties benefit the firms they own? (Chapter 4)[5]

As previously mentioned, ownership concentration is an important governance mechanism. Blockholders (owners with a large ownership stake in a firm) help overcome the free-rider problem by monitoring the firms in which they invest, and increase firm value through different channels: voice (by exercising their voting rights), engagement with the firm ("jawboning"), and exit (selling their stake in the firm, the "Wall Street walk"; see Edmans and Holderness, 2017, for a survey of the literature). Institutional investors are an important type of blockholders. A large body of empirical literature has shown that institutional investors positively affect firm governance (e.g., Gillan and Starks, 2003; Ferreira and Matos 2008), despite the detrimental short-termism of certain categories of institutional investors (e.g., Cella, 2009). However, as Edmans and Holderness (2017) point out, we still know too little about how different types of investors interact to influence firm governance.

In Chapter 4, I focus on an increasingly important category of institutional investors: mutual funds. According to the Investment Company Institute (2017), mutual funds managed 40 trillion US$ in assets worldwide in 2016 (around half the world's total market capitalization), of which 18.9 trillion US$ in the United States alone. However, it is important to note that mutual funds differ markedly in their investment strategies. Unlike active funds, which aim at generating returns above a benchmark and therefore have an incentive to monitor the firms in which they invest, index funds have the sole objective of replicating a benchmark's returns. Monitoring costs hurt the performance of the monitoring index fund relatively to the benchmark.

Over the past decade, there has been a rapid increase in the amount of assets managed by index funds: in 2014, approximately one third of mutual fund assets in the United States were managed passively (Apple, Gormley, and Keim, 2016). This has

[5] Based on my Job market paper: Albuquerque de Sousa, J.A., 2017, "Do index funds' family ties benefit the firms they own?" (available at https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3059128).

raised concerns about their role in corporate governance and, consequently, the impact of the rise of passive ownership on firm value (Wurgler, 2011). Empirical evidence has so far been mixed (e.g., Appel, Gormley and Keim, 2016; Schmidt and Fahlenbrach, 2017)

In Chapter 4, I contribute to the literature on the impact of institutional investors on firm value, by investigating the impact of ties between index and non-index funds within the same mutual fund family on the value of firms in which both funds invest. Family ties between active and passive funds within the same family could benefit firm governance and value because the two funds are more likely to be able to persuade management (either by informal engagement or by voting) to pursue a certain shareholder value maximizing strategy when acting together than when acting separately.

Theoretically, I show that family ties increase non-index funds' incentives to purchase additional shares and monitor a firm. This is because non-index funds are more likely to be able to influence management when index funds in the same family hold the same firm. Empirically, using exogenous variation in family ties following a firm's addition to an index, I show that family ties are associated with higher non-index fund ownership. Furthermore, firms held by funds with family ties are more profitable and have higher valuations. The effect of family ties on valuation is larger for "dedicated" fund-firm relations and for firms in highly innovative industries, for which the potential gains from monitoring are the highest ex-ante.

1.4. Conclusion and further research

Academic researchers and policy makers have long been interested in the determinants and consequences of financial market development. In this dissertation, I contribute to this literature by analyzing the determinants of success and failure of newly established stock exchanges, the political consequences of opening a stock exchange, and the importance of mutual fund family ties between index and non-index funds for firm profitability and valuation.

The results of Chapter 2 show that studying the determinants of success and failure of newly established stock markets is important, because "structural" factors that are well-known determinants of financial development in more mature markets (such as legal origin and democracy) do not explain the success and failure of nascent markets. An important topic for further research is identifying the channels through which banking sector development affects stock market development.

In Chapter 3, I provide evidence of a feedback channel between financial market development and the distribution of political power. Although the economic consequences of stock market development are relatively well studied in the literature, we know little about the political consequences of opening a stock exchange. Further research on the channels through which financial market development affects the distribution of political power is necessary, as well as research on other types of consequence of financial market development for society at large.

In Chapter 4, I show that mutual fund family ties between index and non-index funds do matter for firm profitability and valuation. This result highlights the importance of studying how the interaction between different types of investors affects firm governance and, ultimately, firm value.

Chapter 5 concludes and summarizes the findings of this dissertation. Taken together, the studies in this dissertation highlight the relevance of analyzing the determinants and consequences of financial market development from different perspectives and in an international context, since some of the findings contradict stylized facts based on studies of more mature stock markets. I would like my future research agenda to further build upon these findings.

Chapter 2.

Nascent markets: understanding the success and failure of new stock markets[1]

2.1. Introduction

Although theory is ambiguous, a large body of empirical research emphasizes the importance of well-developed and efficient financial markets for economic growth, at least in developing and emerging economies.[2] This positive impact happens through two main channels. First, financial markets can stimulate the accumulation of capital in the economy (Bencivenga and Smith 1991; Jappelli and Pagano, 1993b; O'Hara, 1995; Morck, Yavuz, and Yeung, 2011). Second, financial markets can foster more efficient allocation of capital to its greatest value use (Schumpeter, 1934; Rajan and Zingales, 1998; Beck, Levine, and Loayza, 2000; Wurgler, 2000; Fisman and Love, 2004). Financial markets also fulfill other important roles besides promoting growth, such as enabling households, firms, and governments to reallocate their consumption and investments over time, which is particularly relevant for developing countries that often face high income volatility (Morduch, 1995).

[1] This chapter is based on Albuquerque de Sousa, J.A., T. Beck, P.A.G. van Bergeijk, and M.A. van Dijk, 2016, "Nascent markets: Understanding the success and failure of new stock markets," (available at https://cepr.org/active/publications/discussion_papers/dp.php?dpno=11604). We thank Stijn Claessens, Jan Dul, Erik Feyen, Andrei Kirilenko, Thomas Lambert, Roberto Steri (EFA discussant), and seminar participants at the 2016 European Finance Association Meetings, the International Institute of Social Studies, the Netherlands Institute for Advanced Study in the Humanities and Social Sciences, and the Rotterdam School of Management for helpful comments.

[2] See, e.g., Grossman and Stiglitz (1980), Diamond and Verrecchia (1982), Laffont and Tirole (1988), Scharfstein (1988), Devereux and Smith (1994), Obstfeld (1994), Bencivenga, Smith, and Starr (1996), and Greenwood and Smith (1997) for theoretical arguments. Empirical studies include Levine (1991), Demirgüç-Kunt and Levine (1996, 2001), Levine and Zervos (1998), and Beck and Levine (2004). Levine (1997, 2005) surveys the literature.

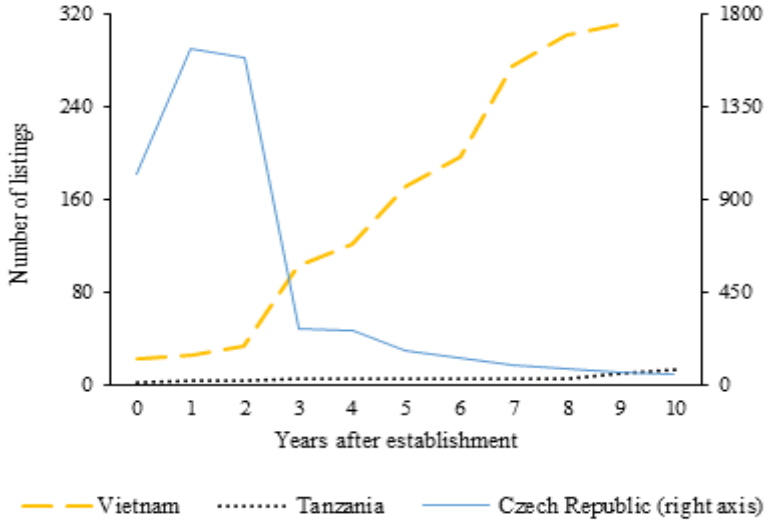
Given the importance of financial sector development for economic development, the question of how to develop efficient and stable financial systems is a critical policy challenge. Many low- and even middle-income countries not only have underdeveloped financial systems, but they also have concentrated financial structures, dominated by banks and characterized by the absence of liquid public capital markets. This paper explores conditions for the successful establishment of public equity markets across a sample of 59 developing countries that have opened a stock exchange since 1975.

Since 1975, the number of countries with at least one stock market has more than tripled, from 53 to 165. The vast majority of academic studies to date (even the "emerging markets" literature) focuses on at most 50-60 of these 165 countries, and thus we know little about the (determinants of) development of many recently established stock markets. As of 2016, there are still 49 countries without a stock market, but several are planning to open a stock exchange, so determining the conditions for successful establishment remains an important policy concern. Furthermore, our study provides an out-of-sample evaluation of the relative importance of structural, economic, and policy determinants of financial sector development that have been studied extensively in the financial development literature.

We analyze the development of newly established ("nascent") markets by using the three measures of stock market development most commonly used in the literature: number of listed domestic companies, aggregate market capitalization as a percentage of GDP, and aggregate turnover of stocks traded (a measure of trading activity). We use these three variables as our key measures of nascent market "success" – while we acknowledge that they do not capture all relevant aspects of stock market success (such as stock price efficiency), and that they primarily measure whether the markets thrive themselves, and not whether they contribute to economic development (an issue we intend to explore in future work).

We find substantial variation in the success of different nascent markets, as illustrated in Figure 2.1 – which shows the development of the number of listings on three new stock markets (Czech Republic, established 1993; Tanzania, 1998; Vietnam,

Figure 2.1. Number of listings in first ten years of select nascent markets



2003) over the first decade after their establishment. Some markets slowly but steadily come to fruition, others perish after thriving initially, and yet others essentially remain dormant.

Unlike in previous work that focuses on more established markets (Demirgüç-Kunt and Levine, 1996), we find that correlations among the success measures are low in the early stage of development of nascent markets, although they increase as markets mature. This suggests that nascent markets may initially thrive according to some measures but not others, and it only becomes clear over time which markets succeed in attaining a high number of listings, large aggregate market cap, as well as high trading activity.

Using cluster analysis based on the three success measures simultaneously, we clearly identify two clusters that represent the least and most successful markets after 20 years of trading. The most successful nascent markets on average fare significantly better according to each of the three success measures than the least successful markets. For example, the stock markets in Kuwait, Poland, and Thailand (in the cluster of most successful markets) each have more listings, a greater market cap to GDP, and higher turnover after 20 years than the markets in Kazakhstan, Panama, and Tanzania (in the cluster of least successful markets). These results are not materially affected when we scale the number of listings by population or GDP.

Long-term nascent market success is not fully determined in the first years after establishment. Some markets that turn out to be successful after 20 years (such as Qatar) initially score relatively poorly on the success measures, while other markets that score relatively well initially (such as Slovak Republic) perish later. Whether initial success is an important condition for long-term success is a relevant policy issue. In several countries, there is a heated debate on whether opening a stock market is sensible when the interest from firms and investors may still be limited. Should these countries wait for such interest to develop or could opening a stock exchange in an early stage induce the necessary interest from firms and investors to generate an adequate number of listings, market cap, and trading activity in a later stage?

We investigate these issues using necessary condition analysis (NCA; Dul, 2016). In contrast to traditional sufficiency-based statistical methods such as regressions, NCA allows us to identify the conditions that are necessary (but may not be sufficient) for certain outcomes. We find that a minimum number of listings and turnover in the first five years are necessary conditions for success along both of these dimensions after 20 years. Stock markets that start out with few listings and low trading activity fail to attract a considerable number of listings and to spur adequate trading activity in a later stage, and run the risk of quickly becoming dormant. On the other hand, there is little evidence that the initial market cap is a necessary condition for long-term success. These results suggest that only liquid markets with substantial opportunities for diversification from the outset are able to generate sufficient interest from firms and investors to thrive. There may thus be a reputational cost to establishing an idle stock market. This may justify the choice of several countries that, given limited local demand, either postponed opening a stock exchange or decided to join forces and form a regional exchange.

After examining whether early success is a necessary condition for long-term success, we proceed with a more comprehensive analysis of the determinants of nascent market success. Broadly speaking, the main debate in the financial development literature focuses on the relative importance of "structural factors" – such as demographic and geographic structure (Beck and Feyen, 2013; De La Torre, Feyen, and Ize, 2013), legal origin (La Porta, Lopez-de-Silanes, Shleifer, and Vishny, 1997), social capital (Guiso, Sapienza, and Zingales, 2004), political system (Rajan and Zingales, 2003; Acemoğlu and Johnson, 2005), and other "inherited" characteristics – versus "policy factors" – such as contractual and informational frameworks (Djankov, McLiesh, and Shleifer, 2007), macroeconomic fundamentals (Boyd, Levine, and Smith, 2001), technological development, and regulatory and supervisory frameworks (Beck and Feyen, 2013) – in determining financial development.

We collect data on over 50 variables that are commonly used as empirical proxies for such factors. We analyze how nascent market success is related to these variables

as measured at the time of establishment of the exchange ("initial conditions") as well as to the "dynamic conditions" as indicated by time-variation in these variables over the life of the stock market. Because of the limited number of nascent markets, data scarcity for many variables, and high correlations among several of the variables, it is not possible to include all variables simultaneously in our regressions. Instead, we first estimate the relation between nascent market success and each of these variables individually (reported in the Internet Appendix), and then include a selection of variables in multivariate regressions. These various limitations imply that our empirical results need to be interpreted with caution.

Nonetheless, our analyses uncover several clear patterns that are suggestive of the relative importance of structural and policy factors in general, and of several individual variables in particular, in determining nascent market success. In cross-sectional regressions, we find that early success and initial conditions explain more than 60% of the variation in long-term success. Private credit to GDP (a common indicator of banking sector development) is the single most reliable predictor of nascent market success. Specifically, a 1% higher private credit to GDP at the time of market establishment is associated with a 1% higher number of listings, a 0.4% greater market cap to GDP, and a 0.7% higher turnover in the long-term. Hence, a well-developed domestic banking sector boosts the probability of subsequent nascent market success. This result is consistent with prior studies suggesting that banks and stock markets are complements, and that both play an important role in a country's development (Boyd and Smith, 1996; Beck and Levine, 2004; Demirgüç-Kunt, Feyen, and Levine, 2011). On the other hand, structural variables – such as legal origin, democracy, and population size – do not enter the cross-sectional regressions significantly.

In panel regressions, we explore the role of dynamic conditions in the development of nascent markets. We find that variation in national savings is the most reliable predictor of success in these regressions: nascent markets tend to thrive when national savings increase. This result is indicative of the importance of demand-driven determinants of stock market success (Garcia and Liu, 1999; Hausmann, Rodrik, and

Velasco, 2005). Of the "initial conditions" included in our panel regressions, private credit to GDP remains positively and significantly related to all three success measures. Again, we find little consistent evidence that structural variables matter.

Taken together, our results suggest that a sufficiently high number of initial listings and initial trading activity, a well-developed banking sector at the time of establishment, and a healthy development of national savings (a proxy for potential investor demand) are important conditions for newly established stock markets to flourish in the long-term.

Our paper is related to several strands of the literature. First, our paper is related to the expansive finance and growth literature (see Beck, 2013, and Levine, 2005, for literature surveys). Although recent studies point to important non-linearities in the relation between financial and economic development (e.g., Arcand, Berkes and Panizza, 2015), there is increasing consensus on the critical role of financial sector development for economic growth in low- and middle-income countries (Claessens and Feyen, 2006). Several studies emphasize banking sector development rather than capital markets driving financial and economic development in developing countries (e.g., Demirgüç-Kunt, Feyen, and Levine, 2013), while other studies have pointed to the importance of diversified financial systems, with a variety of different institutions and markets. Specifically, Levine and Zervos (1998) and Beck and Levine (2004) find independent effects of both banking sector and equity market development on economic growth. We contribute to this paper by gauging the success criteria for stock market development in developing and emerging markets, where the impact of capital market development has been shown to be largest.

Second, our paper is related to the literature on the determinants of financial sector development. This literature examines the role of a large number of structural factors (La Porta et al., 1997; Guiso, Sapienza, and Zingales, 2004; Rajan and Zingales, 2003; Acemoğlu and Johnson, 2005) and economic and policy factors (Boyd et al., 2001; Glaeser, Johnson, and Shleifer, 2001; Djankov et al., 2007; Beck and Feyen, 2013) as determinants of financial development. However, most of the studies in this literature

are based on cross-country correlations in a sample of relatively developed countries with stable financial structures. Levine's (1997) observation that "we do not have a sufficiently rigorous understanding of the emergence, development, and economic implications of different financial structures" still rings true today.

Our paper contributes to these strands of the literature by analyzing the role of structural and policy factors in the context of developing new segments of the financial systems, notably public equity markets, in a large sample of less-developed countries that have received relatively little attention so far. Although some other studies explore the development of several newly established stock markets (Claessens, Djankov, and Klingebiel, 2001; Minier, 2009; Weber, Davis, and Lounsbury, 2009), we are not aware of prior work that provides a comprehensive analysis of whether initial success as well as structural and policy factors help to explain why some nascent markets succeed while others do not.

Before proceeding, we would like to point to several caveats. First, our analysis is based on (partial) correlations and does not imply causality. Specifically, we gauge the predictive power of initial conditions and different structural and policy variables for success indicators of nascent stock markets. Although reverse causation is not necessarily a concern for our analysis, we will refrain from causal interpretations. Nevertheless, we believe that our analyses and findings provide important and novel insights that help researchers and policy makers understand the drivers of stock market development. Second, we focus on nascent markets in general, some of which are actually "re-emerged" markets, i.e., they reopen after having been closed for several decades, mostly due to political constraints. While this distinction matter for computation of long-term returns and volatility measures (Goetzmann and Jorion, 1999) we see this distinction as less significant in terms of scale and liquidity of markets. Third, our work does not speak to the discussion on the extent to which public equity markets contribute to economic development but rather what are the criteria for a successful development of such markets.

The remainder of our paper is structured as follows. Section 2 presents different hypotheses on the development of stock exchanges. Section 3 discusses data sources and the different methodologies we use in our analysis. Section 4 presents results based on cluster, necessary condition and regression analysis and section 5 concludes.

2.2. Hypotheses development

In this section, we briefly discuss our measures of nascent market success, review the extensive literature on financial development and its determinants, and develop the main hypotheses of this paper.

2.2.1. Hypotheses on success measures

We use three popular proxies for financial market development as our key measures of nascent market success: number of listings, market cap to GDP, and turnover. The number of listings and market cap are proxies for market size. Pagano (1993b) shows that market size is positively related to a market's ability to mobilize capital and induce risk-sharing. Turnover captures the amount of trading activity of the market and is often used as a basic indicator of transaction costs or liquidity. In liquid markets, investors can adjust their portfolios quickly and cheaply, which facilitates risk sharing and improves capital allocation (Devereux and Smith, 1994; Obstfeld, 1994). The literature also considers other proxies for financial market development, such as volatility, market concentration, and pricing errors. Demirgüç-Kunt and Levine (1996) show that these measures are positively correlated among relatively mature stock markets. In this paper, we limit our analysis to three key success measures since they are widely-used and easy to interpret, and since we lack the data to compute the other measures for many of the nascent markets in the sample.

Our hypotheses on the development of these three success measures for nascent markets are as follows. Since all three measures indicate the degree of stock market development, we expect the values of these measures to be low in the first years of trading for most nascent markets, and to gradually increase over time as the markets develop. We further expect that markets that do well according to one measure also

tend to score highly on the other measures, such that the success measures are positively correlated, as in Demirgüç-Kunt and Levine (1996) – although we expect that correlations increase as markets mature.

2.2.2. Hypotheses on early success as a condition for long-term success

Some authors suggest that developing countries may not be in the best position for setting up a vibrant stock market (Singh, 1997; Rioja and Valev, 2014) because the stock market pricing process is inherently volatile and arbitrary due to monopolistic abuses and inadequate government regulations. Such stock markets are thus bound to fail, and, in this context, governments are better off investing in the development of the banking sector. It is therefore crucial to understand how stock markets develop in the first years after establishment and whether early success is a precondition for long-term success.

Prior work shows that initial success is not a *sufficient* condition for later success. For example, the number of listings on the (re)opened stock exchanges of transition economies was high in the early 1990s because of mass privatizations, but often dwindled subsequently (Claessens, Djankov, and Klingebiel, 2001). Could initial success be a *necessary* condition for later success? Liquid markets with substantial opportunities for investment and diversification are likely necessary to support investor demand, which may in turn stimulate demand from the corporate sector for exchange listings and raising public equity capital. Similarly, a large aggregate market cap might be a reputation signal necessary to attract investors and issuers alike. In other words, markets with a low initial number of listings, market cap, and turnover could run the risk of becoming dormant, resulting in negative path dependence. We thus hypothesize that early success is a necessary, though not sufficient, condition for long-term success.

2.2.3. Hypotheses on other potential determinants of nascent market success

The financial development literature broadly distinguishes two categories of determinants of financial development: "structural factors" that reflect by and large time-invariant country characteristics (such as demographic and geographic structure, legal origin, and political system), and "policy factors" that reflect more dynamic characteristics of the socioeconomic and regulatory environment of a country that can

potentially be influenced by policy makers (such as regulation and enforcement, macroeconomic conditions, and openness).[3]

Building on this literature, we hypothesize that the following main groups of potential determinants may help to explain nascent market success:

- Size and demographic structure of the country: GDP, population;
- Economic development: GDP per capita, GDP growth (Demirgüç-Kunt and Levine, 1996);
- Legal environment: legal origin, quality of legal institutions, financial market regulations (La Porta et al., 1997, 2006; Bhattacharya and Daouk, 2002; Beck, Demirgüç-Kunt, and Levine, 2003);
- Political environment: level of democracy, control of corruption, political risk, openness (Perotti and van Oijen, 2001; Rajan and Zingales, 2003);
- Financial development: size of the banking sector (Demirgüç-Kunt, Feyen, and Levine, 2011, 2013);
- Demand from investors / supply of capital: national savings (Beck and Feyen, 2013).

In our analyses, we distinguish between the values of these variables at the time of exchange's establishment ("initial conditions") and the time-varying conditions over the life of the exchange as indicated by these variables ("dynamic conditions") as potential determinants of nascent market success. Naturally, the structural factors (such as legal origin) can only be analyzed as initial conditions. However, concerning the policy factors, an interesting question is whether the success of a newly established exchange primarily depends on the characteristics of the socioeconomic and regulatory environment at the time of establishment, or whether policy makers should also be concerned about the development of these characteristics over the life of the exchange.

[3] We acknowledge that the distinction between these two categories is not always clear-cut, since some structural factors could change over the medium- to long-term (e.g., political system), while some policy factors could take a long time to respond to changing policies (e.g., control of corruption).

As a separate issue that has not received much attention in the financial development literature, we are also interested in whether the origin of the initiative to open the exchange can help explain nascent market success. In our sample, this initiative either stems from the government, the private sector, or a combination. As private initiative may signal sufficient interest from companies (Minier, 2009), we expect that nascent markets established by private sector initiative tend to be more successful in the long-term.

The list of potential determinants of nascent market success above is far from exhaustive. For example, other research suggests that informal institutions such as societal norms (Guiso, Sapienza and Zingales, 2004; Garretsen, Lensink, and Sterken, 2004) and stock market design characteristics such as trading mechanism and transaction taxes (Green, Maggioni, and Murinde, 2000; Kairys, Kruza, and Kumpins, 2000) may in part explain stock market development. However, data on these and other variables are scarce. Therefore, we focus on the main groups of potential determinants listed above (for which we can obtain data on most nascent markets in our sample), and present some suggestive evidence on several other variables in the Internet Appendix.

2.3. Data and methods

In this section, we describe the data and methods used in our empirical analyses.

2.3.1. Data

We collect data on the year of establishment of stock markets around the world, indicators of stock market development, and a host of country-level variables that may help to explain stock market development. Our data sources include the World Development Indicators, the S&P Emerging Markets database, the World Governance Indicators, the Financial Development and Structure Dataset, websites of stock exchanges, academic papers, and several others. Variable definitions and data sources of all variables used in our analyses can be found in Table A.1 of the Appendix.

We analyze the development of nascent stock markets in their first 40 years of activity. Our analysis begins in 1975 since that is the first year for which data on our success measures are available.[4] Table 2.1 presents an overview of the number and type (national or regional) of markets opened before and after 1975 and Figure 2.2 presents their geographic distribution. Before 1975, 53 countries had at least one stock exchange. This number has more than tripled in the past 40 years: as of 2016, 165 of the existing 214 countries[5] have at least one stock market, and some of these have more than one.[6] Hence, there are still 49 countries without a stock market as of 2016, but we find evidence that 14 of these countries have plans to open an exchange. Table 2.2 shows the list of all 74 nascent markets that are included in at least one of our analyses. We note that some of these markets were established before 1975, but they have data post 1975 that are within the first 40 years of activity. However, most of our analyses include at most the 59 nascent markets that were opened in 1975 or later, and some analyses use an even smaller sample as we require data on all three success measures over a prolonged period after establishment.

2.3.1.1. Indicators of stock market development ("success measures")

We use three measures to assess the "success" of a stock market: number of listed domestic companies, aggregate market capitalization to GDP, and aggregate turnover of the stocks traded (total value of stocks traded to average market capitalization). We collect data on these measures from the World Development Indicators (WDI) over the period 1988-2013. We extend these data to the period before 1988 using the S&P Emerging Markets database (EMDB) over 1975-1995. The WDI and EMDB databases

[4] In some stock markets, trading does not immediately start at the official date of stock market establishment. Since we are interested in the stock markets' activity, and turnover is one of our success measures, we also collect information on the year trading started in each market and use this year as the first year in the life of the market.

[5] The number of existing countries is based on the World Bank list of countries, retrieved in September 2014.

[6] Not each of these 165 countries has its own stock market: 23 countries share a regional stock exchange. The largest regional stock exchanges are located in Africa (Bourse Régionale des Valeurs Mobilières, BRVM, in West Africa, and Bourse des Valeurs Mobilières d'Afrique Centrale, BVMAC, in Central Africa). A considerable number of countries (14) re-opened a stock market that had been closed due to the prevalence of a communist regime.

Table 2.1. Overview of number of existing stock exchanges

This table presents an overview of the number of countries that established a stock exchange before and after 1975 (the first years for which data on our success measures are available) as well as the number of countries that do not have a stock exchange yet. The second column shows the number of exchanges present in those countries. We refer to Section 2.3 for a description of the data sources.

	# of exchanges	**# of countries**
Established before 1975	1 or more exchanges	53 countries
Re-established after 1975	2 or more exchanges	4 countries
	1 exchange	10 countries
Established after 1975	2 or more exchanges	5 countries
	1 exchange	70 countries
	regional exchange	23 countries
Not established yet	–	49 countries (14 countries have plans to establish an exchange)

Figure 2.2. Countries in which a first stock market was (re)established since 1975

This world map depicts stock markets (re)established before and after 1975. Countries depicted in white have not established a stock market as of 2016.

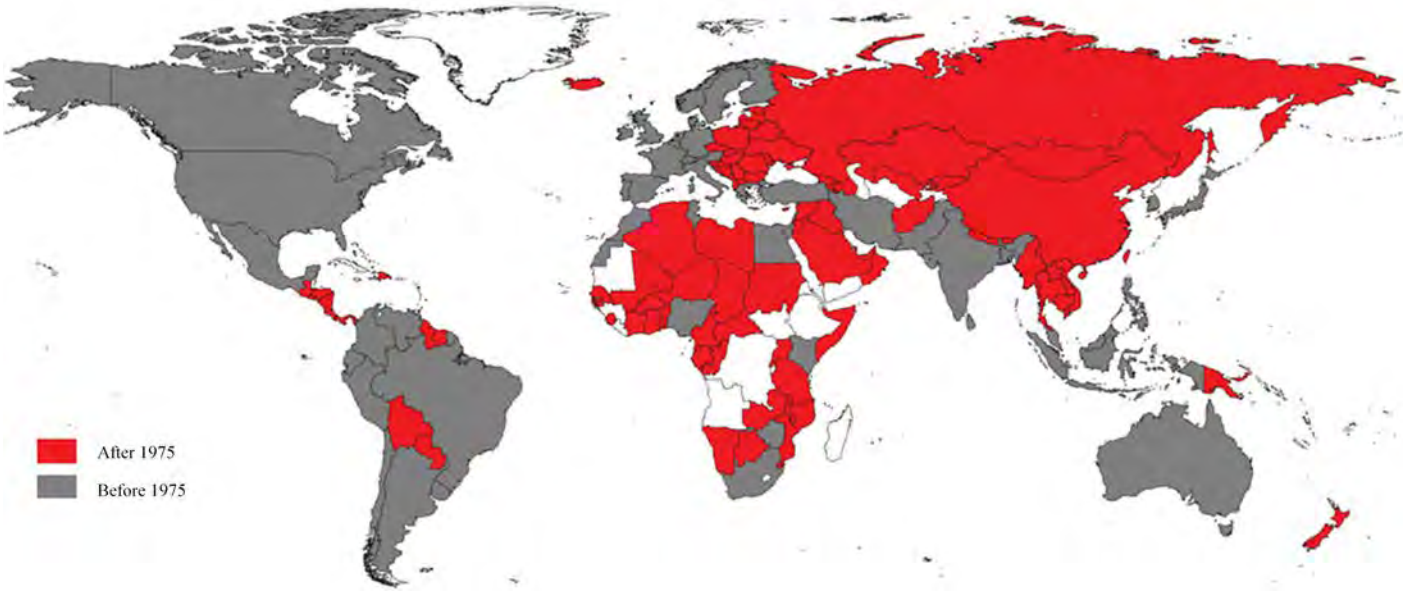


Table 2.2. Overview of all 74 nascent markets in the sample

This table presents all 74 nascent markets included in at least one of the empirical analyses in this paper. Columns present the name of the country, the year when trading started, and the name of the first stock exchange(s) established (or re-opened) in that country. Countries are ordered by the year in which trading started.

Country	Year	Stock exchange(s)
Zimbabwe	1946	Zimbabwe Stock Exchange
Venezuela	1947	Bolsa de Valores de Caracas
Israel	1953	Tel Aviv Stock Exchange
Bangladesh	1954	Dhaka Stock Exchange
Kenya	1954	Nairobi Securities Exchange
Korea, Republic	1956	Korea Exchange
Nigeria	1961	Nigerian Stock Exchange
Malaysia	1964	Bursa Malaysia
Iran	1967	Tehran Stock Exchange
Jamaica	1968	Jamaica Stock Exchange
Ecuador	1969	Bolsa de Valores de Guayaquil/ Bolsa de Valores de Quito
Tunisia	1969	Bourse de Tunis
Bermuda	1971	Bermuda Stock Exchange
Singapore	1973	Singapore Exchange
New Zealand	1975	New Zealand Stock Exchange
Thailand	1975	Stock Exchange of Thailand
Costa Rica	1976	Bolsa Nacional de Valores
El Salvador	1976	Bolsa de Valores de El Salvador
Jordan	1978	Amman Stock Exchange
Fiji	1979	South Pacific Stock Exchange
Trinidad & Tobago	1981	Trinidad and Tobago Stock Exchange
Iceland	1985	Iceland Stock Exchange
Kuwait	1985	Kuwait Stock Exchange
Saudi Arabia	1985	Tadawul
Barbados	1987	Barbados Stock Exchange
Guatemala	1987	Bolsa de Valores Nacional
Oman	1988	Muscat Securities Market
Bahrain	1989	Bahrain Stock Exchange
Bolivia	1989	Bolsa Boliviana de Valores
Botswana	1989	Botswana Stock Exchange
Mauritius	1989	Stock Exchange of Mauritius
China	1990	Shanghai Stock Exchange/ Shenzhen Stock Exchange
Ghana	1990	Ghana Stock Exchange
Honduras	1990	Bolsa Hondureña de Valores
Hungary	1990	Budapest Stock Exchange

(continued on next page)

Table 2.2. Overview of all 74 nascent markets in the sample (continued)

Country	Year	Stock exchange(s)
Panama	1990	Bolsa de Valores de Panama
Slovenia	1990	Ljubljana Stock Exchange
Swaziland	1990	Swaziland Stock Exchange
Bulgaria	1991	Bulgarian Stock Exchange
Croatia	1991	Zagreb Stock Exchange
Mongolia	1991	Mongolian Stock Exchange
Poland	1991	Warsaw Stock Exchange
Russian Federation	1991	Stock Exchange Saint-Pietersburg
Serbia	1991	Belgrade Stock Exchange
Macedonia	1996	Macedonian Stock Exchange
Malta	1992	Malta Stock Exchange
Namibia	1992	Namibian Stock Exchange
Ukraine	1992	PFTS Ukraine Stock Exchange
Czech Republic	1993	Prague Stock Exchange
Lithuania	1993	NASDAQ OMX Vilnius
Montenegro	1993	Montenegro Berza
Nepal	1993	Nepal Stock Exchange
Paraguay	1993	Bolsa de Valores de Paraguay
Slovak Republic	1993	Bratislava Stock Exchange
Kyrgyz Republic	1994	Kyrgyz Stock Exchange
Uzbekistan	1994	Tashkent Stock Exchange
Zambia	1994	Lusaka Stock Exchange
Latvia	1995	NASDAQ OMX Riga
Moldova	1995	Moldova Stock Exchange
Romania	1995	Bursa de Valori Bucure□ ti
West Bank & Gaza	1995	Palestine Exchange
Cyprus	1996	Cyprus Stock Exchange
Estonia	1996	NASDAQ OMX Tallinn
Kazakhstan	1996	Kazakhstan Stock Exchange
Malawi	1996	Malawi Stock Exchange
Qatar	1997	Qatar Exchange
Tanzania	1998	Dar es Salaam Stock Exchange
Uganda	1998	Uganda Securities Exchange
Georgia	1999	Georgian Stock Exchange
Papua New Guinea	1999	Port Moresby Stock Exchange
U.A.E.	2000	Abu Dhabi Securities Exchange/ Dubai Financial Market
Vietnam	2000	Ho Chi Minh City Stock Exchange
Armenia	2001	NASDAQ OMX Armenia
Guyana	2003	Guyana Stock Exchange

overlap in the period 1988-1995. Although the values of our three success measures taken from these two databases are generally highly consistent, we find some slight differences in individual observations, in which cases we take the average values across the two databases.[7] For countries that opened more than one exchange over our sample period (such as China's Shanghai and Shenzhen exchanges; both established 1989), we aggregate success measures across exchanges to obtain indicators of a country's overall stock market development.

2.3.1.2. Determinants of nascent market success

As shown in Table A.1 of the Appendix, we collect data on more than 50 potential determinants of nascent market success. We categorize these variables into 13 main categories: economic indicators, openness indicators, public finance indicators, political indicators, legal indicators, financial indicators, demand and supply of capital indicators, technology and innovation indicators, demographic indicators, socio-cultural indicators, geographic indicators, stock exchange initiative, and market design indicators. Data on several of the collected variables are scarce. There is a trade-off between including as many potentially relevant determinants as possible in our regressions and the resulting decrease in degrees of freedom (due to the increasing number of variables as well as the decreasing number of observations as observations are dropped because not all variables are available for all markets and years). Although we acknowledge the potential importance of all the variables, we focus on the main groups of potential determinants discussed in Section 2.2. As a starting point for our analysis, we run exploratory regressions using all potential determinants one by one, and present the results in the Internet Appendix.

2.3.2. Methods

We use a variety of methods to answer the three main research questions in this paper: (1) how do nascent markets evolve in their initial stage of development; (2) is early success a necessary condition for long-term success; and (3) what are the determinants

[7] We dropped Macedonia from the sample because of its extreme values for turnover (above 1,000% in the initial years). Our main results are similar when we keep this market in the sample.

of long-term success? We use correlations, scatter plots, and cluster analysis to address question (1), necessary condition analysis to address question (2), and cross-sectional and panel regressions to address question (3). Since cluster analysis and necessary condition analysis are relatively new to the financial development literature, we briefly discuss these methods here.

2.3.2.1. Cluster analysis

We use cluster analysis (Sneath and Sokal, 1973) to assess whether two or more clusters of relatively less and more successful nascent markets can be distinguished after 20 years of trading based on the three success measures. To make sure each of the three measures have equal weight in the clustering, we standardize each of the success measures to the interval [0,1] across the whole period for the cluster analysis. We use the *k*-means method (Hartigan and Wong, 1979) to identify clusters. This method minimizes the within-cluster sum of squared distances to the center of the cluster along the three success measures. We follow the approach of Charrad, Ghazzali, Boiteau, and Niknafs (2014) to apply thirty different methods to determine the number of clusters, and use the number of clusters selected most often.

2.3.2.2. Necessary condition analysis

We use necessary condition analysis (NCA; Dul, 2016) to examine whether the early success of nascent markets is a necessary condition for long-term success. The approach of NCA is fundamentally different from the traditional sufficiency-based approach. Traditional paradigms of multi-causality presume that each determinant is sufficient to increase the outcome but none is necessary. In such paradigms, causality is additive and can be expressed in additive models, such as multiple linear regression. In the necessary but not sufficient paradigm, absence of the necessary determinant results in outcome failure, independently of the value of the other determinants. The necessary condition must be present for attaining an outcome, although its presence is not sufficient to guarantee that outcome. Traditional sufficiency-based approaches are not appropriate for testing such statements. For example, the coefficient of a certain determinant may be statistically equal to zero in a multiple linear regression model,

indicating that the determinant does not explain variation in the outcome, and yet this variable may be necessary for the outcome to realize.

To test whether high levels of each of the success measures are necessary conditions for attaining high levels of those measures in the long-term, we follow the method proposed by Dul (2016). We first plot each of our dependent variables (long-term values of success measures) on the y-axis against each of the independent variables (initial values of success measures) on the x-axis. We then evaluate whether an independent variable is a necessary condition for a dependent variable by examining whether there is an empty area (i.e., without observations) in the top left corner of the corresponding scatter plot, because such an empty area suggests that high values for the dependent variable cannot be attained in case of low values for the independent variable. The larger the empty area, the stronger the evidence for a necessary condition.

The "effect size" is defined as the ratio between the surface of this empty area and the surface of the "scope" of the analysis, which corresponds to total area of the scatter plot, where the borders of this area are defined by the minimum and maximum values of the dependent and independent variables. There are two ways to determine the area of the empty area in the top left corner of the scatter plot, both of which are based on a "ceiling line" that defines the border of the empty area. First, the "ceiling envelopment with free disposal hull" (CE-FDH) draws a ceiling line that connects the upper left observations in the scatter plot. In particular, this technique pulls an envelope (piece-wise linear function) along these observations using linear programming. Second, the "ceiling regression with free disposal hull" (CR-FDH) estimates a regression through the upper left observations. We compute effect sizes based on both techniques. Dul (2016) suggests that, generally, an effect size between 0.10 and 0.30 indicates the presence of a necessary condition. An effect size larger than 0.30 is considered strong evidence of a necessary condition. Furthermore, NCA allows us to calculate a "bottleneck table" for each of the dependent variables. This table displays the minimum percentage of the range of the independent variable (across all

observations in the sample) that is necessary to attain a given percentage of the range of the dependent variable.[8]

2.3.2.3. Regression analysis

In a final set of analyses, we use conventional regression methods to explore the factors that are associated with the success of nascent stock exchanges. Specifically, we use both cross-sectional regressions to gauge the importance of initial factors in explaining stock market development after 11 to 15 years and panel regressions including country and year fixed effects to gauge the within-country relationship between time-variant macroeconomic factors and stock market development. For the panel regressions, we cluster error terms on the country level to thus take into account correlations of error terms over time within countries due to unobservable factors.

2.4. Empirical results

In this section, we first provide a general analysis of the development of nascent markets (Section 2.4.1). We then present a cluster analysis to distinguish between less and more successful markets (Section 2.4.2) and a necessary condition analysis of the question whether long-term success requires early success (Section 2.4.3). In Section 2.4.4, we run regressions to study the broader determinants of nascent markets success.

2.4.1. How do nascent markets evolve in their initial stage of development?

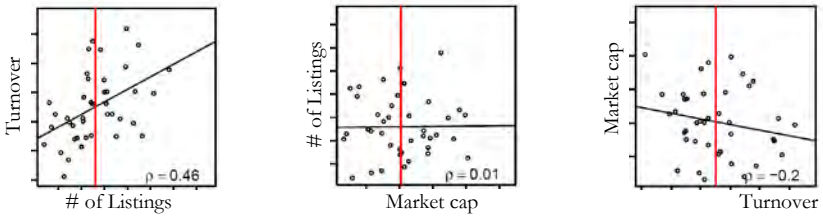
To obtain a first impression of how nascent markets develop in their first years of activity and of whether the different success measures develop in a similar way, Figure 2.3 presents pairwise scatter plots of the three success measures in eight 5-year time intervals following market establishment. We first take logs of each of the three success measures to correct for skewness, and then take the average of the logs of the annual values of each measure within each 5-year interval to reduce noise. We keep a market

[8] We run NCA using the R-package available at https://cran.r-project.org/web/packages/NCA/index.html (downloaded November 2015). We note that just like in sufficiency-based approaches like regressions, endogeneity is a potential concern in NCA. Although reverse causation is not a problem in our application of NCA, the necessary conditions we identify could in part be driven by (unobserved) other factors.

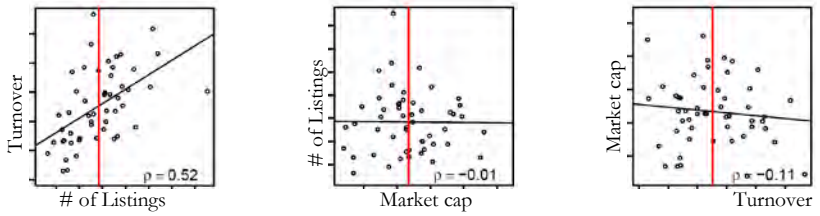
Figure 2.3. Scatter plots of nascent market success measures (5-year intervals after establishment)

This figure presents pairwise scatter plots of the three measures of nascent market success (number of listings, market cap to GDP, and turnover) in eight 5-year intervals after establishment in Panels A-G. Panel A presents the scatter plots of the success measures averaged 1-5 years after establishment (expressed in logs). Panels B-H present scatter plots for each of the subsequent seven 5-year intervals. Each scatter plot represents the relation between two success measures. Each point in the plot represents a different market. The average of the success measure on the x-axis is indicated by a vertical line. The scatter plots also show OLS regression lines. The correlation ρ between the measures is presented in the bottom right corner of the plot. Each panel is based on all markets for which data are available in that 5-year interval.

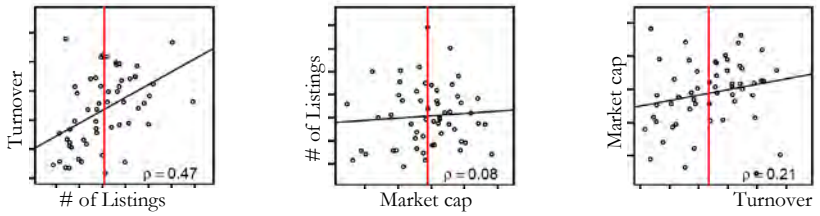
Panel A: 1-5 years after establishment (41 markets)



Panel B: 6-10 years after establishment (51 markets)



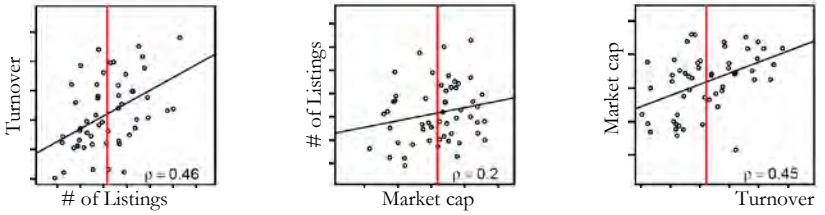
Panel C: 11-15 years after establishment (56 markets)



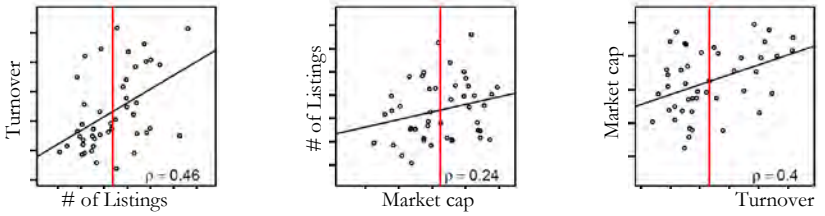
(continued on next page)

Figure 2.3. Scatter plots of nascent market success measures (continued)

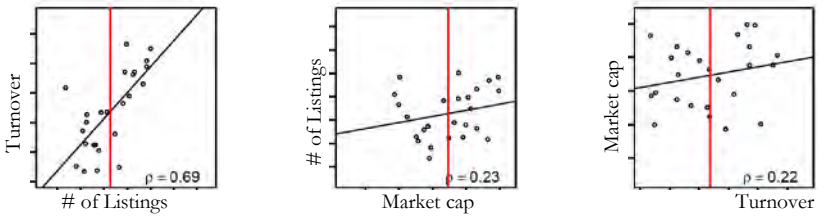
Panel D: 16-20 years after establishment (53 markets)



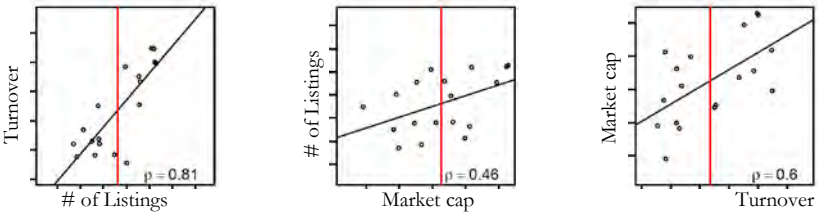
Panel E: 21-25 years after establishment (45 markets)



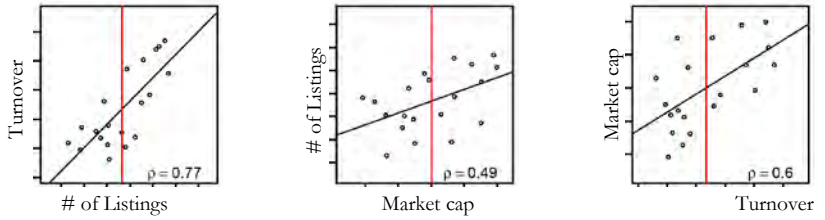
Panel F: 26-30 years after establishment (25 markets)



Panel G: 31-35 years after establishment (18 markets)



Panel H: 36-40 years after establishment (20 markets)



in the sample for a specific 5-year interval if we have at least one annual observation for each success measure for that market in that interval. Panel A of Figure 2.3 shows the first five years after establishment and Panels B-H show the subsequent 5-year intervals.

Since we aim to exploit the full amount of information on nascent market success in their first 40 years in this analysis, we also include markets that opened before 1975 – as long as they have data for the success measures in at least one of the eight 5-year intervals after establishment. In the most extreme case, Zimbabwe (the first country in Table 2.2) opened a stock exchange in 1946, and appears in our sample in Panel H, as we have at least one observation (three in total) for all three success measures over the period 1981-1985, the eighth 5-year interval after establishment of the Zimbabwe Stock Exchange. The number of markets included in each of the panels of Figure 2.3 ranges from 18 to 56 and is reported in the panel title.

The cross-country average of the success measure on the x-axis of the three scatter plots in each panel is depicted with a vertical line. We note that caution needs to be applied in direct comparisons of these averages across different panels, since they may be based on (somewhat) different samples. Nonetheless, the middle of the three scatter plots in Panels B-H of Figure 2.3 indicates that the average market cap to GDP of the nascent markets in our sample generally increases as markets mature. This confirms our hypothesis that markets tend to become more developed over time. However, in contrast to our hypothesis, the average number of listings and turnover barely change over the first 40 years of trading, as indicated by, respectively, the leftmost and rightmost scatter plots in Panels B-H. This could either be because most markets do not evolve in the first 40 years, or because the increase in number of listings and turnover on some markets is counterweighted by a decrease on other markets. We will show in the next subsection that the latter is the case. These initial findings provide pointers that growing success of nascent markets cannot be taken for granted once they have been established. Markets do not necessarily attract more listings and spur higher trading activity over time, although on average they do become larger in market

cap. We proceed by analyzing the correlations between the different success measures. The scatter plots in Panels A-H of Figure 2.3 also show regression lines and pairwise correlations (ρ) between the three success measures in each of the 5-year intervals. The correlation between the number of listings and turnover is high (around 0.5, see leftmost scatter plots) and quite stable throughout the first 40 years of activity. However, the correlation between market cap and both the number of listings and turnover (middle and rightmost scatter plots) is close to zero or even negative in the first three 5-year intervals. Some markets start out with very high turnover and relatively low market cap (e.g., Poland), while others start out with large market cap and low turnover (e.g., Jordan). After the first 15 years, these correlations increase and reach levels of around 0.5 towards the end of the 40 years. As Poland develops, its market cap quickly increases to match its high turnover. As Jordan develops, on the other hand, its level of market cap decreases to match an only slightly improved turnover. In sum, these findings indicate that different success measures can lead to different conclusions about the success of a market in the first 15 years after establishment (consistent with, e.g., Feyen, 2010). One should therefore take care to evaluate whether nascent markets have succeeded along all three dimensions of success only after this period, when correlations between the measures have become reliably positive.

2.4.2. Which nascent markets succeed and which ones fail?

The scatter plots in Figure 2.3 reveal some general patterns in the development of nascent markets, but they are not very informative about the large cross-sectional dispersion in nascent market success. In this section, we examine variation in success across markets. We proceed in two steps. First, we attempt to identify clusters of relatively less and more successful nascent markets based on the long-term values of the three success measures. Then, we examine the values of the success measures in the first five years for these clusters based on long-term success to gauge how the markets in the least and most successful clusters have developed over time. For these analyses, we use the common sample of 34 nascent markets for which values of the success measures are available in both the first (1-5 years) and fourth (16-20 years)

interval. We assess long-term success based on the period of 16-20 years after establishment because Figure 2.3 shows that correlations between the success measures are all positive and relatively stable after this period and because the number of nascent markets for which we have data declines rapidly after 20 years.

Table 2.3 presents summary statistics of the three success measures for each of these 34 markets, sorted by the first year of trading. The oldest stock market in this sample is Thailand (established 1975), and the youngest is Georgia (1998). The averages across markets of each success measure for the initial and final 5-year intervals are presented at the bottom of the table. Consistent with the patterns in Figure 2.3, the average number of listings does not change much across these periods (from 179 in the first 5-year interval to 167 in the fourth 5-year interval). Average turnover actually decreases in this sample (from 33% in the first 5-year interval to 22% in the fourth interval).However, these changes over time in the average number of listings and turnover across markets conceal the large differences in the development of individual markets. The number of listings increases for 25 of the 34 markets, but these increases are outweighed by large decreases for the remaining 9 markets. Similarly, turnover increases for 13 markets and decreases for 21 markets. Confirming our previous findings, the only success measure that consistently increases over the first 20 years is market cap to GDP. The market cap increases from 12% of GDP on average in the first 5-year interval to 34% in the fourth 5-year interval, and increases for 30 of the 34 individual markets.

As a first step to analyze variation in success across markets, we apply cluster analyses to the three success measures for the 34 markets in this sample based on the period of 16-20 years after establishment. Following the approach of Charrad et al. (2014) to determine the number of clusters, we find that 12 methods propose two clusters, while other numbers of clusters are proposed by at most four methods. We conclude that the optimal number of clusters is two, and do a robustness check with three clusters.

Table 2.3. Success measures for 34 nascent markets included in cluster analysis (1-5 years and 16-20 years after establishment)

This table presents the year in which trading started, average number of listings, market capitalization (% GDP) and turnover ratio (%) in the first -year interval (1-5 years) and the fourth 5-year interval (16-20 years) after the year trading started, for all 34 nascent in the sample that have data on all three success measures in both intervals and are thus included in the cluster analysis. Countries are ordered by the year in which trading started. The bottom row presents averages for each measure and each interval. We refer to Table A.1 of the Appendix for variable definitions and data sources.

Country	1st year of trading	# of Listings		Market cap		Turnover	
		1-5y	*16-20y*	*1-5y*	*16-20y*	*1-5y*	*16-20y*
Thailand	1975	48.5	263.9	3.8	47.5	127.7	93.7
Jordan	1978	75	104.9	44.2	69.2	9.1	19.7
Kuwait	1985	60.3	85	52.5	82.2	20	60.2
Barbados	1987	14	19.3	16.4	104.8	3.1	9.3
Oman	1988	57.7	102.7	8.9	32.9	12.9	24.1
Botswana	1989	11	18.4	6.8	34	6.3	2.8
Mauritius	1989	24	54.7	14.8	43.4	3.7	6.1
China	1990	175.3	1477.3	6.4	77	181.5	130.3
Ghana	1990	15.7	31.1	9.8	15.8	4.3	3.4
Hungary	1990	30.3	43.7	2.2	26.3	14.6	83.5
Panama	1990	13	22.6	6.6	28.7	7.3	2
Swaziland	1990	107.3	5.8	18.7	8.2	7.7	0
Bulgaria	1991	21	366.6	0.4	22.6	7.4	18.9
Croatia	1991	61	241.9	2.8	49.6	8.5	6.7
Poland	1991	36.8	334.3	2.2	34.3	122.5	43.2
Russian Federation	1991	139.2	298	1.6	71.4	174	66.8
Malta	1992	5.5	17.1	8.6	49.5	10	2.5
Namibia	1992	10	8.4	7	8.2	9.9	2.6
Czech Republic	1993	1166.3	20.4	24.8	25.7	43.1	50
Lithuania	1993	472.7	38.6	8.6	16.2	21.5	8.9
Nepal	1993	90.3	168.6	4.9	32	3.9	4
Paraguay	1993	39.8	61	2.3	3.9	14.2	3
Slovak Republic	1993	568.7	114	7.6	6	104.9	2.8
Zambia	1994	7.3	18.8	9.6	18.3	1.7	4.2
Latvia	1995	56	32.8	4.6	4.9	21.2	2.4
Romania	1995	2335.6	1275	1.4	13.8	38	9.5
West Bank and Gaza	1995	21.5	40.2	17.7	31.2	16.6	26.9
Cyprus	1996	57.3	119.8	34.2	17.7	55	11.8
Estonia	1996	24.7	15.5	24.4	10.8	52.2	12.8
Kazakhstan	1996	19.3	66.5	9.7	31.4	2.5	4.6
Qatar	1997	20.7	42.3	36.9	79.7	6.7	16
Tanzania	1998	4.5	17	3.6	6.4	7.2	2
Uganda	1998	3	9	0.8	43.1	2.4	0.2
Georgia	1999	280.7	133	3.6	6	5.2	0.2
Average		**178.6**	**166.7**	**12.0**	**33.9**	**33.1**	**21.6**

Figure 2.4 presents the results of the cluster analysis. In Panel A, we plot all 34 nascent markets in this sample along the three dimensions of success as measured after 16-20 years. The x-axis represents the number of listings, the y-axis represents turnover, and the diameter of the circles represents the individual markets' market cap to GDP. The names of the corresponding countries are depicted in each circle. The plot shows a clear distinction between the two clusters of nascent markets that our analysis identifies (indicated in different colors): a cluster of markets with a relatively high number of listings, large market cap, and high turnover, and a cluster of markets with relatively low values for each of these measures. China and Swaziland are the two extremes along the three dimensions of success. China has the most successful stock market, with an average of 1,477 listed companies (Shanghai and Shenzhen combined), market cap representing 77% of GDP, and turnover of 130% over the period of 16-20 years.[9] Swaziland is the least successful market, with an average of 6 listed companies, market cap representing 8% of GDP, and almost no trading activity (turnover is close to 0%) in the fourth 5-year interval after establishment. Figure I.1 in the Appendix depicts the geographic distribution of the markets in the different clusters.[10]

The two vertical lines in the plot in Panel A of Figure 2.4 represent the average number of listings for each cluster. The two horizontal lines represent the average turnover for each cluster. The two circles at the bottom right of the graph represent the average market cap to GDP for each cluster. On average, the number of listings

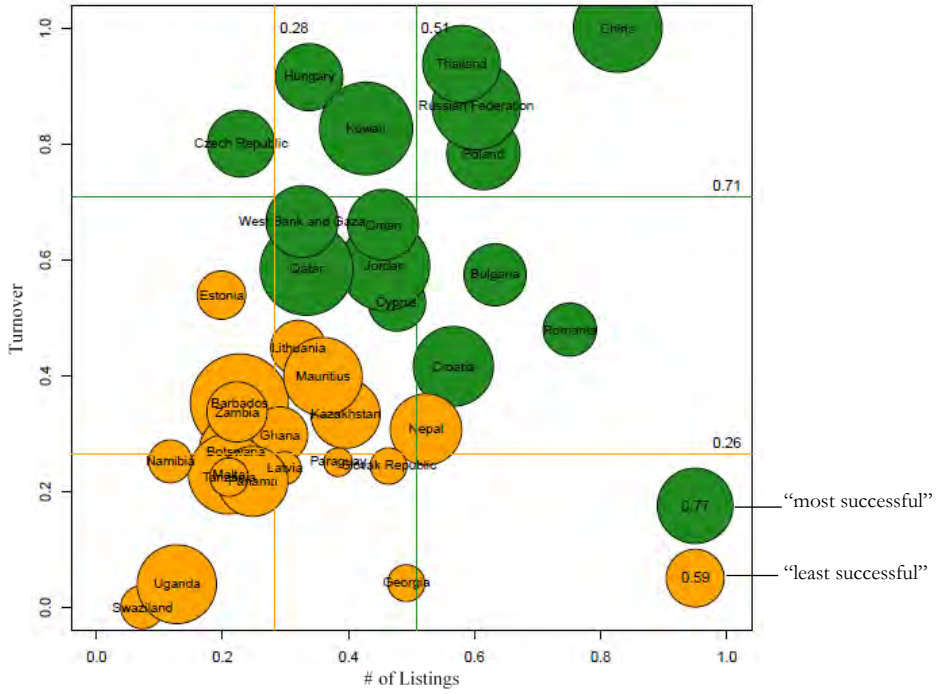
[9] As a comparison, in 2015, the combined number of listings on all U.S. stock exchanges was 4,381, with an aggregate market cap to GDP of 140%, and an aggregate turnover of 165%.

[10] As a robustness check, we redo the cluster analysis using four different ways of scaling the number of listings. Scaling by log population or by log GDP does not alter the results. When scaling by population or by GDP, the difference in the average (scaled) number of listings after 16-20 years across the two clusters is less significant, which makes the classification of some countries as "successful" less clear-cut. However, the allocation of countries between the two clusters remains by-and-large the same. We present these results in Figure I.2 of the Internet Appendix. As a further robustness check, we also use three instead of two clusters. Figure I.3 of the Internet Appendix shows that the same markets are classified as successful, but the least successful markets with very low market cap to GDP are identified as a separate cluster. Overall, our conclusions are the same.

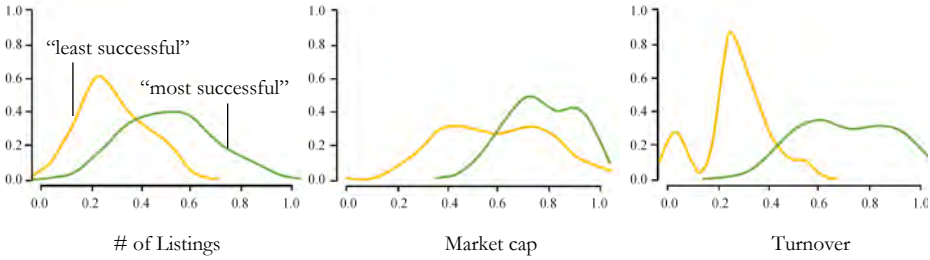
Figure 2.4. Cluster analysis of nascent market success (16-20 years after establishment)

This figure shows the cluster analysis results based on the three measures of nascent market success (number of listings, market cap to GDP, and turnover) over the period 16-20 years after establishment, yielding a cluster of "least successful" markets and a cluster of "most successful" markets after 16-20 years. The sample includes 34 markets. Success measures are expressed in logs and then standardized to the interval [0,1] across the whole period 1-20 years after establishment to facilitate comparison across measures and time periods. The plot in Panel A presents depicts the position of each market along the three dimensions of success after 16-20 years: the x-axis represents number of listings, the y-axis represents turnover, and the diameter of the circle represents market cap. The horizontal lines indicate the average turnover of each cluster, the vertical lines represent the average number of listings of each cluster, and the circles in the bottom right corner represent the average market capitalization of each cluster. Panel B shows smoothed histograms of the success measures for each cluster (one spline for each cluster) after 16-20 years. We refer to Table A.1 of the Appendix for variable definitions and data sources.

Panel A: Plot of three success measures of least/most successful clusters after 16-20 years



Panel B: Histograms of three success measures of least/most successful clusters after 16-20 years



after 16-20 years is around 80% higher for the markets in the most successful cluster than for the markets in the least successful cluster (0.51 vs. 0.28).[11] The average market cap is 30% larger for the most successful markets (0.77 vs. 0.59), while average turnover is 170% higher (0.71 vs. 0.26). These numbers indicate that large differences arise in the success of nascent markets after 16-20 years, especially for number of listings and turnover. Such large differences can have considerable consequences for companies, investors, and economic development more generally, which underlines the importance of understanding the determinants of nascent market success.

These conclusions are supported by Panel B of Figure 2.4, which shows histograms of the three success measures for the clusters of least and most successful markets separately, and by Table 2.4, which tests for the statistical significance of the differences in the average success measures after 16-20 years across both clusters. The histograms show that, although there is also substantial variation in the success measures within each cluster, the cluster of most successful markets on average clearly scores better along all three dimensions of success than the cluster of least successful markets, especially for turnover. Table 2.4 shows that the difference in average values across the two clusters is highly statistically significant for all three success measures.

Next, to provide an initial analysis of how the least and most successful markets develop over time and of the extent to which long-term success is determined by early success, we study the initial success (first 5-year interval) of the markets included in the cluster analysis. Panel A of Figure 2.5 presents a similar three-dimensional plot of the success measures of the 34 markets as Panel A of Figure 2.4, but then based on the first five years after establishment. However, the colors of the circles representing the different countries still indicate whether the nascent markets in these countries were in the least or most successful clusters after 16-20 years. At first sight, it is hard to discern a clear pattern. Some markets that are part of the most successful cluster after 16-20

[11] We note that, as discussed in Section 2.3.2.1, each of the success measures has been standardized over the interval [0,1] across the whole period, facilitating comparison across the measures and across first and fourth 5-year intervals.

Table 2.4. Average success measures of least and most successful nascent markets (16-20 years after establishment)

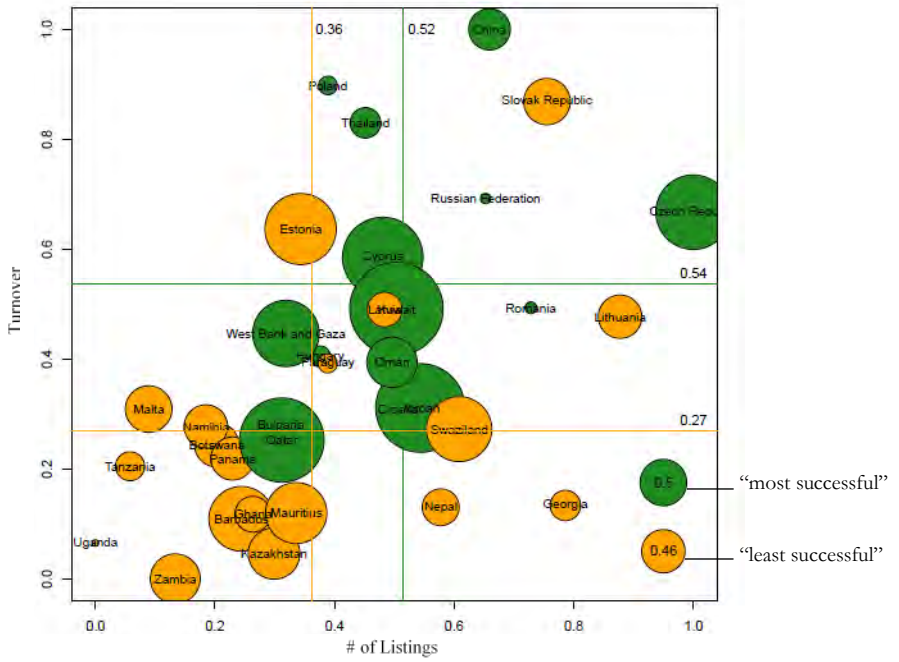
This table presents the results of *t*-tests of the significance of the difference in means of each of the three success measures (number of listings, market cap to GDP, and turnover) over the period 16-20 years after establishment between the two clusters of least and most successful nascent markets from Panel A of Figure 2.4. Success measures are expressed in logs and then standardized to the interval [0,1] across the whole period 1-20 years after establishment to facilitate comparison across measures and time periods. The clusters are formed based on the values of the three success measures over the period 16-20 years after establishment. We refer to Figure 2.4 for more information on the cluster analysis. This table reports the mean of each success measure for each cluster, the difference between the means over the period 16-20 years after establishment, and the *p*-value of the difference. ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively. We refer to Table A.1 of the Appendix for variable definitions and data sources.

	Mean "most successful" cluster	**Mean "least successful" cluster**	**Difference (*p*-value)**
Number of listings	0.51	0.28	0.23*** (0.000)
Market cap	0.77	0.59	0.18*** (0.004)
Turnover	0.71	0.26	0.45*** (0.000)

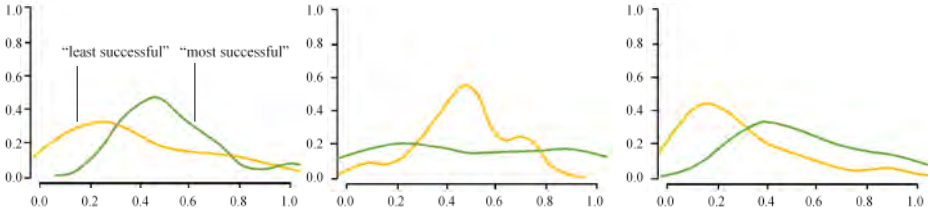
Figure 2.5. Success measures of least/most successful clusters (1-5 years after establishment)

This figure shows the three measures of nascent market success (number of listings, market cap to GDP, and turnover) over the period 1-5 years after establishment for the clusters of least and most successful nascent markets from Panel A of Figure 2.4. The clusters are formed based on the values of the three success measures over the period 16-20 years after establishment. The sample includes 34 markets. Success measures are expressed in logs and then standardized to the interval [0,1] across the whole period 1-20 years after establishment to facilitate comparison across measures and time periods. The plot in Panel A presents depicts the position of each market along the three dimensions of success after 1-5 years: the x-axis represents number of listings, the y-axis represents turnover, and the diameter of the circle represents market cap. The horizontal lines indicate the average turnover of each cluster, the vertical lines represent the average number of listings of each cluster, and the circles in the bottom right corner represent the average market capitalization of each cluster. Panel B shows smoothed histograms of the success measures for each cluster (one spline for each cluster) after 1-5 years. We refer to Table A.1 of the Appendix for variable definitions and data sources.

Panel A: Plot of three success measures of least/most successful clusters after 1-5 years



Panel B: Histograms of three success measures of least/most successful clusters after 1-5 years



years (such as Qatar) have a comparatively low number of listings and turnover in the first five years, while some markets that start out with relatively high values for the success measures (such as Slovak Republic) end up in the cluster of least successful markets later.

One observation that does emerge from Panel A of Figure 2.5 is that markets with an insufficiently high initial number of listings and turnover in the first five years fail to make it into the cluster of most successful markets after 16-20 years: all the markets in the very bottom left of the graph are part of the least successful cluster. On the other hand, markets that start out small in terms of market cap to GDP, but with a relatively high number of listings and turnover from the outset (such as China) can still develop into markets that are successful along all three dimensions of success later on. These conclusions based on visual inspection are buttressed by the histograms in Panel B of Figure 2.5 and the tests for the statistical significance of the differences in the average success measures in the first 5-year interval across both clusters in Table 2.5. Markets that turn out to be successful after 20 years on average do not have a significantly greater market cap to GDP in the first five years of trading (neither statistically nor economically) than markets that end up in the cluster of least successful markets after 20 years. In contrast, the most successful markets after 20 years on average do already have more listings and a higher turnover in the first five years of trading than the least successful markets (from both a statistical and economic perspective). In the next subsection, we test more formally whether early success is necessary to attain long-term success.

2.4.3. Is early nascent market success a necessary condition for long-term success?

We use necessary condition analysis (NCA), as developed by Dul (2016), to assess the importance of initial success for long-term success. We start by plotting each of our dependent variables (number of listings, market cap, and turnover 16-20 years after establishment) on the y-axis against the independent variables (number of listings,

Table 2.5. Average success measures of least and most successful nascent markets (1-5 years after establishment)

This table presents the results of *t*-tests of the significance of the difference in means of each of the three success measures (number of listings, market cap to GDP, and turnover) over the period 1-5 years after establishment between the two clusters of least and most successful nascent markets from Panel A of Figure 2.4. Success measures are expressed in logs and then standardized to the interval [0,1] across the whole period 1-20 years after establishment to facilitate comparison across measures and time periods. The clusters are formed based on the values of the three success measures over the period 16-20 years after establishment. We refer to Figure 2.4 for more information on the cluster analysis. The table reports the mean of each success measure for each cluster, the difference between the means over the period 1-5 years after establishment, and the *p*-value of the difference. ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively. We refer to Table A.1 of the Appendix for variable definitions and data sources.

	Mean "most successful" cluster	**Mean "least successful" cluster**	**Difference (*p*-value)**
Number of listings	0.52	0.36	0.16** (0.051)
Market cap	0.50	0.46	0.04 (0.728)
Turnover	0.54	0.27	0.27*** (0.002)

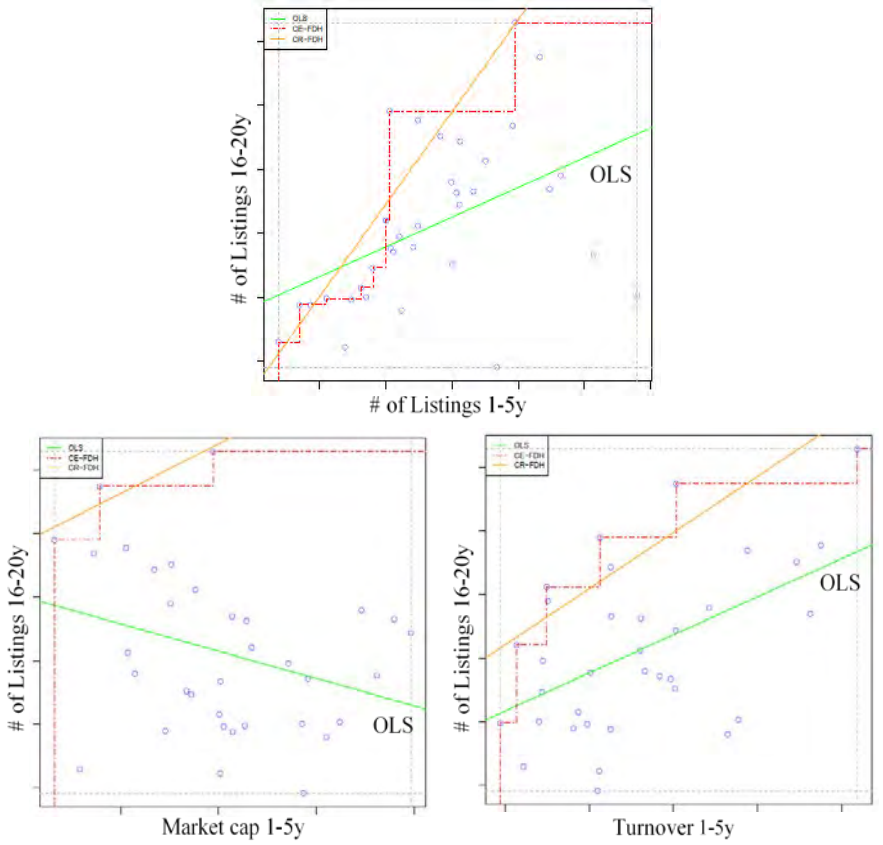
market cap, and turnover after 1-5 years) on the x-axis in Panel A of Figures 2.6-2.8. Since NCA determines whether condition *x* is a necessary condition for outcome variable *y* in a univariate way, this yields nine (3×3) scatter plots. Each scatter plots shows the observation for each of the 34 nascent markets in this sample in small circles, two ceiling lines demarcating the empty area in the top left corner of the scatter plot (based on both the CE-FDH and the CR-FDH method, see Section 2.3.2.2), and – for comparison purposes – a simple OLS regression line. As described in Section 2.3.2.2, the "effect size" is defined as the ratio between the surface of the empty area and the surface of the total area of the scatter plot. Panel B of Figures 2.6-2.8 present the "bottleneck tables" corresponding to the necessary conditions for each of the dependent variables. These tables indicate the percentage of the range of values of each independent variable that is necessary to attain the corresponding percentage of the range of the dependent variables, and also show the effect sizes based on both the CE-FDH and the CR-FDH method.

Figure 2.6 shows that a high initial number of listings as well as high initial turnover are necessary conditions for attaining a high number of listings in the long-term. The empty areas at the top left of the first and third scatter plots in Panel A are large relative to the total area (CE-FDH effect sizes of 0.34 and 0.25, respectively, and CR-FDH effect sizes very similar; see Panel B). The bottleneck table in Panel B indicates that substantial percentages of the range of number of listings and turnover in the first five years need to be attained in other to attain a high number of listings after 16-20 years (expressed as a percentage of the range of values of the number of listings after 16-20 years across all 34 markets in this sample). For example, for a market to attain a number of listings at the 50th percentage or better of the range of values of number of listings after 16-20 years across markets, it must attain a number of listings at the 31st percentage of the range of values of number of listings after 1-5 years across markets (first column of Panel B). Similarly, to attain a number of listings at 80% or better of the range of number of listings after 16-20 years, the number of listings after 1-5 years needs to be at least 65.9% of the range of that variable in that 5-year interval across the

Figure 2.6. Necessary condition analysis of number of listings (16-20 years) as dependent variable

This figure presents the results of necessary condition analysis (NCA) for the number of listings. Panel A shows scatter plots of the number of listings over the period 16-20 after establishment as dependent variable (y-axis) and three different independent variables (x-axis, from left to right: number of listings over 1-5 years after establishment, market cap over 1-5 years, and turnover over 1-5 years) for the 34 markets included in the analysis. Success measures are expressed in logs. The dotted lines at the outer border of each plot indicate the "scope" of the analysis (defined by the minimum and maximum values of the dependent and independent variables). The dash-dot line (step function) represents the "ceiling line" based on the "ceiling envelopment with free disposal hull" (CE-FDH) method. The diagonal line in the upper left corner represents the ceiling line based on the "ceiling regression with free disposal hull" (CR-FDH) method. The plots also show OLS regression lines. Panel B presents the "bottleneck table" of the necessary conditions for attaining a high number of listings. The first column represents the different percentages of the range of the number of listings (16-20 years). Each of the other columns represents the percentage of the range of values of each independent variable that is necessary to attain the corresponding percentage of the range of the number of listings ("NN" stands for "Not necessary"). The bottom row shows effect sizes (based on the ceiling line using the CE-FDH and CR-FDH methods), where + and ++ indicate evidence and strong evidence of a necessary condition, respectively (Dul, 2016). We refer to Section 2.3.2.2 for a discussion of NCA and to Table A.1 of the Appendix for variable definitions and data sources.

Panel A. Scatter plots of number of listings (16-20 years) vs. initial success measures (1-5y)



(continued on next page)

Figure 2.6. Necessary condition analysis of number of listings (16-20 years) as dependent variable (continued)

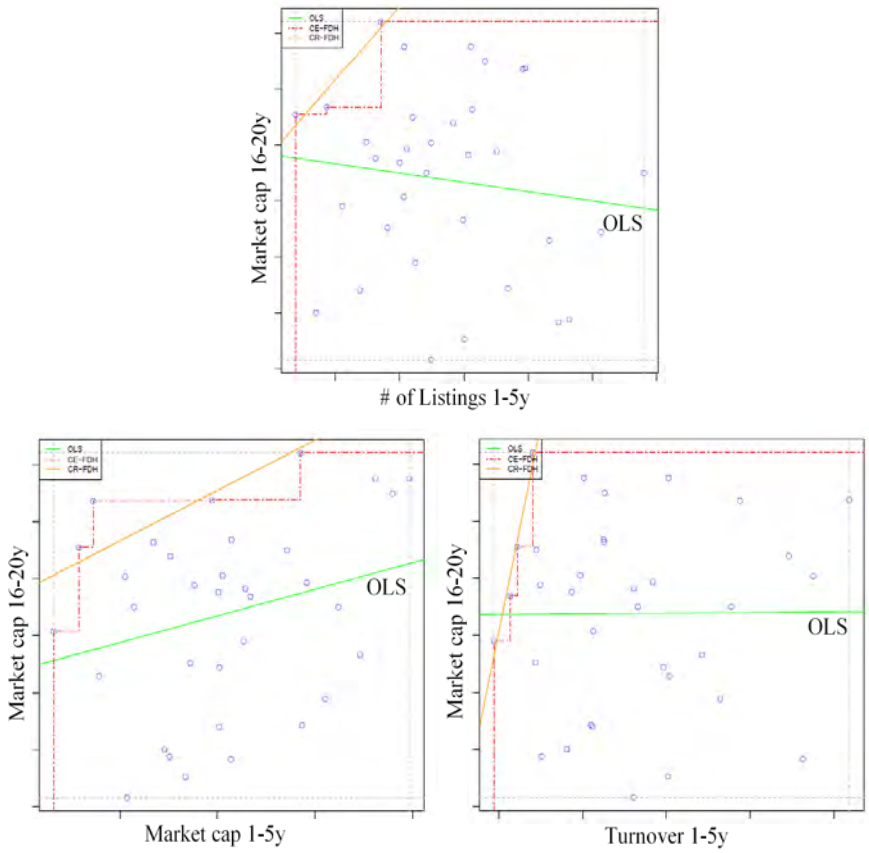
Panel B. Bottleneck table of necessary conditions for number of listings (16-20 years)

# of Listings (16-20y)	# of Listings (1-5y)	Market cap (1-5y)	Turnover (1-5y)
0	NN	NN	NN
10	5.8	NN	NN
20	23.0	NN	4.6
30	29.9	NN	4.6
40	29.9	NN	4.6
50	31.0	NN	13.0
60	31.0	NN	27.9
70	31.0	NN	27.9
80	65.9	12.7	49.3
90	65.9	44.5	100.0
100	65.9	44.5	100.0
Effect size:			
CE-FDH	0.34++	0.07	0.25+
CR-FDH	0.32++	0.05	0.24+

Figure 2.7. Necessary condition analysis of market cap (16-20 years) as dependent variable

This figure presents the results of necessary condition analysis (NCA) for market cap to GDP. Panel A shows scatter plots of market cap over the period 16-20 after establishment as dependent variable (y-axis) and three different independent variables (x-axis, from left to right: number of listings over 1-5 years after establishment, market cap over 1-5 years, and turnover over 1-5 years) for the 34 markets included in the analysis. Success measures are expressed in logs. The dotted lines at the outer border of each plot indicate the "scope" of the analysis (defined by the minimum and maximum values of the dependent and independent variables). The dash-dot line (step function) represents the "ceiling line" based on the "ceiling envelopment with free disposal hull" (CE-FDH) method. The diagonal line in the upper left corner represents the ceiling line based on the "ceiling regression with free disposal hull" (CR-FDH) method. The plots also show OLS regression lines. Panel B presents the "bottleneck table" of the necessary conditions for attaining a large market cap. The first column represents the different percentages of the range of market cap (16-20 years). Each of the other columns represents the percentage of the range of values of each independent variable that is necessary to attain the corresponding percentage of the range of market cap ("NN" stands for "Not necessary"). The bottom row shows effect sizes (based on the ceiling line using the CE-FDH and CR-FDH methods), where + and ++ indicate evidence and strong evidence of a necessary condition, respectively (Dul, 2016). We refer to Section 2.3.2.2 for a discussion of NCA and to Table A.1 of the Appendix for variable definitions and data sources.

Panel A. Scatter plots of market cap (16-20 years) vs. initial success measures (1-5y)



(continued on next page)

Figure 2.7. Necessary condition analysis of market cap (16-20 years) as dependent variable (continued)

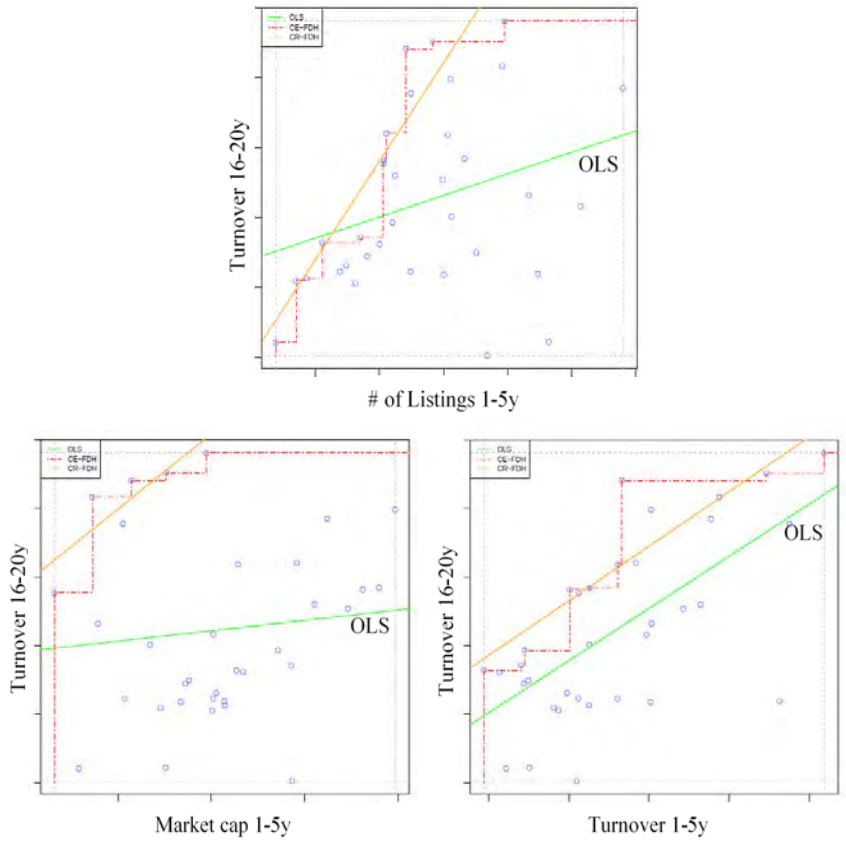
Panel B. Bottleneck table of necessary conditions for market cap (16-20 years)

Market cap (16-20y)	# of Listings (1-5y)	Market cap (1-5y)	Turnover (1-5y)
0	NN	NN	NN
10	NN	NN	NN
20	NN	NN	NN
30	NN	NN	NN
40	NN	NN	NN
50	NN	7.1	4.6
60	NN	7.1	6.5
70	NN	7.1	6.5
80	24.4	11.0	10.9
90	24.4	69.4	10.9
100	24.4	69.4	10.9
Effect size:			
CE-FDH	0.06	0.13+	0.05
CR-FDH	0.04	0.12+	0.03

Figure 2.8. Necessary condition analysis of turnover (16-20 years) as dependent variable

This figure presents the results of necessary condition analysis (NCA) for turnover. Panel A shows scatter plots of turnover over the period 16-20 after establishment as dependent variable (y-axis) and three different independent variables (x-axis, from left to right: number of listings over 1-5 years after establishment, market cap over 1-5 years, and turnover over 1-5 years) for the 34 markets included in the analysis. Success measures are expressed in logs. The dotted lines at the outer border of each plot indicate the "scope" of the analysis (defined by the minimum and maximum values of the dependent and independent variables). The dash-dot line (step function) represents the "ceiling line" based on the "ceiling envelopment with free disposal hull" (CE-FDH) method. The diagonal line in the upper left corner represents the ceiling line based on the "ceiling regression with free disposal hull" (CR-FDH) method. The plots also show OLS regression lines. Panel B presents the "bottleneck table" of the necessary conditions for attaining a high turnover. The first column represents the different percentages of the range of turnover (16-20 years). Each of the other columns represents the percentage of the range of values of each independent variable that is necessary to attain the corresponding percentage of the range of turnover ("NN" stands for "Not necessary"). The bottom row shows effect sizes (based on the ceiling line using the CE-FDH and CR-FDH methods), where + and ++ indicate evidence and strong evidence of a necessary condition, respectively (Dul, 2016). We refer to Section 2.3.2.2 for a discussion of NCA and to Table A.1 of the Appendix for variable definitions and data sources.

Panel A. Scatter plots of turnover (16-20 years) vs. initial success measures (1-5y)



(continued on next page)

Figure 2.8. Necessary condition analysis of turnover (16-20 years) as dependent variable (continued)

Panel B. Bottleneck table of necessary conditions for turnover (16-20 years)

Turnover (16-20y)	# of Listings (1-5y)	Market cap (1-5y)	Turnover (1-5y)
0	NN	NN	NN
10	5.8	NN	NN
20	5.8	NN	NN
30	13.4	NN	NN
40	31.0	NN	25.2
50	31.0	NN	25.2
60	31.9	11.0	39.4
70	37.6	11.0	40.5
80	37.6	11.0	40.5
90	37.6	22.5	40.5
100	65.9	44.5	100.0
Effect size:			
CE-FDH	0.27+	0.08	0.27+
CR-FDH	0.25+	0.06	0.28+

34 markets.

The bottleneck table also shows that considerable turnover in the first five years is needed to attain a high number of listings after 16-20 years. Most numbers in the third column of Panel B of Figure 6 are smaller than those in the first column, suggesting that in general high initial turnover is slightly less critical in attaining a high number of listings after 16-20 years than a high initial number of listings (third column of Panel B). However, to attain a number of listings at the 90th percentage or better of the range of values of number of listings after 16-20 years, a market needs to have initial turnover equal to the maximum turnover across markets. In contrast, there is little evidence that large initial market cap is a necessary condition for a high number of listings in the long term. The surface of the empty area is relatively small (CE-FDH and CR-FDH effect sizes only 0.07 and 0.05, respectively; see Panel B), and the bottleneck table in Panel B indicates that a certain initial market cap is only needed to attain a very high (close to the maximum) number of listings after 16-20 years.

Figure 2.7 presents the NCA results for market cap to GDP after 16-20 years as dependent variable. There is little evidence that high initial values for any of the three success measures are necessary conditions for attaining a large market cap after 16-20 years. The surface of the empty areas in the top left of each of the three scatter plots is relatively small (CE-FDH effects sizes of 0.06, 0.13, and 0.05, respectively; see Panel B) and the bottleneck table in Panel B indicates that relatively large market cap after 16-20 years can be attained without any condition on either initial number of listings, market cap, or turnover. There is some indication that attaining a very large market cap (close to the maximum) after 16-20 years requires some minimum level of market cap after 1-5 years.

Similar to Figure 2.6, Figure 2.8 shows that a high initial number of listings as well as high initial turnover are necessary conditions for attaining high turnover in the long-term. Both the scatter plots in Panel A and the bottleneck table in Panel B indicate that relatively high turnover after 16-20 years cannot be attained without considerable initial levels of number of listings and turnover. The effect sizes for initial number of listings

and initial turnover as necessary conditions for long-term turnover are both 0.27. Again, a high initial market cap is not a necessary condition for high turnover after 16-20 years, although very high levels of turnover (close to the maximum) after 16-20 years do not occur without a certain minimum initial market cap (44.5% of the range of initial market cap across markets, see second column of Panel B).

In sum, both cluster analysis and NCA indicate that a high initial number of listings and turnover are necessary conditions for a market to thrive in the long term. The initial market cap is not a necessary condition for long-term success. These findings suggest that it is important for newly established stock markets to ensure that the market is sufficiently liquid and offers sufficient opportunities for diversification early on to retain the opportunity for long-term success.[12]

2.4.4. What are the determinants of long-term nascent market success?

We are not only interested in the importance of initial success in determining long-term nascent market success. As discussed in Section 2.2.3, the academic literature examines a large number of other potential determinants of stock market development. In this section, we discuss the results of both cross-sectional and panel regressions to explain variation in the three measures of nascent market success using these determinants. We focus on a set of key variables related to the size and demographic structure of the country, as well as its economic development, legal environment, political environment, financial development, supply of capital, and the initiative to open the market (government or private). We distinguish between these variables as measured at the time of establishment ("initial conditions") and over the life of the market ("dynamic conditions").

As a first step, we run cross-sectional and panel regressions of the nascent market success measures on a large number (>50) of individual independent variables in the

[12] This does not necessarily imply that countries should wait for enough demand from companies and investors to develop before opening a stock market. Taking part in a regional stock exchange could be an alternative. Some authors (Irving, 2005; Piesse and Hearn, 2005) show that certain African countries integrated several markets into a single regional stock exchange to ensure more liquidity than if they would have acted on their own.

categories listed above (as well as other categories of potential determinants suggested by the literature, such as the openness and culture of the country), with a small number of control variables. We present the results of the exploratory regressions in Tables I.1 through I.3 of the Internet Appendix. We then choose a number of multivariate specifications of the cross-sectional and panel regressions based on a combination of the significance of the univariate results in these tables, the number of countries for which data are available for the independent variables in these multivariate specifications, and the correlations between the independent variables. We note that several of the univariate results in Tables I.1 through I.3 do not survive more complex specifications.

Table 2.6 presents the results of cross-sectional regressions of the long-term success measures (number of listings, market cap, and turnover over the period 11-15 years after establishment[13]) on the initial success measures (measured over the period of 1-5 years after establishment), initial conditions (measured over the period from two years before to two years after establishment), dynamic conditions (the growth in GDP and private credit to GDP over the first 15 years), and the initiative to open the stock market. These regressions thus focus on cross-country variation, ignoring market development over time within countries. For each of the three success measures, the table presents the estimation results for five regression models that include different combinations of the explanatory variables.

The most salient result in Table 2.6 is that all three measures of long-term nascent market success are positively related to the size of the banking sector at the time of market establishment, as measured by private credit to GDP. The coefficients on private credit to GDP are statistically significant in most specifications. We note that the lack of significance of this variable in some specifications might be due to the

[13] We use the period of 11-15 years after establishment to evaluate long-term success to include more markets in the sample (up to 40 markets in the cross-sectional regressions vs. 34 markets in the cluster analysis based on 16-20 years after establishment). When we redo the cluster analysis based on 11-15 years after establishment, only four countries (Croatia, Kazakhstan, Lithuania, and Slovakia) switch between the two clusters relative to Panel A of Figure 2.4.

Table 2.6. Cross-sectional regressions to explain long-term nascent market success (11-15 years after establishment)

This table presents the results of cross-sectional regressions of the three success measures (number of listings, market cap to GDP, and turnover) as the dependent variables on the initial success measures, "initial conditions," "dynamic conditions," and initiative to open a stock market as independent variables. The success measures as dependent variables are measured as the averages over the period 11-15 years after establishment of the stock market and are expressed in logs. The initial success measures (t0) as independent variables are measured as the averages over the period 1-5 years after establishment, also expressed in logs. Initial conditions (t0) are the average of log Private credit, Democracy, Civil law, log Population, log GDP per capita, and World GDP growth over the 5-year period around the year of establishment. Dynamic conditions (Δ) are the percentage growth rates in GDP and Private credit between the average of the five years around establishment and the average of the 11-15 year period after establishment. For each of the three success measures, columns present the estimation results of five regression models. Model (1) includes only the initial success measures as independent variables. Model (2) includes only the initial conditions as independent variables. Model (3) includes all variables from Models (1) and (2). Model (4) adds dynamic conditions to Model (3). Model (5) includes initial conditions, dynamic conditions, and two dummy variables that indicate whether the stock market was opened by government or private initiative (the baseline is joint government/private initiative). The table reports the coefficients and statistical significance based on White standard errors (***, **, and * indicate significance at the 1%, 5%, and 10% level), the number of observations, and the R2. We refer to Table A.1 of the Appendix for variable definitions and data sources.

(continued on next page)

Table 2.6 – Cross-sectional regressions to explain long-term nascent market success *(continued)*

	# of Listings (11-15y)					Market cap (11-15y)					Turnover (11-15y)				
	(1)	(2)	(3)	(4)	(5)	(1)	(2)	(3)	(4)	(5)	(1)	(2)	(3)	(4)	(5)
Initial success measures (t_0):															
# of Listings (1-5y)	0.41**		0.23	0.20		-0.05		-0.17	-0.17		0.08		0.04	0.05	
Market cap (1-5y)	-0.26		-0.11	-0.13		0.55***		0.44***	0.44**		0.31*		0.15	0.16	
Turnover (1-5y)	0.33**		0.26	0.23		0.07		-0.01	-0.02		0.65***		0.35	0.36	
Initial conditions (t_0):															
log Private credit		0.53	0.73**	1.01**	1.13***		0.25	0.40**	0.44**	0.25		0.85***	0.71**	0.68	0.66**
Democracy		-0.01	-0.00	-0.01	0.00		-0.00	-0.00	-0.01	0.00		-0.03	-0.04	-0.03	-0.02
Civil law		0.57	0.80	0.76	0.46		-0.76**	0.10	0.08	-0.07		0.14	0.14	0.15	0.51
log Population		0.06	-0.18	-0.24*	0.16		0.12	-0.01	-0.03	0.08		0.14	0.10	0.11	0.13
log GDP per capita		-0.07	-0.72**	-0.67**	-0.40		0.23*	-0.19	-0.17	0.07		0.06	-0.10	-0.11	0.09
World GDP growth		-0.27	0.11	-0.08	-0.38		0.26**	0.23	0.21	0.44***		-0.19	0.00	0.02	-0.34
Dynamic conditions (Δ):															
log GDP				-0.15	-1.51**				0.08	0.04				-0.09	0.35
log Private credit				0.60	0.67*				0.06	0.09				-0.03	0.00
Initiative to open stock market:															
Government initiative					1.22***					0.57*					0.49
Private initiative					2.89***					-1.62***					-1.00
# observations	40	38	28	28	25	40	38	28	28	25	40	38	28	28	25
R^2	0.40	0.26	0.65	0.69	0.78	0.39	0.45	0.67	0.67	0.68	0.43	0.50	0.63	0.63	0.69
Robust SE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES

limited statistical power in these regressions, which include up to 11 explanatory variables and some of which are based on as few as 25 observations. This conjecture is supported by the observation that the magnitude of the coefficient on private credit to GDP is fairly stable across model specifications, even in cases where statistical significance weakens.

The economic magnitudes of the coefficients on private credit to GDP at the time of market establishment are substantial. Based on the coefficient estimates in regression model (3), a 1% higher private credit is associated with a 1% higher number of listings, a 0.4% greater market cap to GDP, and a 0.7% higher turnover after 11-15 years. The economic magnitudes of the coefficients on private credit are similar in models (4) and (5), with the possible exception of the coefficient on private credit in model (5) for market cap as success measure. This coefficient, which is not significant but based on a regression with 10 explanatory variables and only 25 observations, suggests that a 1% higher private credit is associated with a 0.25% greater market cap to GDP (compared to 0.4% based on model (3)).

Although regression model (1) in Table 2.6 suggests that initial success along one or more dimensions is a sufficient condition for long-term success, most of these effects disappear when we include other explanatory variables in models (3) and (4). The only exception is that the effect of initial market cap on long-term market cap remains significant. Although the previous subsection presented only weak evidence that initial market cap is a necessary condition for attaining a large market cap to GDP in the long-run, Table 2.6 thus indicates that larger initial market cap is a sufficient condition for larger long-term market cap. We find no such evidence for number of listings and turnover when including other explanatory variables.

None of the other initial or dynamic conditions included in Table 2.6 are reliably related to long-term nascent market success, either across specifications by measure or across measures. In particular, we note that none of the structural variables included in our regressions (democracy, legal origin, and population size) seem to contribute to explaining long-term nascent markets success. Statistical significance of the coefficients

is weak and the magnitudes of the coefficients vary considerably across specifications. There is some indication that nascent markets that were established in a period of high world GDP growth tend to have a greater market cap to GDP ratio after 11-15 years, but such an effect is not observed for number of listings and turnover.

In model (5) in Table 2.6, we assess the role of the origin of the initiative to open the stock exchange (government, private, or both) on long-term success. The reference category is joint private-government initiative. We find some evidence that the origin of the initiative matters for long-term nascent market success, but it depends on the success measure. Nascent markets established on private initiative have a higher number of listings, but a smaller market cap to GDP after 11-15 years than markets established on joint private-government initiative. On the other hand, markets established on government initiative have both a higher number of listings and a greater market cap to GDP. Turnover after 11-15 years is not significantly related to initiative. These results suggest that private initiative tends to favor a higher number of smaller firms listing on the exchange, but also that neither private nor government initiative is associated with unequivocally "better" outcomes of the long-term success measures along all three dimensions.

Taken together, Table 2.6 shows that initial success and initial conditions explain more than 60% of the variation in long-term success. The most reliable determinant of success within these two categories is the development of the banking sector at the time of nascent market establishment. This result suggests that a well-developed banking sector is an important condition for long-term financial market development, possibly because banks provide a range of services (such as savings and investment accounts, brokerage, analyst reports, underwriting) that are crucial for stock markets to flourish. This conclusion accords well with prior research that highlights the complementarities between banks and financial markets (Boyd and Smith, 1996; Beck and Levine, 2004; Demirgüç-Kunt, Feyen, and Levine, 2011)

In Table 2.7, we broaden the scope of our analysis of the determinants of nascent markets success by presenting the results of panel models with annual data to explain

the development of the three different success measures over the first 15 years of trading after establishment. These panel models allow us to analyze the time-series development of the success measures within countries, and to control for unobserved heterogeneity across countries and years (or omitted variables) using country and time fixed effects in some of the specifications. Again, we distinguish between initial success measures, initial conditions, and dynamic conditions as three different categories of potential determinants of success. For each success measure, the table presents the estimation results for four panel regression models. Model (4) includes both country and year fixed effects, and thus excludes initial success measures and initial conditions, which do not vary over time.

The results for initial success measures would seem to indicate that high values for each of the three success measures are sufficient conditions for later success according to the same measure. However, we note that, relative to Table 2.6, these results are not driven by success after 11-15 years only, but rather by the development of the success measures in the short- and medium-term. In other words, these results do not affect our prior conclusion that number of listings and turnover are necessary but not sufficient conditions for long-term success.

The results for initial conditions confirm the important role of banking sector development around the time of nascent market establishment for the market's development later on. The coefficient on private credit to GDP is positive and statistically significant in all nine panel regressions reported in Table 2.7 that include this variable, although its magnitude is somewhat attenuated relative to the cross-sectional regressions. None of the other initial conditions display a consistent relation with the development of nascent market success. We now find some significant coefficients on the civil law dummy, but they are not consistent with the law and finance literature in which common law countries have a greater number of stock exchange listings, and they are also not consistent across either model specifications or success measures. Similar conclusions hold for population, GDP per capita, and world GDP growth.

Table 2.7. Panel regressions to explain development of nascent market success (1-15 years after establishment)

This table presents the results of panel regressions of the three success measures (number of listings, market cap to GDP, and turnover) as the dependent variables on the initial success measures, "initial conditions," and "dynamic conditions." The success measures as dependent variables are measured as the moving averages of 5-year windows in the first 15 years after establishment of the stock market and are expressed in logs. The initial success measures (*to*) as independent variables are measured as the averages over the period 1-5 years after establishment, also expressed in logs. Initial conditions (*to*) are the average of *log Private credit*, *Democracy*, *Civil law*, *log Population*, *log GDP per capita*, and *World GDP growth* over the 5-year period around the year of establishment. Dynamic conditions are the percentage growth rates in *GDP* and *Private credit* between the average of the five years around establishment and the average of the 5-year period that is lagged one year relative to the period over which the dependent variables are measured, and the level of *National savings*, *Trade openness*, *Control of corruption*, *Law and order*, *Insider trading laws*, *log GDP*, and *log Private credit* measured as averages of the 5-year period that is lagged one year relative to the period over which the dependent variables are measured. For each of the three success measures, columns present the estimation results of four regression models. Model (1) includes initial success measures and initial conditions. Model (2) adds lagged growth in *GDP* and *Private credit*. Model (3) includes initial conditions and select dynamic conditions. Model (4) includes country and year fixed-effects and select dynamic conditions. The table reports the coefficients and statistical significance based on standard errors clustered by country (***, **, and * indicate significance at the 1%, 5%, and 10% level), the number of observations and countries included in each model, and the R^2. We refer to Table A.1 of the Appendix for variable definitions and data sources.

(continued on next page)

Table 2.7 – Panel regressions to explain development of nascent market success *(continued)*

	# of Listings				Market cap				Turnover			
	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)
Initial success measures (t_0):												
# of Listings (1-5y)	0.50***	0.49***			-0.09*	-0.10*			0.11	0.11		
Market cap (1-5y)	-0.08	-0.07			0.61***	0.60***			0.06	0.04		
Turnover (1-5y)	0.21*	0.21*			-0.02	-0.03			0.63***	0.62***		
Initial conditions (t_0):												
log Private credit	0.46***	0.46***	0.43*		0.25**	0.30***	0.26*		0.25*	0.28*	0.53***	
Democracy	-0.00	-0.00	0.04		-0.00	-0.00	0.02		-0.01	-0.01	-0.04	
Civil law	0.60*	0.60*	0.53		0.04	0.01	-0.83**		0.18	0.16	0.33	
log Population	-0.14**	-0.15***	0.07		0.01	-0.00	0.07		0.05	0.05	0.13	
log GDP per capita	-0.47***	-0.46***	0.30		-0.08	-0.07	0.48**		-0.06	-0.05	0.05	
World GDP growth	0.01	0.00	-0.30		0.20**	0.18**	0.20		0.12	0.12	-0.32	
Dynamic conditions:												
GDP (Δ, t-1)		0.84**	0.04			0.82**	-0.50			-0.20	0.13	
Private credit (Δ, t-1)		0.18	-0.18			0.90***	-0.18			0.38	0.79	
National savings (t-1)			0.04**	0.04**			0.03***	0.02**			0.00	0.02
Trade openness (t-1)			-0.24	-0.54			0.40	0.31			-0.12	-0.21
Control of corruption (t-1)			-0.40***	-0.21*			-0.37***	-0.04			0.18*	-0.10
Law and order (t-1)			0.23	0.08			0.21	0.13			0.25*	0.28
Insider trading laws (t-1)				0.38				0.35				0.15
log GDP (t-1)				0.96**				0.64*				-0.95**
log Private credit (t-1)				-0.38				-0.11				-0.56*
# observations	349	345	199	234	345	341	198	233	333	330	184	219
# countries	28	28	30	34	28	28	30	34	28	28	28	33
Country F.E.	NO	NO	NO	YES	NO	NO	NO	YES	NO	NO	NO	YES
Year F.E.	NO	NO	NO	YES	NO	NO	NO	YES	NO	NO	NO	YES
Clustered S.E. (country)	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES

The results for dynamic conditions indicate that the lagged level of national savings (as a % of GNI) is the most reliable predictor of nascent market success in this category of potential determinants. This variable is positively and significantly related to the development of the number of listings and market cap to GDP, even when including country and year fixed effects. In particular, a 1% higher national savings is associated with a 2% higher number of listings and a 4% greater market cap to GDP. However, we find no such relation of this variable with turnover. We interpret this finding as consistent with the idea that the number of listings and aggregate market cap are in part determined by the potential demand from investors and thus the potential supply of capital to listed firms (Beck and Feyen, 2013). Somewhat surprisingly, a greater control of corruption is associated with fewer listings and a lower market cap, although - consistent with expectations - a less corrupt environment spurs trading activity.

In sum, Table 2.7 confirms our prior finding that banking sector development helps promote nascent markets success, and indicates that a high level of national savings (a demand factor) contributes to the successful development of nascent markets.

2.5. Conclusions

Given the importance of financial sector development for economic development, understanding the determinants of the successful establishment of public equity markets is relevant from both an academic and a policy perspective. In this paper, we analyze the development of 59 newly established ("nascent") stock markets in their 40 years of activity, and examine the determinants of long-term nascent market success. We are particularly interested in the question whether various "structural factors" and "policy factors" identified by the financial development literature as important determinants of financial market development can help explain the success of this sample of relatively understudied stock markets.

We find that nascent markets show very different levels of success, and that the correlation between the three success measures used in this paper (number of listings,

market cap to GDP, and turnover) steadily increases as markets become more mature. We show that a minimum initial number of listings and initial turnover are necessary, but not sufficient, conditions (Dul, 2016) for long-term nascent market success along these dimensions. We further find that the size of the banking sector at the time of nascent market establishment and the development of national savings over the life of the stock market help to understand variation in nascent market success.

Our finding that long-term success can be predicted quite accurately in the initial stage of a market's development suggests that stock markets thrive when they are established at the right stage of a country's development. In particular, our evidence indicates that having a well-developed banking sector in place before a new stock market is established boosts the likelihood that the market will thrive. On the other hand, we find no compelling evidence that structural factors such as the legal and political environment help explain nascent market success.

In future work, we intend to extend our analyses to broader indicators of the success of newly established stock markets, such as stock price efficiency and the contribution of nascent market development to capital accumulation, capital allocation efficiency, and potentially economic growth. Our understanding of the determinants of nascent markets success could also benefit from more in-depth analyses of individual markets, such as case studies.

Chapter 3.

The political consequences of financial market development: Evidence from the opening of African stock exchanges[1]

3.1. Introduction

Studying the consequences of financial market development has long been of interest to economists, policy makers, and society at large. So far, the financial development literature has primarily focused on the *economic* consequences, and documents a positive relation between financial development and economic growth, at least in developing and emerging economies.[2] This finding, together existing evidence that economic growth leads to the democratization of political institutions (Lipset, 1959,1994; Barro, 1996, 1999), suggests that financial development might be positively related to democracy. However, to our knowledge, there has been no comprehensive study on this relation yet. In this paper, we examine the *political* consequences of financial development, by studying how opening a stock exchange affects the allocation of political power and the development of democracy across the African continent.

[1] This Chapter is based on Albuquerque de Sousa, J.A., and M.A. van Dijk, 2018, "The political consequences of financial market development: Evidence from the opening of African stock exchanges.". We would especially like to thank Peter van Bergeijk for his comments and suggestions. We are grateful to Thomas Lambert and seminar participants at Erasmus University for helpful comments.

[2] See, e.g., Grossman and Stiglitz (1980), Diamond and Verrecchia (1982), Laffont and Tirole (1988), Scharfstein (1988), Devereux and Smith (1994), Obstfeld (1994), Bencivenga, Smith, and Starr (1996), and Greenwood and Smith (1997) for theoretical arguments. Empirical studies include Levine (1991), Demirgüç-Kunt and Levine (1996, 2001), Levine and Zervos (1998), and Beck and Levine (2004). Levine (1997, 2005) surveys the literature. Although recent studies point to important non-linearities in the relation between financial and economic development (e.g., Arcand, Berkes and Panizza, 2015), there is increasing consensus on the critical role of financial sector development for economic growth in low- and middle-income countries (Claessens and Feyen, 2006).

The political economy literature examines the interplay between financial development and political institutions (see Lambert and Volpin (2017) for a survey of the literature). Political institutions comprise the set of institutions that shape the allocation of *de jure* political power[3]. Examples of these institutions are electoral rules, political parties, and political systems (e.g., democracy vs autocracy). Most prior studies focus on showing that political institutions affect financial development because they shape the legal framework that regulates financial contracts (e.g. Pagano and Volpin, 2005). Despite that, the literature largely recognizes that political institutions are themselves affected by financial development, since financial development alters the balance of *de facto* political power within a society through changes in competition, economic development, and resource redistribution (Rajan and Zingales, 2003; Claessens and Perotti, 2007). The allocation of *de jure* political power, on the other hand, is ultimately the result of choices made by a country's population, and is therefore affected by the allocation of *de facto* political power (Acemoğlu and Robinson, 2001; Aghion, Alesina and Trebbi, 2004). Changes in the balance of *de facto* political power caused by financial development may, therefore, lead to changes in the allocation of *de jure* political power and redefinition of political institutions. We contribute to the political economy literature by providing evidence of this *feedback* effect.

According to the interest group theory of financial development (Rajan and Zingales, 2003), incumbent interest groups could oppose financial development because it breeds competition and restricts the incumbent elite's ability to extract market rents. An implicit assumption in this interest group theory of financial development is that interest groups anticipate that financial development alters the allocation of *de facto* political power in disfavor of the incumbent elite, and therefore oppose financial development, in an effort to maintain the status quo. If financial

[3] The political economy literature distinguishes *de jure* and *de facto* political power. *De jure* political power refers to political power originating from political institutions, such as electoral rules (e.g., heads of state and governments); *de facto* political power refers to political power possessed by interest groups as a result of their ability to organize, lobby or bribe politicians, organize contest of power, etc. (Acemoglu, Johnson, and Robinson, 2005).

market development negatively affects the political survival of incumbent leaders, they might oppose it to protect their own interests. Therefore, the main hypothesis of this paper is that financial market development negatively affects the political survival of incumbent leaders.

We examine the political consequences of stock market development by studying how opening a stock exchange affects the political survival of incumbent leaders and the development of democracy across the African continent. The opening of stock exchanges in Africa provides a rich empirical setting to study the political consequences of financial development. First, opening a stock exchange is an important step towards financial development, and is likely the result of a deliberate decision by political and economic incumbents. Second, 34 countries have opened a stock exchange since 1960, the "year of Africa" in which many countries achieved independence from their colonizing powers. At the same time, the opening of the 34 African stock exchanges in our sample was spread out over a period of 45 years, allowing a difference-in-differences approach in several of our analyses. Third, African countries exhibit a rich variation in terms of political institutions, despite their common colonization history, and only relatively recently becoming independent and starting to develop financially.

To test our main hypotheses, we collect data on the opening of all stock exchanges, on all 367 political leaders (including their age, date of appointment and date of removal from office), and on the level of democracy in all 54 countries on the African continent over the period 1960-2016, from stock exchanges' websites, the World Development Indicators database, the ARCHIGOS database, the Database of Political Institutions, and the Polity IV database.

Our first observation is that the majority of the newly opened African stock exchanges in our sample (20 out of 34) were opened in autocracies. At first sight, this may seem hard to reconcile with the interest group theory, because the theory would suggest that incumbent elites, who hold *de facto* political power, oppose financial development. However, as Rajan and Zingales (2003) point out, there may be exogenous forces muting incumbents' opposition and thus stimulating financial

development. In particular, incumbents may be pushed to open a country up to external trade and capital flows – thereby stimulating financial development – by specific circumstances exogenous to a country's domestic politics (for example, in small countries that are close to other countries or during times when important parts of the world are open).[4] If political leaders in autocracies would only open a stock exchange due to exogenous forces that push them to do so, we would expect the hypothesized negative effect of opening a stock exchange on political survival to be most pronounced for autocracies.

We proceed with a survival analysis of political incumbents, in which "failure" is defined as the replacement of a political leader, using Cox proportional hazards model and Weibull regressions (including country and year fixed effects and time-varying controls for the level of economic and financial development). In contrast to our main hypothesis, we find that, in a given year, political leaders that opened a stock exchange are 30-50% *less likely* to be replaced than political leaders that did not open an exchange. In other words, this finding suggests that financial market development *strengthens* the position of incumbents.

To test for different effects in democracies and autocracies, we split our sample according to the Polity score of the country.[5] We find that the ex-ante level of democracy of a country's political institutions moderates the effect of opening a stock exchange on political survival. However, we find that this effect is strong for autocracies, but considerably weaker and not statistically significant for democracies. In autocracies, political leaders who opened a stock exchange are 60% less likely to be replaced in a given year than political leaders that did not open an exchange. This finding does not support the view that stock exchange arise in autocracies solely because exogenous forces push incumbents to surrender their opposition to financial

[4] Other forces that may induce countries to open a stock exchange could include international coercion and the mimicry of peers (Weber, Davis, and Lounsbury, 2009).
[5] The Polity database is widely used in the political economy literature. The Polity score is an index (in a scale of -10 to 10) that quantifies the autocracy/ democracy level of a country based the competitiveness and openness of its political institutions, political participation, and the existence of checks on executive authority.

development. In fact, autocratic leaders seem to benefit from the opening of a stock exchange.

Borrowing from selectory theory (Bueno de Mesquita, Smith, Siverson, and Morrow, 2003; a similar theory is proposed by Acemoğlu and Robinson, 2001), we consider an alternative explanation for why stock exchanges might arise, even in autocracies, and positively affect political survival. According to selectorate theory, political leaders face multiple threats to their political survival. When societies are controlled by a rich elite, the disenfranchised poor may threaten revolution, especially when the opportunity cost is low. To ameliorate this threat, political leaders can increase the provision of public goods – goods that benefit the whole society. This may lead to democratization of political institutions, because the provision of public goods alters the distribution of resources in disfavor of the incumbent elite, and allows the disenfranchised poor to invest in human and physical capital (Aidt and Jensen, 2014; Law, Tan, and Azman-Saini, 2014; Aidt and Franck, 2015). At the same time, to maintain its position, the incumbent elite may threaten to mount a coup. To ameliorate this second type of threat to political survival, political leaders can increase the provision of private goods – goods that benefit the elite that helps political leaders stay in power. The political leader should, therefore, balance the provision of public and private goods in such a way that both the threat of a revolution and the threat of a coup are ameliorated.

Assuming that the main objective of political leaders is to survive in office (Bueno de Mesquita, Smith, Siverson, and Morrow, 2003), autocratic leaders may thus have incentives to open a stock exchange either because it benefits society at large (public goods view), or because it disproportionally benefits the elite that keeps the political leader in power (private goods view). Studying the effect of opening a stock exchange on the democratization of political institutions might offer insights into which of these two incentives explain why opening a stock exchange supports political survival. If a stock exchange benefits society at large, resources are redistributed more widely, which disfavors the incumbent elite. This could lead to more competitiveness for political

power (e.g. through the creation of new political parties) and openness of political institutions, as proposed by the interest group theory of financial development (Rajan and Zingales, 2003). The effect of opening a stock exchange on democratization should therefore be positive.

If, on the other hand, a stock exchange benefits only a select elite, the political power of the incumbent elite should be reinforced, and the effect of opening a stock exchange on democratization should be negative. The existing literature provides some arguments for why this could be the case. Recent evidence suggests that financial market development leads to increased inequality (Claessens and Perotti, 2007; Campbell, Ramadorai, and Ranish, 2018). Perotti and von Thadden (2006) argue that the median voter will support politically the development of stock markets over the banking sector only if it has sufficient participation in the stock market. The recent literature on "Crony capitalism" argues that the business class and the political class collude to maintain the *status-quo* and avoid competition (e.g. Krueger, 2002).

We conduct a difference-in-differences analysis in which we compare changes in the democracy level of countries that opened a stock exchange to changes in the democracy level of a matched control group of countries that did not open a stock exchange but were equally likely to open one given their size and level of economic, financial, and political development (in the year before the treated countries actually opened the stock exchange). We find that our dependent variable, the Polity score, increases both in the treatment and the control samples, indicating that the average country in both groups became more democratic over our sample period. However, in autocracies, this increase is significantly smaller (on average 1.38 points in the 3 years following the opening of the stock exchange, on a scale from -10 to 10) in countries that opened a stock exchange. In democracies, there is no significant effect.

In sum, our results suggest that opening a stock exchange benefits autocratic leaders by consolidating their political power and by thwarting democratization, which supports the view that, in autocracies, newly opened stock exchanges especially benefit the elite and thus effectively constitute private goods. Why are the effects insignificant

in democracies? Selectorate theory predicts that the effectiveness of providing private goods to the elite depends on the level of a country's democracy, since the size of the interest group that selects the political leader increases in the level of democracy. According to Bueno de Mesquita, Smith, Siverson, and Morrow (2003), this elite is a much smaller group in autocracies. Therefore, the provision of private goods may not be a viable alternative to ameliorate a threat to political survival in democracies, simply because the interest group that the political leader would need to benefit is too large.

The fact that African exchanges have a limited number of listed companies, market capitalization, and trading activity (Albuquerque de Sousa, Beck, van Bergeijk, and van Dijk, 2017) and the large income inequality in the continent (Odusola, Cornia, Bhorat, and Conceição, 2017), together with recent evidence that stock markets may increase inequality (Claessens and Perotti, 2007; Campbell, Ramadorai, and Ranish, 2018) are in line with the interpretation of newly opened stock exchanges as private goods. Moreover, several of the stock exchanges were the stage of large-scale privatizations (e.g., which are generally controversial and viewed as an opportunity to influence the allocation of political power (Biais and Perotti, 2002; Bortolotti and Faccio, 2009; Dinc and Gupta, 2011; González, Prem, and Urzúa, 2018).

To shed more light on the private goods view of newly opened stock exchanges, we collect data on the number of listings on these exchanges as well as the concentration of these listings in different economic sectors. If indeed the channel through which opening a stock exchange affects political institutions is the degree to which it disproportionally benefits a small elite, we would expect the effects of opening a stock exchange to be stronger when a smaller number of companies is listed, and when the listed companies are more concentrated in specific sectors. If stock markets can be used to access capital by many firms in several different industries, on the other hand, its benefits are more likely to be more widely distributed across society, and the political consequences of opening a stock exchange should be less pronounced. Using the difference-in-differences setting described above, we find that, indeed, the negative effect on democratization is larger when the number of listings is smaller, and when

they are more concentrated in specific sectors (particularly banking). Taken together, we interpret our evidence as consistent with the private goods view of newly opened stock exchanges in which incumbent autocratic leaders have incentives to open a stock exchange to strengthen their position and slow down democratization.

A large literature (e.g., La Porta, Lopez-de-Silanes, Shleifer and Vishny, 1997, 1998; Acemoğlu, Johnson, and Robinson; 2001, 2002; Acemoğlu and Johnson, 2005) emphasizes the importance of different institutions (including investor protection, property rights, and contracting institutions) for financial development.[6] The political economy literature argues that political institutions come first in the hierarchy of institutions that explain financial development because politicians are responsible for setting other institutions, and because they are more difficult to change and change more slowly than other types of institutions (e.g., Pagano and Volpin, 2001; Acemoğlu and Johnson, 2005; Pagano and Volpin, 2005; Perotti and von Thadden, 2006; Braun and Raddatz, 2008; Baltagi, Demetriades, and Law, 2009; Bebchuk and Neeman, 2010; Degryse, Lambert, and Schwienbacher, 2016[7]). We contribute to this literature by providing evidence of a feedback channel between financial development and political institutions. We also contribute to the political science literature, which models the political survival of leaders, and the political transition to democracy (Acemoğlu and Robinson, 2001; Bueno de Mesquita, 2005, Bueno de Mesquita, and Smith, 2010; Bueno de Mesquita and Smith, 2017), as well as the literature on democratization (Barro, 1996; Friedman, 2006).

3.2. Data and descriptive statistics

3.2.1. Stock exchanges

For all 54 African countries, we collect data over the period 1960-2016 on the year in which the stock exchange was opened, the year in which the first initial public offering (IPO) took place, and a set of variables that reflect the country's level of economic,

[6] See Glaeser and Shleifer (2002) and Beck and Levine (2005) for literature reviews.
[7] See Lambert and Volpin (2017) for a survey of the literature.

financial, and political development. The main sources of data are the stock exchanges' websites, the World Development Indicators database (World Bank), and the Polity IV database (updated in 2017). A description of all variables and their sources can be found in Panels A and B of Table B.1 in the Appendix.

We construct two samples: the full panel of 54 countries and a subsample of the 34 countries that officially opened a stock exchange after 1960. We use the Polity score in the year before the stock exchange was opened to further divide this subsample into two groups: autocracies (Polity score lower than or equal to zero) and democracies (Polity score greater than zero).

Table 3.1 presents all African countries that opened a stock exchange, the name of the stock exchange, the year in which the stock exchange was officially opened, and the year in which the first IPO took place. We split the countries into three groups: countries that opened a stock exchange before the end of 1960 (Panel A), countries that opened a stock exchange during the sample period (Panel B), and countries that had not officially opened a stock exchange by the end of 2016 (Panel C).

Panel A shows that six countries have opened a stock exchange before the end of 1960. Panel B shows that 34 countries opened a stock exchange during the sample period. Thirteen of those countries have joined efforts by opening two regional stock exchanges: the Bourse Régionale des Valeurs Mobilières and the Bourse des Valeurs Mobilières d'Afrique Centrale. Six countries have officially opened a stock exchange after 1960, but no domestic company was listed yet by the end of 2016. Panel C presents the 14 countries that had not officially opened a stock exchange by the end of 2016.

Figure 3.1 presents a map of the African continent in which countries are colored according to the categories of "autocracy" and "democracy". Twenty of the 34 countries in this subsample were autocracies; thirteen countries were democracies. Hence, the large majority of African countries that opened a stock exchange after 1960 were autocracies. This may seem surprising, since one might expect, based on the interest group theory of financial development (Rajan and Zingales, 2003; Claessens

Table 3.1. African stock exchanges sorted by year of opening.

This table presents the sample of 54 African countries in the 1961-2016 period. Panel A presents the countries that opened a stock exchange before the end of 1960. Panel B presents the countries that opened a stock exchange during the sample period. Panel C presents the countries that had not officially opened a stock exchange by the end of 2016. For each country, we report the name of the stock exchange, the year in which the stock exchange was officially opened, and the year in which the first initial public offering took place.

Panel A. Opened before the end of 1960			
Egypt, Arab Rep. (Egyptian Exchange, 1883), South Africa (Johannesburg Stock Exchange, 1887), Morocco (Casablanca Stock Exchange, 1929), Zimbabwe (Zimbabwe Stock Exchange, 1946), Kenya (Nairobi Stock Exchange, 1954), Nigeria (Nigerian Stock Exchange, 1960).			
Panel B. Opened 1961-2016			
Country	Name of exchange	Opening	First IPO
Tunisia	Bourse de Tunis	1969	1969
Botswana	Botswana Stock Exchange	1989	1989
Mauritius	Mauritius Stock Exchange	1989	1989
Ghana	Ghana Stock Exchange	1989	1991
Swaziland	Swaziland Stock Exchange	1990	1990
Namibia	Namibian Stock Exchange	1992	1992
Zambia	Lusaka Stock Exchange	1993	1994
Sudan	Khartoum Stock Exchange	1994	1994
Malawi	Malawi Stock Exchange	1995	1996
Benin	Bourse Régionale des Valeurs Mobilières	1996	2000
Burkina Faso			2009
Cote d'Ivoire			1998
Guinea-Bissau			-
Mali			2016
Niger			2003
Senegal			1998
Togo			1998
Tanzania	Dar Es Salaam Stock Exchange	1996	1998
Algeria	Algiers Stock Exchange	1997	1999
Uganda	Uganda Securities Exchange	1997	2000
Cape Verde	Cape Verde Stock Exchange	1998	2005
Mozambique	Mozambique Stock Exchange	1999	1999
Cameroon	Douala Stock Exchange	2001	2006
Cent. Afr. Rep.	Bourse des Valeurs Mobilières d'Afrique Centrale	2003	-
Chad			-
Congo, Rep.			-
Equatorial Guinea			-
Gabon			2013
Rwanda	Rwanda Stock Exchange	2005	2010
Libya	Libyan Stock Market	2007	2007
Sierra Leone	Sierra Leone Stock Exchange	2009	2009
Somalia	Somalia Stock Exchange	2011	2015
Seychelles	Trop-X	2012	2013
Angola	Bolsa de Dívida e Valores de Angola	2014	-
Panel C. No exchange by the end of 2016			
Burundi, Comoros, Dem. Rep. Congo, Djibouti, Eritrea, Ethiopia, The Gambia, Guinea, Lesotho, Liberia, Madagascar, Mauritania, Sao Tome and Principe, South Sudan			

Figure 3.1. Polity score of African countries in the year before the opening of the stock exchange

This figures depicts the African continent. We use the scores in the Polity IV database by the end of the year before the exchange was officially opened (the year in which the stock exchange was opened is reported under the country's name) to sort all 54 countries into one of the following categories: 1) the country has officially opened a stock exchange before the end 1960; 2) the country has not officially opened a stock exchange before the end of 2016; 3) the country has opened a stock exchange in the sample period (1961-2016), and the Polity score in the year before the exchange was officially opened was lower than or equal to zero (we classify these countries as "autocratic"); 4) the country has opened a stock exchange in the sample period (1961-2016), and the Polity score in the year before the exchange was officially opened was higher than zero (we classify these countries as "democratic"); and 5) the country has opened a stock exchange in the sample period (1961-2016), but the Polity score is not reported in the Polity IV database.

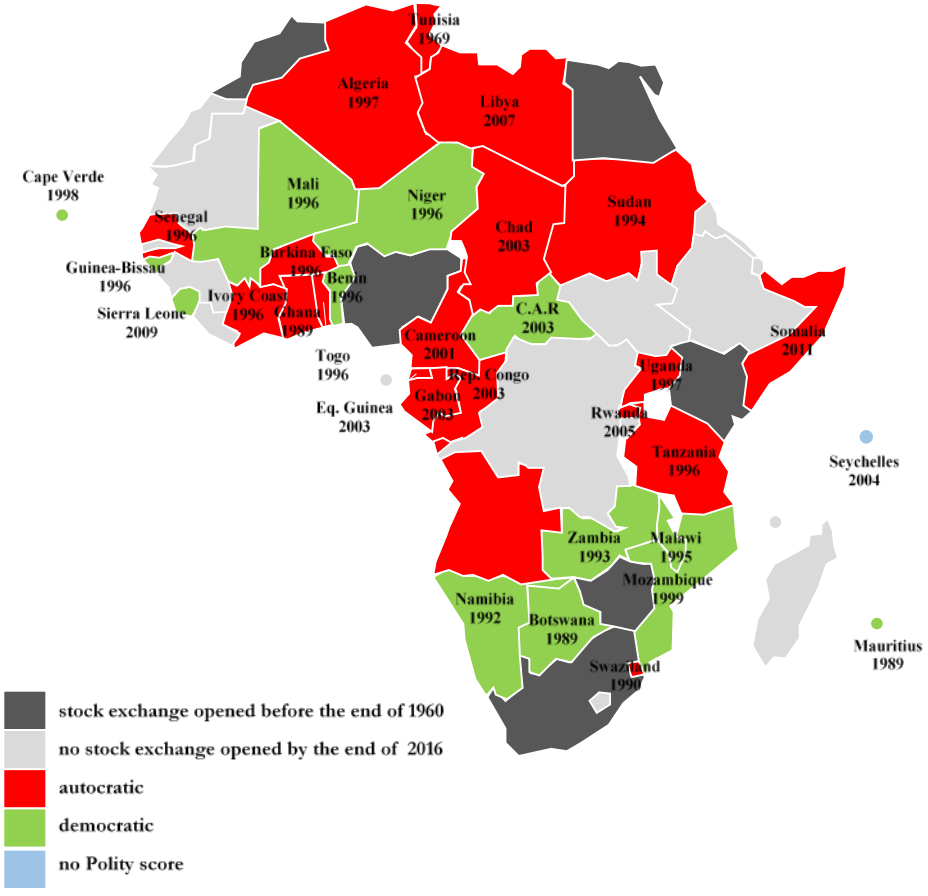


Table 3.2. Country-level summary statistics before and after the opening of a stock exchange

This table presents summary statistics of country-level characteristics of the panel of 54 African countries in the 1960-2016 period. The first column presents the mean and standard deviation of each of the variables in the full sample. The second and third columns present the mean and standard deviation of each of the variables for the subsamples of countries in which no stock exchange was officially open and countries in which a stock exchange was officially open, respectively. The last two columns present the results of the t-test of mean differences between the two subsamples, and the p-value of the difference. ***, **, and * indicate significance at the 1%, 5%, and 10% level, respectively. We refer to Table B.1 of the Appendix for variable definitions and data sources.

		Full sample	**No stock exchange**	**Stock exchange**		
		N=2,088	*N=1,142*	*N=946*	difference	p-value
GDP	mean	14.16	4.08	31.03	26.95***	0.00
(billion US$)	stdev	41.81	10.02	63.66		
GDP per capita	mean	1,117.23	695.57	1,823.61	1,128.04***	0.00
(US$)	stdev	2,066.01	1,360.17	2,743.77		
GDP growth	mean	3.95	3.66	4.44	0.79**	0.02
(%)	stdev	7.77	8.92	5.37		
Private credit/	mean	18.85	14.38	25.79	11.41***	0.00
GDP (%)	stdev	19.19	10.53	26.26		
Polity score	mean	-2.33	-3.79	0.34	4.13***	0.00
	stdev	5.89	5.35	5.90		

and Perotti, 2007), that incumbents in autocracies would oppose financial development. However, the opening of a stock exchange in autocracies could be the result of external forces that push the country to open up to external trade and capital flows. We revisit this question in more detail below.

Table 3.2 presents summary statistics of country-level characteristics for our full sample, for the subsample of country-years in which no stock exchange was officially open, and for the subsample of country-years in which a stock exchange was officially open. The last two columns present the results of t-tests for differences in means across the two subsamples. There are significant differences in the level of economic, financial, and political development between country-years in which no stock exchange was officially open, and country-years in which a stock exchange was officially open. In particular, the subsample of country-years with a stock exchange exhibits a significantly greater GDP, GDP per capita, GDP growth, private credit as a fraction of GDP, and Polity score, indicating that, on average, countries with a stock exchange are larger, richer, faster growing, have a more highly developed banking sector, and are more democratic than countries without a stock exchange. We therefore use these variables as controls in the subsequent analysis.

3.2.2. Political leaders

We use two main sources for the data on political variables: Archigos (Goemans, Gleditsch, and Chiozza, 2009) and the Database of Political Institutions (Scartascini, Cruz, and Keefer, 2017). We collect the names of all 367 political leaders in the 1960-2016 period (including political leaders of countries that have opened a stock exchange before that period, and countries that had not opened a stock exchange yet by the end of that period), their date of birth, the years in which there was a change in political leader, and the manner in which transfers between political leaders occurred. We present an overview of the 34 political leaders that opened stock exchanges in the 1961-2016 period in Table B.2 and Figure B.1 of the Appendix. A description of all variables and their sources can be found in Panel C of Table B.1 in the Appendix.

3.3. Methodology

We start by analyzing the effect of opening a stock exchange on the political leader's survival in office by means of survival analysis (discussed in Section 3.3.1). We then proceed to examine the effect of opening a stock exchange on the democratization of political institutions by means of a difference-in-differences setting in which countries that are "treated" with the opening of a stock exchange are compared to a control group of countries (discussed in Section 3.3.2).

3.3.1. Political leader's survival in office

To test our first main hypothesis that opening a stock exchange affects political survival, we use survival analysis, in which "failure" refers to the replacement of the political leader. Since our sample starts in 1960, it is censored at the left for political leaders in countries that were independent before 1960. Similarly, because our sample ends in 2016, it is censored at the right for all political leaders that were in office at that time. To address the issue of "immortal time bias" (we could observe that political leaders that open exchange stay longer in power not because they opened an exchange, but because political leaders that stay longer in power are more likely to open a stock exchange in the first place), we adopt a time-varying setting.[8] The dummy variable that identifies the political leader that opened a stock exchange takes the value zero before the exchange was opened. Moreover, we control for time-varying variables and country and year fixed-effects.

We use two different types of survival analysis. We first estimate the following Cox proportional hazards model:

$$(1)\quad h(t) = h_0(t)\, exp\,(\beta_1\, Opened\ exchange_{i,k,t} + \beta_2\, Exchange\ open_{i,k,t} + \beta_3\, Ln\ GDP_{i,k,t} + \beta_4\, Ln\ GDP\ per\ capita_{i,k,t} + \beta_5\, GDP\ growth_{i,k,t} + \beta_6\, Polity\ score_{i,k,t} + \beta_7\, Ln\ private\ credit/\ GDP_{i,k,t} + \theta_{y,k} + v_i),$$

[8] The immortal time bias has long been documented in epidemiology, and refers to the time during which a subject in a cohort cannot, due to exposure definition, incur the outcome event during the study (see e.g. Walker 1991; Rothman and Greenland, 1998).

where t represents the t-th year in office, $h(t)$ represents the hazard ratio at time t, $h_0(t)$ represents the baseline hazard ratio at time t (the hazard ratio when all covariates take the value 0), $Opened\ exchange_{i,k,t}$ is a dummy variable that takes the value 1 if a stock exchange is open in country i at time t and it was open during political leader k's term in office, and zero otherwise, $Exchange\ open_{i,k,t}$ is a dummy variable that takes the value 1 if a stock exchange is open in country i at time t and it was not opened by political leader k, and zero otherwise, $Ln\ GDP_{i,k,t}$ is the natural logarithm of country i's GDP in the t-th year of political leader k's term in office, $Ln\ GDP\ per\ capita_{i,k,t}$ is the natural logarithm of country i's GDP per capita in the t-th year of political leader k's term in office, $GDP\ growth_{i,k,t}$ is the percentage growth of country i's GDP in the t-th year of political leader k's term in office, $Polity\ score_{i,k,t}$ is country i's Polity score in the t-th year of political leader k's term in office, and $Ln\ private\ credit/\ GDP_{i,k,t}$ is the natural logarithm of country i's Private credit/ GDP in the t-th year of political leader k's term in office. $\theta_{y,k}$ represents beginning of term fixed effects (calendar year y in which political leader k took office) and v_i represents country i fixed effects. Given that we have several observations for each political leader, we cluster the standard errors by political leader.

Cox proportional hazard models are the most commonly used method in survival analysis and have the advantage of being flexible to various shapes of the baseline hazard. However, a reduction in proportionality of hazard ratios over time or across strata invalidates the use of a standard Cox proportional hazards model (Box-Steffensmeier and Zorn, 2001). Parametrized models, such as the Weibull model, are less flexible but have the advantage of allowing for a more precise estimate of duration dependency, because they allow for an ancillary shape parameter which describes how the baseline hazard changes over time.[9] Moreover, this parameter can be estimated as a function of one or several co-variates.

[9] In the Cox Proportional Hazards model, the hazard rate takes the form $h(t_i|x_i) = h_0(t_i)\ exp(\beta' x_i)$, where t_i is the time to event or censoring for unit i, h_0 is the baseline hazard, x_i is a vector of covariates, and β is a vector of parameters. In the Weibull model, the hazard rate takes the form $h(t_i|x_i) = p\ t_i^{p-1}\ exp(\beta' x_i)$, where

Since the baseline hazard may be different across countries and a political leader's risk of replacement may also increase over time (see, e,g, Bueno de Mesquita and Smith, 2010), we additionally estimate model (1) with a parametrized Weibull distribution in which the ancillary parameter is a function of the country and the two-decade in which the political leader started his term in office. It is important to note, however, that we still rely on the assumption that, within country and two-decade in which the political leader started his term in office, hazard ratios are proportional across co-variates and over time.

3.3.2. Democratization of political institutions

Our second main hypotheses is that that opening a stock exchange affects the democratization of political institutions. Testing this hypothesis requires taking into account that the decision to open a stock exchange is, of course, endogenous and undoubtedly related to, among others, a country's size and level of economic, political and financial development, as well as international conditions. To deal with this issue, we conduct a difference-in-differences analysis that includes both year fixed effects and time-varying proxies for a country's size, and level of economic, political and financial development.

The treatment group is the group of 34 countries that opened a stock exchange in the 1961-2016 period. When considering a control group, two issues arise: first, there is no obvious pre- and post-treatment period for countries that have not opened a stock exchange yet. Second, finding countries that are similar to the treatment group on all possible dimensions, both observable and unobservable, is a nontrivial task.

To construct a control group, we use propensity score matching based on the probability that a given country will open a stock exchange in a given year based on its size and level of economic, political, and financial development. We further describe the exact procedure below.

---

p is the shape parameter for the baseline hazard. The parameter p reflects the shape of the monotonic hazard, with $p>1$ reflecting a monotonically increasing hazard rate, $p<1$ a monotonic declining hazard rate, and $p=1$ a flat hazard rate (Box-Steffensmeier and Jones, 2004)

3.3.2.1. Propensity score matching

We use data on all African countries, starting in 1960 and ending in the year in which a stock exchange was opened, to estimate the probability that a given country will open a stock exchange in a given year based on its size and level of economic, political, and financial development. We estimate the probability that country *i* will open a stock exchange in year *t* using the following probit model:

$$(2)\quad Opened\ exchange_{i,t} = a + \beta_1 Ln\ GDP_{i,t} + \beta_2 Ln\ GDP\ per\ capita_{i,t} + \beta_3 GDP\ growth_{i,t} + \beta_4 Polity\ score_{i,t} + \beta_5 Ln\ private\ credit/\ GDP_{i,t} + \varepsilon_{i,t},$$

where $Opened\ exchange_{i,t}$ is a dummy variable that takes the value 1 if country *i* opened a stock exchange on year *t*, and zero otherwise, $Ln\ GDP_{i,t}$ is the natural logarithm of country *i*'s GDP in year *t*, $Ln\ GDP\ per\ capita_{i,t}$ is the natural logarithm of country *i*'s GDP per capita in year *t*, $GDP\ growth_{i,t}$ is the percentage growth of country *i*'s GDP in year *t*, $Polity\ score_{i,t}$ is country *i*'s Polity score in year *t*, and $Ln\ private\ credit/\ GDP_{i,t}$ is the natural logarithm of country *i*'s Private credit/ GDP in year *t*.

We find the most suitable match for each treated country by selecting the country-year in our control sample with the closest propensity score (the predicted value from the probit regression above) that belongs to a country that has either not opened a stock exchange yet, or not opened a stock exchange in the 11 years following the year for which the matching is done.[10] This allows treated countries to be candidates for inclusion in the control group, in the period before the opening of the exchange. Moreover, we impose the restriction that the treated and the control countries are both either democratic (Polity score > 0) or autocratic (Polity score ≤ 0) at the time of the matching. This procedure allows us to define the pre and post period for the control

[10] Since we take the 10 year period before the opening of the exchange as the pre-period in our difference-in-differences analysis, the second condition is necessary to ensure that the effect of opening a stock exchange remains unconfounded for countries that serve as a control before the stock exchange was opened.

group: the year in which the country is matched automatically becomes the year prior to the post period.

3.3.2.2. Difference-in-differences analysis

Several countries opened a stock exchange in the same year. We use year fixed effects to deal with the fact that international conditions correlated with the timing of opening a stock exchange might explain variation in the democratization level of a country. Even though we match the control group based on their size and level of economic, financial, and political development before the opening of the exchange, our results will be biased if these characteristics change in a systematically different way for the control and treatment group after the stock exchange is opened. To deal with this issue, we include the variables used in probit regression (2) in our difference-in-differences model. However, for our results to be unbiased, we still have to assume that we have not omitted any variable that affects democratization and is correlated with the opening of the exchange. We then estimate the effect of opening a stock exchange on democratization in the following difference-in-differences model:

$$(3)\quad Polity\ score_{i,t} = a + \beta_1 P{*}T_{i,t} + \beta_2\, Post_{i,t} + \beta_3\, Treatment_i + \beta_4\, Ln\ GDP_{i,t} + \beta_5\, Ln\ GDP\ per\ capita_{i,t} + \beta_6\, GDP\ growth_{i,t} + \beta_7\, Ln\ private\ credit/\ GDP_{i,t} + \theta_t + \varepsilon_{it},$$

where the dependent variable, $Polity\ score_{i,t}$, is the polity score of country i in year t. $Post_{i,t}$ is a dummy variable that takes the value 1 in the years following the opening of the stock exchange in country i (or the year after the matching year for the control group) and zero otherwise, $Treatment_i$ is a dummy variable that takes the value 1 if country i belongs to the treatment group (i.e. it opened a stock exchange), and $P{*}T_{i,t}$ is the interaction of the previous two variables. The remaining control variables are the same as the ones included in the probit regression (2) used to calculate the probability that a stock exchange is opened in country i in year t. θ_t represents year fixed effects.

For the estimation of the coefficients of regression (3) we use data on the 10 years prior to the opening of the stock exchange (pre-period). We separately estimate

regression (3) using the three years and ten years after the opening of the exchange to study its short- and long-term impact on democratization.

3.4. Results

3.4.1. Political leader's survival in office

3.4.1.1. Summary statistics and Kaplan-Meier survival functions

Based on the interest group theory of financial development, we hypothesize that opening a stock exchange negatively affects political survival. A preliminary analysis of summary statistics provides important insights on the unconditional political survival around the opening of a stock exchange.

Table 3.3 presents these summary statistics. We split survival statistics for country-years in which: 1) there was no stock exchange during the political leader's term in office ("No exchange"); 2) a stock exchange was opened during the political leader's term in office ("Political leader opened exchange"); and 3) a stock exchange was opened before the political leader's term in office ("Exchange opened by prior political leader"). For each category, we present the time at risk (total number of years in our panel), the incidence rate (number of "failures" scaled by the time at risk), the number of political leaders at risk ("# of political leaders") and the survival time (in years) of the 25th, 50th and 75th percentiles.

Panel A of Table 3.3 presents summary statistics for the full sample, and shows that the incidence rate of replacement is the lowest for political leaders that opened a stock exchange (24 of the 36 political leaders were replaced in the 328 years at risk, which corresponds to an incidence rate of 7.32% vs. 10.95% in the no exchange subsample and 13.65% subsample in which a prior leader opened an exchange). In line with this, the survival time of the 25th, 50th and 75th percentiles is the highest for leaders that opened an exchange (respectively 5, 10, and 19 years). When no exchange was opened, the survival times of the 25th, 50th and 75th percentiles are, respectively, 1, 5, and 14 years and when a prior leader opened an exchange, these survival times are, respectively, 1, 4, and 10 years.

Table 3.3. Summary statistics of political leader survival

This table presents summary statistics of the political leaders' survival in office. "Failure" occurs when a political leader's term in office ends. Panel A presents summary statistics for the full sample, Panel B presents summary statistics for autocracies (country-years for which the Polity score is lower than or equal to zero), and Panel C presents summary statistics for democracies (country-years for which the Polity score is higher than zero). Survival statistics of political leaders are presented for country-years in which: 1) there was no stock exchange during the political leader's term in office ("No exchange"), 2) a stock exchange was opened during the political leader's term in office ("Political leader opened exchange"), and 3) a stock exchange was officially opened before the political leader's term in office. For each category, we present the time at risk (total number of years in office), the incidence rate (number of "failures"/time at risk), the number of political leaders at risk ("# of political leaders") and the survival time (in years) of the 25th, 50th and 75th percentiles.

	Time at risk (years)	Incidence rate (%)	# of political leaders	Survival time (years)		
				25%	50%	75%
Panel A. Full sample						
No exchange	1,845	10.95	247	1	5	14
Political leader opened exchange	328	7.32	36	5	10	19
Exchange opened by prior political leader	630	13.65	114	1	4	10
Total	2,803	11.11	366	1	5	13
Panel B. Autocracies						
No exchange	1,430	10.07	182	1	6	16
Political leader opened exchange	227	4.85	22	3	6	19
Exchange opened by prior political leader	289	13.50	46	1	1	11
Total	1,946	9.97	230	1	5	14
Panel C. Democracies						
No exchange	415	13.98	86	2	5	10
Political leader opened exchange	97	13.40	16	6	10	13
Exchange opened by prior political leader	345	13.62	75	3	5	10
Total	857	13.77	166	2	5	10

This preliminary analysis contradicts our first hypothesis that the relation between the opening of a stock exchange and political survival should be negative. We also hypothesize that the effect of opening a stock exchange on political survival is moderated by a country's level of democracy. Therefore, we split the statistics above by autocracies and democracies.[11]

Panel B of Table 3.3 presents summary statistics for autocracies, and Panel C presents summary statistics for democracies. In line with our hypothesis, the effect of opening a stock exchange on political survival seems to depend on a country's level of democracy. In democracies, the incidence rate for political leaders that opened a stock exchange (13.40%) is only marginally lower than for other political leaders. The incidence rate is the lowest for political leaders that opened a stock exchange in autocracies (4.85%).

Figure 3.2 presents the above results graphically. In Panel A, we plot Kaplan-Meier survival functions for political leaders in the three mentioned categories during the first 25 years in office (horizontal axis). The figure confirms that political leaders that opened a stock exchange stay the longest in office. In Panel B of Figure 3.2, we plot Kaplan-Meier survival functions adjusted for leader age, ln GDP, ln GDP per capita, GDP growth, ln private credit/ GDP and Polity score. Once we adjust the survival functions for these variables, political leaders that opened a stock exchange do not only survive the longest in office, but they are virtually not replaced in their first 25 years in office.

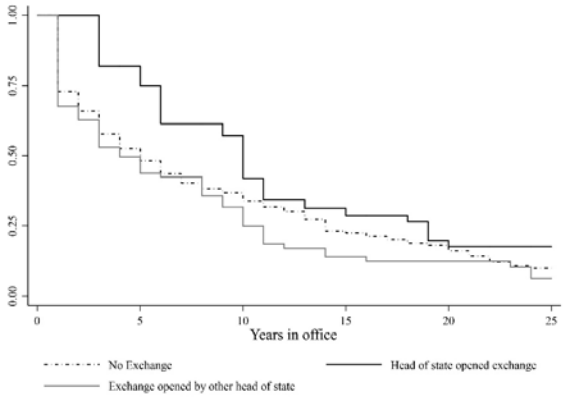
Panels C and D of Figure 3.2 present the adjusted Kaplan-Meier survival functions for autocracies and democracies. In democracies, although survival is still the highest for political leaders that opened a stock exchange, the difference between the survival functions of political leaders that did and did not open a stock exchange is much smaller than in autocracies. Despite being in line with the hypothesis that the ex-ante level of

[11] This split is based on country-year Polity scores. "Autocracies" refers to country-years in which the Polity score is lower than or equal to zero; "Democracies" refers to country-years in which the Polity score is higher than zero.

Figure 3.2. Political leader survival – Kaplan-Meier survival functions

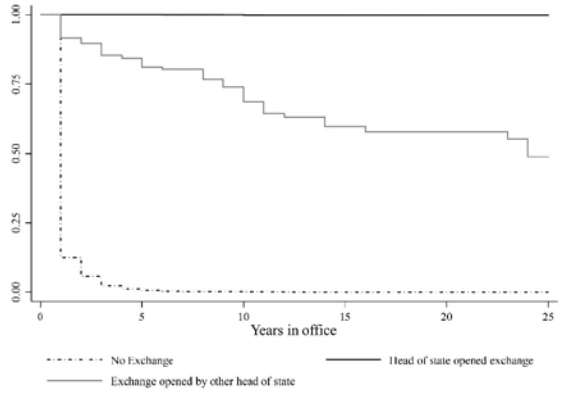
This picture presents political leaders' Kaplan-Meier survival functions during the first 25 years in office (horizontal axis). "Failure" occurs when a political leader's term in office ends. The dash-dotted line represents the survival function of political leaders in countries where there was no stock exchange during the political leader's term in office. The black line represents the survival function of political leaders if a stock exchange was opened during their term in office. The gray line represents the survival function of political leaders in countries where a stock exchange was officially opened before the political leader's term in office. Panel A presents unadjusted survivor functions. Panel B presents survival functions adjusted for the political leader's age, as well as the country's Ln GDP, Ln GDP per capita, GDP growth, and Ln private credit/ GDP. Panels C and D present adjusted survival functions for autocracies (country-years for which the Polity score is lower than or equal to zero) and democracies (country-years for which the Polity score is higher than zero), respectively. We refer to Table B.1 of the Appendix for variable definitions and data sources.

Panel A. Unadjusted survivor functions



Panel B. Adjusted survivor functions

Adjusted for age, Ln GDP, Ln GDP per capita, GDP growth, Ln private credit/ GDP, and Polity score

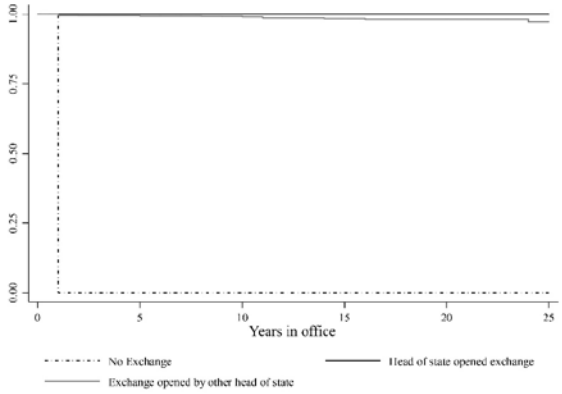


(continued on next page)

Figure 3.2. Political leader survival – Kaplan-Meier survival functions (continued)

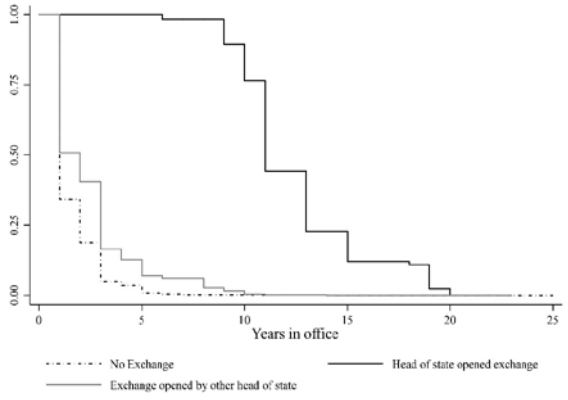
Panel C. Adjusted survival functions - Autocracies

(Polity score ≤ 0, adjusted for age, Ln GDP, GDP growth, Ln GDP per capita, Ln private credit/ GDP, and Polity score)



Panel D. Adjusted survival functions - Democracies

(Polity score > 0, adjusted for age, Ln GDP, GDP growth, Ln GDP per capita, Ln private credit/ GDP, and Polity score)



democracy of political institutions moderates the relation between the opening of a stock exchange and political survival, the results strongly contradict the hypothesis that this relation is negative.

Most of the statistics presented in section 3.4.1.1. are unconditional and none is adjusted for country and year effects. Besides that, they do not statistically test for differences in survival between leaders that opened and did not open a stock exchange. To address these issues, we proceed with estimating the Cox proportional hazards model (1).

3.4.1.2. Cox proportional hazards model and Weibull regressions

The first three columns of Table 3.4 present the estimates of equation (1). Beginning year (year in which the political leader started his term in office) and country fixed effects are included where indicated. Standard errors are clustered at the political leader level, and reported in parentheses.

The first column of Table 3.4 shows the results if we only condition on the age of the political leader. The results are in line with the unconditional survival, since the hazard rate of political leaders that opened a stock exchange is lower than the hazard rate of political leaders that did not open a stock exchange. The ratio between the two is 73.9%, which means that, in a given year, political leaders that opened a stock exchange are 73.9% as likely to be replaced (or, equivalently, 26.1% less likely to be replaced) as political leaders that did not open a stock exchange. However, the results are not statistically significant if we only control for the age of the political leader.

Once we include controls for the size of the country and its level of economic, financial, and political development, as well as country fixed effects (columns (2) and (3) of Table 3.4), results are statistically significant (at the 5% level), and strongly contradict our hypothesis. The estimated hazard ratio is 72.7%. When additionally controlling for the year in which the political leader took office, results are not only statistically significant at the 1% level, but also economically very significant: the hazard ratio caused by the opening of a stock exchange is 52.4%. In other words, a political leader is around half as likely to be replaced in a given year if he opened a stock

Table 3.4. The impact of opening a stock exchange on political leader survival

This table presents the results of the survival analysis presented in model (1) to test the impact of opening a stock exchange on the political leaders' survival in office. "Failure" occurs when a political leader's term in office ends. "Opened exchange" is a dummy variable that takes the value 1 for country years in which a stock exchange was opened and the stock exchange was opened during the political leaders' term in office, and zero otherwise. "Exchange open" is a dummy variable that takes the value 1 if a stock exchange was already open when the political leader started his term in office, and zero otherwise. The first three columns present the results of a Cox proportional hazards model. Beginning year (year in which the political leader started his term in office) and country fixed effects are included where indicated. The last three columns present the results of a Weibull regression, where */ln_p* is the estimated ancillary parameter. We let the ancillary parameter be a function of two decade and country dummies, as indicated in the last two rows. Standard errors are clustered at the political leader level, and reported in parentheses (***, **, and * indicate significance at the 1%, 5%, and 10% level). We refer to Table B.1 of the Appendix for variable definitions and data sources.

(continued on next page)

Table 3.4. The impact of opening a stock exchange on political leader survival (continued)

	Cox Proportional Hazards Model			Weibull Regression		
	(1)	(2)	(3)	(4)	(5)	(6)
Opened exchange	0.739 (-1.62)	0.727** (-1.76)	0.524*** (-2.74)	0.729 (-1.61)	-0.703*** (-3.04)	-0.713*** (-3.04)
Exchange Open	0.937 (-0.44)	0.966 (-0.19)	1.130 (0.45)	1.102 (0.65)	0.025 (0.11)	-0.005 (-0.02)
Age political leader	1.016*** (3.00)	1.014** (2.43)	1.017*** (2.63)	1.010* (1.92)	0.015** (2.05)	0.015** (2.04)
Ln GDP		0.985 (-0.31)	0.329 (-1.51)		-0.067 (-0.80)	-0.062 (-0.72)
Ln GDP per capita		0.872 (-1.53)	3.237 (1.54)		-0.099 (-0.74)	-0.091 (-0.68)
GDP growth		0.976*** (-4.92)	0.974*** (-3.89)		-0.035*** (-7.43)	-0.035*** (-7.47)
Ln private credit/ GDP		0.980 (-0.21)	0.958 (-0.31)		-0.025 (-0.20)	-0.027 (-0.22)
Polity score		1.035*** (2.78)	1.034** (2.08)		0.037** (2.46)	0.036 (2.20)
/ln_p				-0.131*** (-3.68)		
# observations	2,738	2,147	2,147	2,738	2,147	2,147
# political leaders	362	309	309	362	309	309
Log (pseudo) likelihood	-1,506.80	-1,190.74	-1,152.83	-564.57	-397.49	-397.35
Beginning year f.e.	NO	NO	YES			
Country f.e.	NO	YES	YES			
Clustered s.e.	YES	YES	YES	YES	YES	YES
/ln_p: two decade				NO	NO	YES
/ln_p: Country				NO	YES	YES

exchange. Furthermore, we find that the hazard ratio of political leaders of countries in which a stock exchange was already open by a previous leader does not significantly differ from the hazard ratio of leaders of countries in which no exchange was opened.

The results of the Weibull regression that allows for acceleration/ deceleration of the baseline hazard rate over time depending on the political leader's country and two-decade in which he took office, presented in the last three columns of Table 3.4, are in line with the previous results: the coefficient of the dummy for political leaders that opened a stock exchange is negative and significant at the 1% level.

To test whether the effect of opening a stock exchange is moderated by a country's democracy level, we split the results between autocracies and democracies. Table 3.5 presents the results. In line with our hypothesis, we find that the positive effect of opening a stock exchange on political survival is only statistically significant in autocracies, although the coefficient estimates also show a lower hazard ratio for politicians that opened a stock exchange in democracies.

We argued that the level of democracy should moderate the relation between the opening of a stock exchange and political survival because leaders in autocracies stand to lose the most from financial development. The fact that our results consistently reject the first hypothesis in autocracies suggests that political leaders in autocracies stand to benefit the most from financial development.

3.4.1.3. Political survival to mass revolution and coups

Selectory theory (Bueno de Mesquita, Smith, Siverson, and Morrow, 2003) could help explain these results. Assuming that political leaders are able to correctly anticipate the consequences of opening a stock exchange, they might open a stock exchange to avoid threats to their survival. These threats could take the form of either mass revolution or being deposed by a coup.

We proceed by restricting our analysis to replacement caused by the threats named above. So far, our analysis included all types of political replacement. However, several replacements are due to exogenous forces like age, limits on a political leader's tenure,

Table 3.5. The impact of opening a stock exchange on political leader survival – autocracies vs. democracies

This table presents the results of the survival analysis presented in model (1) to test the impact of opening a stock exchange on the political leaders' survival in office, split between autocracies (country-years for which the Polity score is lower than or equal to zero), and democracies (country-years for which the Polity score is higher than zero). "Failure" occurs when a political leader's term in office ends. "Opened exchange" is a dummy variable that takes the value 1 for country years in which a stock exchange was opened and the stock exchange was opened during the political leaders' term in office, and zero otherwise. "Exchange open" is a dummy variable that takes the value 1 if a stock exchange was already open when the political leader started his term in office, and zero otherwise. The first three columns present the results of a Cox proportional hazards model. Beginning year (year in which the political leader started his term in office) and country fixed effects are included. The last three columns present the results of a Weibull regression, where the ancillary parameter is estimated as a function of two decade and country dummies. Standard errors are clustered at the political leader level, and reported in parentheses (***, **, and * indicate significance at the 1%, 5%, and 10% level). We refer to Table B.1 of the Appendix for variable definitions and data sources.

(continued on next page)

Table 3.5. The impact of opening a stock exchange on political leader survival – autocracies vs. democracies (continued)

	Autocracies		Democracies	
	Cox	Weibull	Cox	Weibull
	(1)	(2)	(3)	(4)
Opened exchange	0.378**	-1.040**	0.522	-0.637
	(-2.06)	(-2.39)	(-1.26)	(-1.57)
Exchange open	1.127	0.057	1.298	-0.103
	(0.22)	(0.17)	(0.46)	(-0.23)
Age political leader	1.029***	0.030***	1.008	0.012
	(3.45)	(2.88)	(0.58)	(0.74)
Ln GDP	0.434	-0.120	0.438	-0.249
	(-0.64)	(-1.07)	(-0.72)	(-1.63)
Ln GDP per capita	2.730	0.051	3.390	0.154
	(0.72)	(0.28)	(1.01)	(0.56)
GDP growth	0.976***	-0.020***	0.985	-0.034
	(-2.74)	(-3.98)	(-0.56)	(-2.13)
Ln private credit/ GDP	0.934	0.107	1.554	0.212
	(-0.38)	(0.70)	(0.52)	(0.83)
Polity score	1.140***	0.179***	0.891*	-0.075
	(3.64)	(5.04)	(-1.88)	(-1.16)
# observations	1,464	1,464	683	683
# political leaders	191	191	141	141
Ln (pseudo)likelihood	-603.16	-230.85	-328.36	-121.82
Beginning year fixed effects	YES		YES	
Country fixed effects	YES		YES	
Clustered s.e. (pol. leader)	YES	YES	YES	YES
/ln_p: two decade dummy		YES		YES
/ln_p: Country dummy		YES		YES

illness, accidents, death, international pressure, etc. To identify these types of replacements, we use the codes of transfer of power between political leaders used in the Archigos dataset (Table B.3 in the Appendix shows an overview of these codes). Due to the limited number of observations for replacements by mass revolution or coup, we limit ourselves to providing suggestive evidence from survival statistics.

Table 3.6 presents summary statistics of political survival when "failure" is defined as replacement by "popular protest" and replacement by "military/ other government actors". Consistent with the theory that opening a stock exchange ameliorates the threats of mass revolution and coups, we find that no political leader that opened a stock exchange has been replaced by popular protest, and that the incidence rate of replacement by "military/other government actors" is the lowest if the political leader opened a stock exchange (1.76% in autocracies and 1.03% in democracies, compared to 4.61% if there is no stock exchange in autocracies and 3.61% if there is no stock exchange in democracies).

3.4.2. Democratization of political institutions

The results presented so far suggest that, besides being positively related to political survival, opening a stock exchange successfully ameliorates threats of mass revolution and coups. An analysis of the effect of opening a stock exchange on the democratization of political institutions might help explain whether political leaders stay longer in power because opening a stock exchange benefits society at large, or because it disproportionally benefits the elite that keeps the political leader in power. If stock exchanges benefit only a select elite (private goods view), the political power of the incumbent elite should be reinforced, and the effect of opening a stock exchange on the democratization should be negative. If stock exchanges benefit the whole society (public goods view), this effect should be positive.

To analyze the effect of opening a stock exchange on the democratization of a country's political institutions, we conduct a difference-in-differences analysis in which the control group is matched on size and level of economic, financial and political

Table 3.6. Political leader survival - summary statistics of power transfer modes

This table presents summary statistics of the political leaders' survival to two types of power transfer modes: "popular protest" (third and fourth column) and "removal by military/ other government actors" (last two columns). Panel A presents summary statistics for the full sample, Panel B presents summary statistics for autocracies (country-years for which the Polity score is lower than or equal to zero), and Panel C presents summary statistics for democracies (country-years for which the Polity score is higher than zero). Survival statistics of political leaders are presented for country-years in which: 1) there was no stock exchange during the political leader's term in office ("No exchange"), 2) a stock exchange was opened during the political leader's term in office ("Political leader opened exchange"), and 3) a stock exchange was officially opened before the political leader's term in office. For each category, we present the time at risk (total number of years in office), the incidence rate (number of "failures"/time at risk), and the number of political leaders at risk ("# of political leaders").

			Popular protest		**Military/ other government actors**	
	Time at risk (years)	# of political leaders	Incidence rate (%)	# of subject failures	Incidence rate (%)	# of subject failures
Panel A. Full sample						
No exchange	1,845	247	0.16	3	4.39	81
Political leader opened exchange	324	35	0	0	1.54	5
Exchange opened by prior political leader	634	115	0.79	5	1.89	12
Total	2,803	366	0.29	8	3.50	98
Panel B. Autocracies						
No exchange	1,430	182	0.14	2	4.61	66
Political leader opened exchange	227	22	0	0	1.76	4
Exchange opened by prior political leader	289	46	1.73	5	2.77	8
Total	1,946	230	0.36	7	4.01	78
Panel C. Democracies						
No exchange	415	86	0.24	1	3.61	15
Political leader opened exchange	97	16	0	0	1.03	1
Exchange opened by prior political leader	345	75	0	0	1.16	4
Total	857	166	0.12	1	2.33	20

development. Results of the matching procedure and the difference-in-differences analysis are discussed below.

3.4.2.1. Propensity score matching

Table B.4 in the Appendix presents the estimates of probit regression (2), used to find a suitable control group for the estimation of the difference-in-differences. All variables related to a country's economic development are positively and significantly related to the probability that a country will open a stock exchange in a given year.[12]

We then match each country that opened a stock exchange to a country that in the previous year was as likely to open a stock exchange, based on the predicted value of probit regression (2). We allow countries that opened a stock exchange later to be included in the control group, as decribed in section 3.3. Table 3.7 presents, for each treated and matched country, the year of the matching and the propensity score in that year. Panels A and B present the treated and matched countries that were, respectively, autocracies and democracies in the year before the stock exchange was opened.

Several countries that opened a stock exchange[13] belong also to the control group in the period before the stock exchange was opened, and some other countries[14] serve as match for several treated countries in different years. This is not surprising, since only 14 of the 54 African countries have not opened a stock exchange yet.

The average propensity score is 5.4% for autocracies, and 5.8% for democracies, which means that countries in democracies were slightly more likely to open a stock exchange in the year before they actually opened one, based on their size and level of

[12] Evaluated at the sample mean, a 0.72 standard deviation increase in GDP is associated to a 0.62% increase in the probability that a country will open a stock exchange in a given year. A 1.11 standard deviation increase in GDP per capita is associated to a 0.73% increase in that probability, and an increase of 1 percentage point in GDP growth is associated with a 0.05% increase in the same probability. The level of financial development, measured by the natural logarithm of private credit/ GDP, does not have a significant relation to the probability that a country opens a stock exchange. The level of democracy, on the other hand, is significantly associated with that probability: a 1 point increase in the country's polity score is associated with a 0.15% increase in the probability of opening a stock exchange.

[13] Algeria, Burkina Faso, Cameroon, Gabon, Republic of Congo, Senegal, Sudan, Uganda, and Zambia.

[14] Democratic Republic of Congo, Gabon, Guinea, Lesotho, Madagascar, and Republic of Congo.

Table 3.7. Results of propensity score matching procedure

This table presents the results of the propensity score matching procedure. The treatment group is composed by countries that opened a stock exchange during the sample period. We find the most suitable match for each treated country by selecting the country-year in our sample with the closest propensity score (the predicted value from the probit regression in Table B.4) that belongs to a country that has either not opened a stock exchange yet, or not opened a stock exchange in the 11 years following the year at which the matching takes place. Moreover, we impose the restriction that the treated and the control countries are both either autocratic (Polity score ≤ 0) or democratic (Polity score > 0) at the time of the matching. Panels A and B present the treated and matched countries that were, respectively, autocracies and democracies in the year before the stock exchange was opened. For each treated and matched country, we report the year of the matching and the propensity score in that year.

Treatment group			**Matched control group**		
Country	year before opening	pscore	Country	year	pscore
Panel A. Autocracies					
Tunisia	1968	0.0029	Congo, Rep.	1969	0.0029
Swaziland	1989	0.0089	Burundi	1998	0.0089
Togo	1995	0.0130	Senegal	1976	0.0129
Burkina Faso	1995	0.0168	Cameroon	1983	0.0168
Rwanda	2003	0.0174	Algeria	1983	0.0174
Chad	2002	0.0239	Burkina Faso	1978	0.0238
Ghana	1988	0.0277	Guinea	1994	0.0276
Tanzania	1995	0.0286	Guinea	1993	0.0286
Sudan	1993	0.0310	Congo, Dem. Rep.	1995	0.0312
Uganda	1996	0.0350	Sudan	1976	0.0350
Cote d'Ivoire	1995	0.0362	Congo, Rep.	1991	0.0358
Senegal	1995	0.0379	Congo, Dem. Rep.	1979	0.0379
Congo, Rep.	2002	0.0421	Uganda	1984	0.0417
Cameroon	2000	0.0496	Gabon	1988	0.0490
Gabon	2002	0.0661	Congo, Dem. Rep.	2000	0.0658
Eq. Guinea	2002	0.0723	Gabon	1990	0.0782
Algeria	1996	0.1343	*no match*		
Angola	2013	0.1879	*no match*		
Libya	2006	0.1952	*no match*		
Somalia	2010	NA	*no match*		
Panel B. Democracies					
Malawi	1994	0.0131	Gambia, The	1983	0.0132
Guinea-Bissau	1995	0.0142	Djibouti	2001	0.0142
Cent. African Rep.	2002	0.0298	Zambia	1967	0.0301
Cape Verde	1997	0.0316	Lesotho	2001	0.0313
Mali	1995	0.0455	Madagascar	1992	0.0437
Benin	1996	0.0530	Congo, Dem. Rep.	2003	0.0524
Mozambique	1998	0.0613	Lesotho	2003	0.0620
Sierra Leone	2008	0.0654	Madagascar	2001	0.0651
Mauritius	1988	0.0746	Lesotho	2004	0.0706
Namibia	1991	0.0893	Madagascar	2003	0.0793
Botswana	1988	0.1574	*no match*		
Zambia	1992	NA	*no match*		
Niger	1995	NA	*no match*		

economic, political, and financial development. Propensity scores vary between 0.29% for Tunisia in 1968, and 19.52% for Libya in 2006.[15]

Our difference-in-differences analysis is only reliable if the treatment and control group are similar in terms of size and economic, financial, and political development. Table B.5 in the Appendix presents the statistics used to evaluate the quality of the matching procedure. The difference in means between the treatment and the control group before the opening of the exchange is insignificant for all control variables, except for GDP growth in the 10 year pre-period.[16] Therefore, we consider the matching procedure to be successful and proceed to the difference-in-difference analysis.

3.4.2.2. Difference-in-differences analysis

Before estimating regression (3), we report the results of a univariate analysis that tests differences between the pre- and the post-period for both the treatment and the control group. Table 3.8 presents summary statistics of all variables, as well as a t-test for the difference in the means of each variable between the two periods. Panel A presents summary statistics for the full sample, Panel B for autocracies and Panel C for democracies.

Some patterns are noteworthy in Table 3.8, because they suggest important linkages between the variables included in our model. GDP and GDP per capita increase both in autocracies and democracies after the opening of the stock exchange, but more so for countries that opened a stock exchange than for the corresponding control group in autocracies. In democracies, however, this increase is approximately the same for both groups. GDP growth, on the other hand, only increases significantly for the control group in democracies. Despite this growth, GDP growth is, on average,

[15] We are unable to match four autocratic countries (Algeria, Angola, Libya, and Somalia) and three democratic countries (Botswana, Zambia, and Niger), which are dropped in our difference-in-differences analysis.

[16] In the 10 years prior to the opening of the exchange, the average GDP growth was 2.29% in the control group, and 5.17% in the treatment group. To avoid the impact of this difference on our results, we include all control variables used in the matching procedure as controls in the difference-in-differences analysis.

Table 3.8. Summary statistics treatment and control group

This picture presents summary statistics of all variables for the treatment and control group in the 10-year period before (pre) and the 10-year period after the stock exchange was opened (post), as well as a t-test for the difference in the means of each variable between the two periods (***, **, and * indicate significance at the 1%, 5%, and 10% level). Panel A presents summary statistics for the full sample. Panel B presents summary statistics for autocracies (countries with a Polity score lower than or equal to zero in the year before the opening of the stock exchange). Panel C presents summary statistics for democracies (countries with a Polity score higher than zero in the year before the opening of the stock exchange). We refer to Table B.1 of the Appendix for variable definitions and data sources.

	Treatment				**Control**			
	pre	post	diff		pre	post	diff	
Panel A. Full sample								
Ln GDP	21.43	22.22	0.78	***	21.48	22.06	0.58	***
Ln GDP per capita	6.13	6.61	0.48	***	6.00	6.31	0.31	***
GDP growth	5.17	5.10	-0.07		2.29	3.04	0.75	*
Ln private credit/ GDP	2.44	2.43	-0.01		2.52	2.37	-0.15	**
Polity score	-2.58	0.24	2.82	***	-2.25	-0.07	2.18	***
Panel B. Autocracies								
Ln GDP	21.79	22.61	0.82	***	21.77	22.29	0.52	***
Ln GDP per capita	6.21	6.72	0.51	***	6.09	6.32	0.22	*
GDP growth	5.76	5.51	-0.25		2.26	2.66	0.40	
Ln private credit/ GDP	2.40	2.31	-0.08		2.44	2.31	-0.13	
Polity score	-4.87	-3.14	1.74	***	-5.64	-3.14	2.51	***
Panel C. Democracies								
Ln GDP	20.90	21.57	0.66	***	21.02	21.71	0.69	***
Ln GDP per capita	6.01	6.43	0.43	***	5.84	6.30	0.46	***
GDP growth	4.29	4.41	0.13		2.34	3.64	1.30	**
Ln private credit/ GDP	2.51	2.62	0.11		2.65	2.46	-0.19	
Polity score	1.38	5.79	4.41	***	3.53	4.85	1.31	*

still lower in the control group than in the treatment group. The level of financial development of a country, on the other hand, does not significantly change for any of the groups. The level of democracy of a country (our dependent variable, measured by its Polity score) increases in both democracies and autocracies, both in the treatment and in the control group. However, this increase is considerably higher in the treatment group than in the control group in democracies (4.41 points and 1.31 points on average, respectively), and the opposite in autocracies (1.54 points and 2.51 on average, respectively).

This univariate analysis suggests that opening a stock exchange is associated with increases in the level of democracy in democracies, and decreases in the level of democracy in autocracies. However, changes in democratization in the treatment group could be attributable to changes in economic development, and it is therefore important to control for these once evaluating the effect of opening a stock exchange on the democratization of a country.[17]

We therefore conduct the difference-in-differences (3). The first two columns in Table 3.9 present the results for both autocracies and democracies. The pre-period is defined as the 10-year period before the stock exchange was opened. In the second and third columns, we present, respectively, the results for the post-period defined as the 3-year period after the stock exchange was opened, and the 10-year period after the stock exchange was opened, to capture eventual short- and long-term effects. All regressions include year fixed effects and robust standard errors.

The estimated interaction coefficients in the first three columns of Table 3.9 are statistically insignificant when we include the full sample of countries in the analysis. This is not fully surprising, since opening a stock exchange does not have an impact on political survival in democracies, as shown in the previous section. We are particularly interested in the results for the subsample of autocracies, which should help us

[17] The opening of a stock exchange could on the other hand, cause economic development. In that case, we will underestimate the effect of opening a stock exchange on democratization by controlling for changes in economic development.

Table 3.9. The impact of opening a stock exchange on democracy

This table presents the results of the difference-in-differences regression (3) used to calculate the effect of opening a stock exchange on the level of democracy of a country. The first two columns present the results for the full sample. The following two columns present the results for autocracies (countries with a Polity score lower than or equal to zero in the year before the opening of the stock exchange). The last two columns present the results for democracies (countries with a Polity score higher than zero in the year before the opening of the stock exchange). The pre-period is defined as the 10 year period before the stock exchange was opened. For each subsample, we present the results for a post-period defined as the 3 year period after the stock exchange was opened, as well as the 10 year period after the stock exchange was opened. All regressions include year fixed effects and robust standard errors (reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% level). We refer to Table B.1 of the Appendix for variable definitions and data sources.

	Full sample		**Autocracies**		**Democracies**	
	3 years	10 years	3 years	10 years	3 years	10 years
	(1)	(2)	(3)	(4)	(5)	(6)
Post × Treatment	-0.45	0.10	-1.38**	-1.13**	-1.82	0.14
	(-0.49)	(0.16)	(-2.12)	(-2.06)	(-1.65)	(0.16)
Treatment	-1.54***	-1.77***	-0.48	-0.93**	-0.60	-1.26*
	(-2.82)	(-3.37)	(-0.99)	(-2.10)	(-0.74)	(-1.75)
Post	0.89	0.25	0.81*	0.44	3.20***	1.66**
	(1.57)	(0.57)	(1.80)	(1.22)	(3.41)	(2.04)
Ln GDP	-1.27***	-1.12***	0.03	0.30*	0.71**	-0.01
	(-5.64)	(-6.34)	(0.15)	(1.87)	(2.10)	(-0.04)
Ln GDP per capita	-0.67***	-0.88***	-0.82***	-1.16***	3.52***	2.41***
	(-2.81)	(-5.19)	(-5.87)	(-10.83)	(5.97)	(5.10)
GDP growth	-0.03	-0.01	-0.02	-0.02	0.17**	0.21***
	(-1.51)	(-0.26)	(-1.60)	(-1.18)	(2.58)	(4.32)
Ln private credit/ GDP	0.88***	1.55***	-0.28	0.52**	-1.47*	-1.02*
	(3.18)	(6.98)	(-1.13)	(2.30)	(-1.85)	(-1.96)
Constant	28.67***	24.67***	8.62**	2.61	-32.84***	-13.15*
	(6.86)	(7.28)	(2.43)	(0.84)	(-4.10)	(-1.94)
Observations	662	1,016	401	619	261	397
R-squared	0.35	0.37	0.36	0.40	0.54	0.45
Year FE	YES	YES	YES	YES	YES	YES
Robust SE	YES	YES	YES	YES	YES	YES

understand whether political leaders stay longer in power because they benefit society at large (which would imply a positive effect on democracy) or a particular interest group (which would imply a negative effect on democracy).

In Table 3.9, the two central columns present the results for autocracies and the last two columns present the results for democracies. As expected, the coefficients of the interaction term are insignificant in democracies, but significant for both the three and the 10-year period in autocracies. When political leaders open a stock exchange in autocracies, the Polity score of the country remains relatively stable for the control group (the coefficients of the "post" dummy are only significant at the 10% level when we consider a 3 year post-period), but decreases by 1.38 points per year in the following 3 years, and 1.13 points per year in the following 10 years (in a scale of -10 to 10).

In Figure 3.3, we present the results of the difference-in-differences analysis graphically. For each subsample we present estimates of the treatment coefficient pooled in periods of 3 years. The parallel trends assumption holds in all subsamples: the difference in Polity score between the control and treatment group in the pre-period does not significantly differ from zero neither in the full sample, nor in autocracies or democracies. After the exchange is opened, however, the coefficients of treatment dummy became negative and statistically significant for all subsamples. This confirms that political institutions become less democratic when a stock exchange is opened.

In sum, the results presented in Table 3.9 and Figure 3.3 support the private goods view, according to which political leaders stay longer in power when they open a stock exchange because they benefit the elite that supports them, which in turn further slows down the democratization of political institutions.

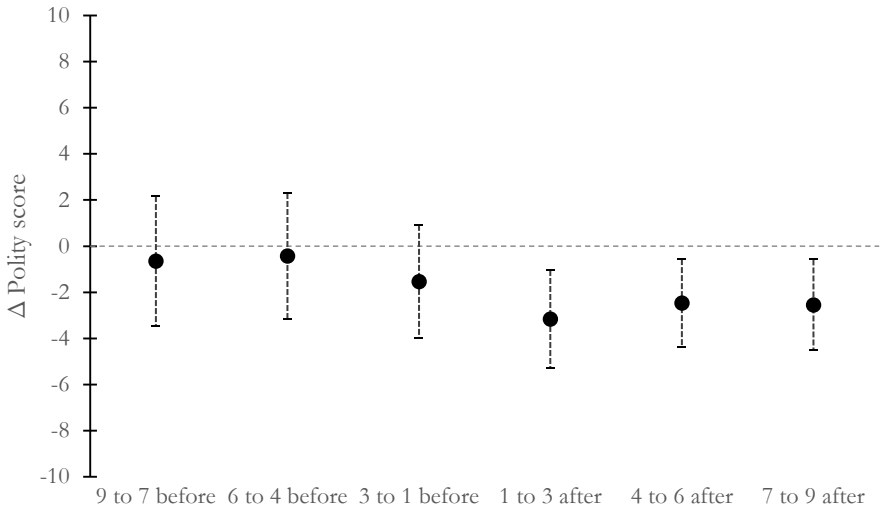
3.4.2.3. Stock market concentration and democratization of a country's institutions

The results thus far indicate that political leaders that opened a stock exchange stay longer in office, and that the level of democracy of political institutions decreases when

Figure 3.3. Impact of opening a stock exchange on democracy

This picture presents, pooled by periods of 3 years around the opening of a stock exchange (where negative (positive) numbers represent years before (after) the stock exchange was opened, starting (ending) 9 years before (after) the stock exchange was opened), the results of the regression $Polity\ score_{it} = a + \beta_1\ Treatment_i + \beta_2\ Ln\ GDP_{it} + \beta_3\ Ln\ GDP\ per\ capita_{it} + \beta_4\ GDP\ growth_{it} + \beta_5\ Ln\ private\ credit/\ GDP_{it} + \theta_t + \varepsilon_{it}$, where $Treatment_i$ is a dummy variable that takes the value 1 if the country opened a stock exchange, and zero otherwise, t represents the year around the opening of a stock exchange, and θ_t represents year fixed effects. The black dot in the picture represents the estimate of coefficient β_1. The dashed line represents the 95% confidence interval around the coefficient estimate. Panel A presents the results for the full sample. Panel B presents the results for the subsample of autocracies (country-years for which the Polity score is lower than or equal to zero). Panel C presents the results for the subsample of democracies (country-years for which the Polity score is higher than zero). We refer to Table B.1 of the Appendix for variable definitions and data sources.

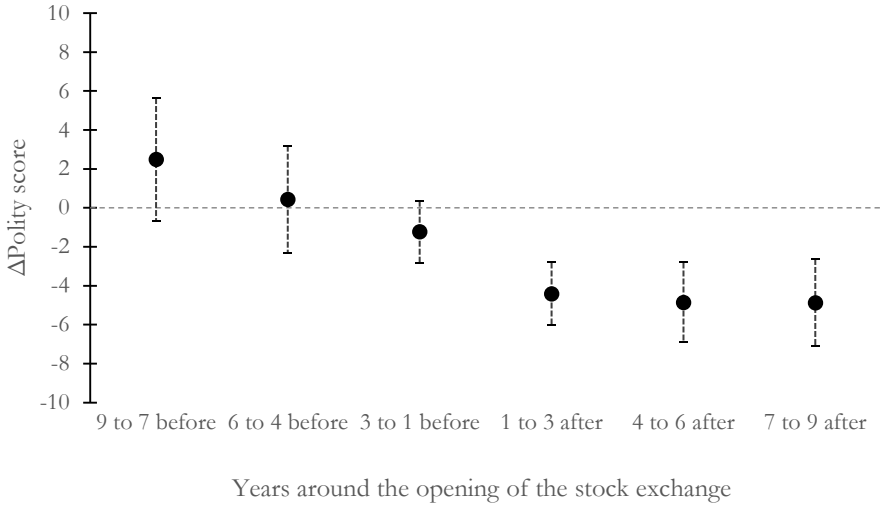
Panel A. Full sample



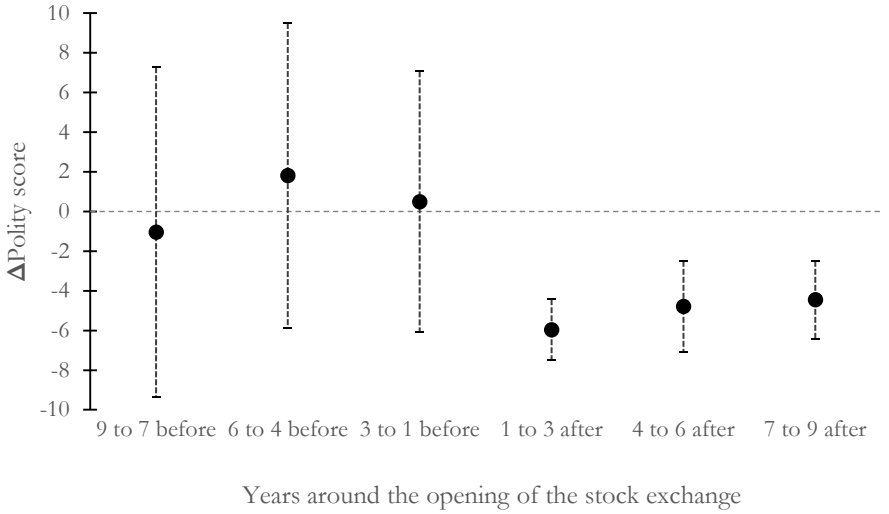
(continued on next page)

Figure 3.3. Impact of opening a stock exchange on democracy (continued)

Panel B. Autocracies



Panel C. Democracies



a stock exchange is opened. These results hold in autocracies, which suggests that rather than opposing the opening of a stock exchange, incumbents benefit from it. According to the private goods view, this could happen because the stock exchange disproportionally benefits a certain interest group. We collect further evidence on this channel by analyzing the companies listed in the stock exchange. The benefits of a stock exchange for society should be more limited if the listed companies is concentrated in a certain sector.

To test this hypothesis, we collect data on the companies listed in each stock exchange as of 2018 from several data sources.[18] The main sources are the stock exchanges' websites and the Orbis database (Bureau van Dijk). A description of these variables and their sources can be found in Panel D of Table B.1 in the Appendix.

Table B.6 in the Appendix presents, for each of the 34 newly opened stock exchanges, the number of companies listed in the stock exchange's website, and the number of listings included in the Orbis database (Bureau van Dijk) in 2018. The Orbis database reports data on 399 of the 533 companies listed in the stock exchanges' websites. For these companies, Table B.6 further reports the number of banks, the number of banks as a percentage of the number of listed companies, the number of sectors represented in the stock exchange, and the sector concentration of the stock exchange . Panels A and B of Table B.6 present, respectively, summary statistics for democracies and autocracies.

We find some evidence that stock exchanges in autocracies might benefit a smaller interest group than in democracies. The average number of listed companies in democracies (18.3) is higher than the average number of listed companies in autocracies (15.5), while the average number of listed banks as a percentage of total listed companies (weighted by the total number of listed companies in the stock exchange) is

[18] Time-series data on listed companies in African stock exchanges is limited. Therefore, we use the listed companies in 2018 in our analysis, thereby implicitly assuming that sector concentration of listed companies is relatively stable over time.

higher in autocracies (26.2% vs 16.4%). Sector concentration is only slightly higher in autocracies (HHI = 0.213) than democracies (HHI = 0.205).

In Table 3.10, we substitute our treatment dummy in regression (3) by the number of listings in a stock exchange, and interact it with bank concentration and sector concentration measures described in section 2. Our new treatment measure is a continuous measure that classifies countries that have not had an IPO (and therefore have no listings) as a control country, and assumes the effect of opening an exchange is the largest when more companies are listed. The interaction coefficients are, again, negative and statistically significant in autocracies only.

Hence, the negative effect of opening a stock exchange on the democratization of political institutions is larger if the listed companies are predominantly banks, and if the listings are highly concentrated in a certain economic sectors. This suggests that the more a certain interest group disproportionately benefits from the opening of the stock exchange, the larger the negative effect of opening the stock exchange on the democratization level of the political institutions.

3.4.3. Robustness checks

Some exchanges are officially opened for a long period before the first IPO takes place. We use this feature of the data to test whether the impact of opening a stock exchange is purely due to a "ceremonial" effect, or whether what really matters is whether the stock exchange is actually active. If the channels described above matter, the effect of opening a stock exchange on political survival should be larger if at least one company is listed in the stock exchange.

Figure B.2 and Table B.7 present the results of this analysis. Consistent with the previous results, the effect of opening a stock exchange on political survival is the largest if at least one company is listed in the stock exchange. The results are confirmed by Cox proportional hazards model (1) and Weibull regressions using these categories of political leaders, presented in Table B.8 in the Appendix. It is also worth noting that political leaders of countries in which a stock exchange is open but there has not been any IPO have much higher hazard ratios than political leaders of countries in which

Table 3.10. Stock market concentration and democratization of a country's institutions

This table presents the results of the difference-in-differences regression (3), where the number of listed companies reported in Orbis in 2018 is used as a continuous treatment variable. Additional interactions test the impact of bank and sector concentration on the effect of opening a stock exchange on the level of democracy of a country. The first two columns present the results for the interaction with the number of banks as a percentage of the number of listed companies. The following two columns present the results for the interaction with sector concentration (the Herfindahl-Hirschman-index of the sectors represented in each stock exchange, calculated as $I = \sum_{s=1}^{19}(N_s/N)^2$. *X* represents the interaction variable. The pre (post) period is defined as the 10 year period before (after) the stock exchange was opened. For each interaction, we present the results for autocracies (columns (1) and (3)) and democracies (columns (2) and (4)). All regressions include year fixed effects and robust standard errors (reported in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% level). We refer to Table B.1 of the Appendix for variable definitions and data sources.

	X = # banks/ # listed companies		**X = Sector concentration**	
	autocracies	democracies	autocracies	democracies
	(1)	(2)	(3)	(4)
X × Post × # listed companies	-0.37***	0.14	-0.48***	0.14
	(-3.26)	(0.64)	(-5.41)	(0.75)
X × Post	-2.44	0.55	-1.86*	0.32
	(-1.37)	(0.47)	(-1.70)	(0.26)
X	1.13	0.04	-0.11	-0.12
	(0.68)	(0.03)	(-0.11)	(-0.11)
Post × # listed companies	0.10***	-0.05**	0.07***	-0.06**
	(3.57)	(-2.14)	(3.63)	(-2.32)
Post	0.80**	1.47*	0.77**	1.52**
	(2.37)	(1.95)	(2.30)	(2.03)
# listed companies	-0.03	0.07***	-0.03	0.07***
	(-1.42)	(4.21)	(-1.45)	(4.18)
Ln GDP	0.40**	-0.32	0.51***	-0.33
	(2.43)	(-1.08)	(3.11)	(-1.07)
Ln GDP per capita	-1.25***	1.19**	-1.30***	1.19**
	(-9.13)	(2.06)	(-10.88)	(2.05)
GDP growth	-0.02	0.20***	-0.02	0.20***
	(-1.18)	(4.52)	(-1.17)	(4.55)
Ln private credit/ GDP	0.34	-0.49	0.42*	-0.50
	(1.49)	(-0.96)	(1.78)	(-0.97)
Constant	1.73	-0.49	-0.28	-0.38
	(0.55)	(-0.06)	(-0.09)	(-0.05)
Observations	619	397	619	397
R-squared	0.41	0.47	0.43	0.47
Year FE	YES	YES	YES	YES
Robust SE	YES	YES	YES	YES

there is no stock exchange. This may indicate that having a "dormant" stock exchange actually hurts the political leaders' survival, and shows that "ceremonial" exchanges actually do not benefit incumbents as much as active exchanges.

Another possible issue is that the health of the political leaders may affect their survival. Although we have no reason to believe that the health of political leaders of countries in which a stock exchange was opened systematically differs from that of political leaders of countries with no stock exchange, we verify the robustness of our results by excluding leaders that were replaced because of death, illness or accident. Table B.9 in the Appendix presents these results, which are similar to the main results of our analysis.

3.5. Conclusions

The political economy literature provides evidence of the importance of political institutions in shaping a country's financial development, but evidence on the feedback effect (how financial development affects political institutions) has so far been limited. In this paper, we contribute to the political economy literature by analyzing the political consequences of opening a stock exchange in 34 African countries over 1960-2016.

Based on the interest group theory of financial development (Rajan and Zingales, 2003), we hypothesize that financial development negatively affects the political survival of incumbent leaders, and that financial development leads to and a democratization of political institutions. We base this hypothesis on the assumption that incumbents are able to anticipate that financial development alters the allocation of power within a society by reducing the dominant elite's ability to capture financial and product market rents.

Using survival analysis we find that, contrarily to our prediction, political leaders in autocracies stay longer in power when they open a stock exchange. In a given year, the probability that a political leader in an autocracy is replaced if (s)he opened a stock exchange is around half the probability that he is replaced if (s)he did not open a stock exchange.

We explain this result by resorting to selectorate theory (Bueno de Mesquita, Smith, Siverson, and Morrow, 2003), and hypothesize that political leaders stay longer in power in autocracies because stock exchanges ameliorate the threat of contest of power by benefiting either society at large, or the elite that supports the autocrat.

Using a difference-in-differences analysis in which we compare changes in the democracy level of countries that opened a stock exchange to changes in the democracy level of a matched control group of countries that did not open a stock exchange, we find evidence of the second channel: democratization of political institutions is slowed down when political leaders open a stock exchange, suggesting that the opening of a stock exchange disproportionally benefits the incumbent elite, thereby further consolidating the autocrat's position.

Additional evidence of this channel is provided by taking into account differences in the sector concentration of listed companies in the stock exchange. The negative effect of opening a stock exchange on the democratization of political institutions is larger when this concentration is highest. This suggests the negative effect of opening a stock exchange on the democratization of political institutions is the largest when the interest group benefiting from the stock exchange is likely to be smaller.

Further evidence of this channel could be gathered by comparing inequality levels and economic competition across countries before and after the opening of the stock exchange. Unfortunately, however, we are not aware of the sufficient availability of such data for the time series and cross-section of countries in our sample.

This study highlights the importance of considering feedback effects caused by stock market development. We show that financial market development, besides the well-know economic consequences, also has important political consequences. We believe this is an important topic for future research.

Chapter 4.

Do index funds' family ties benefit the firms they own?[1]

4.1. Introduction

Over the past decade, there has been a rapid increase in the amount of assets managed by index funds. Even large mutual fund families traditionally known for their active style, such as Fidelity, have started to offer index funds. Unlike active funds, which aim at generating returns above a benchmark, index funds have the sole objective of replicating a benchmark's returns. This raises concerns about their role in corporate governance and, consequently, the impact of the rise of passive ownership on firm value (Wurgler, 2011). On the one hand, index funds lack the incentive to incur monitoring costs because this deteriorates their performance relative to the benchmark[2]. Schmidt and Fahlenbrach (2017) find that passive ownership negatively affects corporate governance when it comes to high-cost governance activities such as the choice of board members and monitoring mergers and acquisitions. On the other hand, because of their large long-term stakes in companies, index funds have incentives to pressure management to comply with, at least, standard governance requirements that demand no - or low - monitoring costs. Appel, Gormley, and Keim (2016) find evidence that passive investor ownership leads to better governance when it comes to

1 This Chapter is based on Albuquerque de Sousa, J.A., 2017, "Do index funds' family ties benefit the firms they own?" (available at https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3059128). I am grateful for the hospitality of the Department of Finance at the Haas School of Business (University of California at Berkeley) where some of the work on this paper was performed. I thank Thorsten Beck, Dion Bongaerts, Henrik Cronqvist, David Denis, Diane Denis, Mathijs van Dijk, Gelly Fu, Todd Gormley, Rogier Hanselaar, Sai Hong Kan, Ross Levine, Kai Li, Gustavo Manso, Ernst Maug, Laura Starks, Marta Szymanowska, Jerome Taillard, Francisco Urzúa Infante, Wolf Wagner, Renjie Wang, participants of the Brown Bag Seminar at Haas School of Business, participants of the Job Market Paper Special Session and Doctoral Consortium at the Financial Management Association (FMA) Annual Meeting 2017, and participants of the Erasmus Finance Day 2017 and the Erasmus University PhD seminar for helpful comments.

2 Similar to the free-rider problem as in Berle and Means (1932) and Shleifer and Vishny (1986).

standard governance activities, such as removing poison pills and staggered boards. In this paper, I contribute to this literature by identifying another mechanism through which index funds can affect firm governance and value: the existence of family ties between index and non-index[3] funds holding the same firm.

Family ties between active and passive funds within the same family should benefit firm governance and value because the two funds are more likely to be able to persuade management (either by informal engagement or by voting) to pursue a certain shareholder value maximizing strategy when acting together than when acting separately. When acting individually, passive funds lack the incentive to incur monitoring costs, like researching how to vote on a proxy fight. They are more likely to follow the advice of proxy advisors such as Institutional Shareholder Services (ISS) (Ertimur, Ferri, and Oesch, 2013; Larcker, McCall, and Ormazabal, 2015; Malenko and Shen, 2016). Although active funds are less likely to vote in a "one size fits all" manner (Iliev and Lowry, 2015) when acting individually, they are more likely to sell their shares and forego monitoring the firm, because their ownership stake is more likely to be under the voting threshold that would allow them to be able to influence management. When the two funds interact, however, the passive fund is able to vote informedly without incurring the monitoring cost, since it can simply follow the advice of the active fund. Empirical evidence shows that large mutual fund families economize on voting decisions by centralizing them: funds within the family vote in lockstep, but families vote substantially differently from each other (Choi, Fisch, and Kahan, 2013).[4] By pooling the votes of the active and passive funds, the family is more likely to be able to achieve the threshold that allows the active fund to be able to influence management.

3 In this paper, I use the terms "passive funds" and "index funds" interchangeably. These are funds that simply replicate a benchmark. I use the terms "active funds" and "non-index funds" to refer to all other types of funds.

4 Morgan, Poulsen, Wolf, and Yang (2011) find that mutual funds within a family don't vote in lockstep when proposals are initiated by shareholders. However, they do not investigate whether there is disagreement between different active funds or between active and passive funds. A possible reason for disagreement is competition between fund managers of active funds within the family (Kempf and Ruenzi, 2007).

The active fund is then less likely to sell its shares and more likely to monitor the firm, which increases firm value and consequently the fund's profit.

To formalize this mechanism, I develop a simple theoretical model based on Maug (1998). In Maug's (1998) model there are two types of investor: a blockholder and a continuum of households (uninformed liquidity traders). During the game, the blockholder chooses one of two strategies: purchase additional shares and monitor the firm, or sell its shares and not monitor the firm. As Maug (1998) shows, the blockholder's choice depends on four factors: its ownership stake relative to the threshold necessary to force management to implement a shareholder value maximizing strategy, the potential increase in firm value, the costs of monitoring, and the liquidity of the market. I adapt Maug's (1998) model by introducing a third type of investor: a passive fund (uninformed investor, not subject to liquidity shocks). I compare two situations in which 1) the blockholder (active fund) and the passive fund coordinate their actions – this situation represents the existence of family ties; and 2) the two funds act separately – this situation represents the absence of family ties.

I show that mutual fund family ties lead to an increase in the probability of monitoring and, consequently, higher firm value. An increased probability of monitoring (decreased probability of not monitoring) is associated with additional share purchases (less share sales) and higher firm value. This is crucial, because it makes the theory empirically testable: although the monitoring activities of mutual funds are not observable, their holdings and firm value are. An exogenous change in mutual fund family ties should lead to a higher probability of additional share purchases (c.q. lower probability of share sales) by active funds and, as a consequence, higher firm value.

Empirically, I test the impact of mutual fund family ties on the trading activity of active funds and on firm value by exploiting an exogenous source of variation in mutual fund family ties: the addition of firms to S&P indices[5]. When the addition occurs, index

[5] I do not include index deletions in my sample because removals from an index occur after a material change in the firm, like a merger or acquisition. Comparing firm value before and after the event would therefore constitute a major challenge.

funds automatically start holding the firm, irrespective of whether active funds within the same mutual fund family held that firm before it was added to the index. Therefore, the addition to the index serves as an exogenous "activation" of family ties. I test the predictions of the model by examining changes in holdings of the non-index fund, and changes in firm profitability and valuation.

My sample consists of all firms added to the S&P 400, 500, and 600 during the 1995-2011 period. I collect data on the ownership of these firms three years prior and three years after their addition to an index. I classify mutual funds as index funds (passive) if they are pure index funds that hold the full set of firms included in one of the indices. All other funds are classified as non-index funds. I later subdivide active funds into different investment styles. I perform a difference-in-differences analysis in which the treatment consists of the "activation" of family ties. The non-index fund-firm relation is assigned to the treatment group if there is an index fund in the same family that starts holding the firm after its addition to the index. Conversely, if no index fund in the same family starts holding the firm after its addition to the index, the non-index fund-firm relation is assigned to the control group. Consistent with the theoretical prediction, I find a positive relation between mutual fund family ties and the ownership stake of non-index funds. The result is robust to the inclusion of firm fixed effects, mutual fund fixed effects and controlling for several firm and fund time-varying characteristics.

To test the hypothesis that family ties lead to higher firm value, I use two proxies commonly used in the literature: Return on Assets and Tobin's Q. I aggregate the ownership stake of index funds that have family ties with non-index funds by firm. I find that firms are more profitable and have higher valuations when the ownership stake of index funds that have family ties with non-index funds is higher. The average firm in my sample is owned by 125 non-index funds before it is added to an index, of which 21 have family ties with index funds that hold the firm after it is added to the index. If this number increases by 50% to 31 funds, the firm's ROA increases from 13.9% to 14.5%, and its average Tobin's Q increases from 2.28 to 2.35.

To further explore whether this effect depends on the type of non-index fund, I consider differences in the investment style and investment horizon of those funds. Using a modified version of Bushee's (1998) methodology (also used in e.g. Aghion, van Reenen, and Zingales, 2013; He and Tian, 2013), I classify institutional investors in three groups: "dedicated" (large blockholders, with highly concentrated portfolios and low turnover), "transient" (investors with lower stakes in a single firm, more diversified portfolios, and high turnover, related to the firm's earnings) and "quasi-indexed" (investors with diversified portfolios and low turnover).[6] I find that the effect of family ties is larger when the non-index fund has a "dedicated" relation with the firm. This is consistent with the notion that the higher stake of the blockholder in the firm, the easier it is to realize the benefits of monitoring. However, mutual fund family ties between "transient" non-index funds and index funds also have a positive impact, although more modest, on firm profitability and valuation.

I verify the robustness of my results by investigating how the effect of family ties on firm valuation varies across industries with different levels of innovative activity. The effect of mutual fund family ties on firm value should be larger when firms stand to benefit the most from monitoring, i.e., when the costs of monitoring are the lowest relative to the potential increase in firm value. Firms in more innovative industries should fall into this category[7]. I use Kogan, Papanikolaou, Seru, and Stoffman's (2017)

[6] Although there is general consensus about the role of "dedicated" investors in spurring firm value, there is a heated debate as to whether transient investors can achieve the same results. Some authors argue that "transient" investors can effectively govern through the threat of exit (Stein, 1988, 1989; Admati and Pfleiderer, 2009; Edmans, 2009; Edmans and Manso, 2010; Dasgupta and Piacentino, 2015; Bebchuk, Brav and Jiang, 2015 find similar results for hedge fund activists). Other authors find no evidence that "transient" investors are able to influence firm's investment and innovation, or even argue that transient investors' short termism negative impacts firm innovation (Cella, 2009; Asker, Farre-Mensa, and A. Ljungqvist, 2014; Chemmanur and Tian (2013) find that anti-takeover provisions spur corporate innovation).

[7] Innovative activities are difficult to finance because of asymmetric information between the entrepreneur and the investor (Akerlof, 1970; Leland and Pyle, 1977), the cost of revealing information to competitors (Bhattacharya and Ritter, 1983; Anton and Yao, 2002), moral hazard between the entrepreneur and the investor (Jensen and Meckling, 1976), investor short-term pressure (Porter, 1992) which may cause manager career concerns (Holmström, 1999; Narayanan, 1985; Miller and Rock, 1985; Stein, 1989; Shleifer and Vishny, 1990; von Thadden, 1995; Kaplan and Minton, 2006) and managers preference for a "quite life", not exerting enough effort to innovate (Hart, 1983; Bertrand and Mullainathan, 2003). Finally, entrenched managers may simply shirk (Aggarwal and Samwick, 2006).

empirical findings on the innovation levels of several industries to classify firms' industries as "less innovative", "innovative", and "highly innovative". I then redo my previous analysis split by industry innovation intensity. I find that the effects are higher in more innovative industries, which are more likely to benefit from better monitoring ex-ante.

This paper contributes to the ongoing debate about the extent to which institutional investors are able to increase firm value through different channels: voice (by exercising their voting rights), engagement with the firm ("jawboning"), and exit (selling their stake in the firm, the "Wall Street walk"). Much attention has been given to how different types of institutional investors use these channels to pressure firm managers to pursue shareholder value maximizing strategies.[8] However, as Edmans and Holderness (2017) point out, we still know too little about how different types of investors interact to influence firm governance. Some recent papers have investigated the impact of interactions between different types of institutional investors on firm governance, but none of them has analyzed interactions between different types of funds within the same mutual fund family. Appel, Gormley, and Keim (2016b) find that activist hedge funds seek the support of passive mutual funds in proxy fights. This leads to an increased probability of success of hedge fund activist campaigns. Crane, Koch and Michenaud (2016) find that different institutions connected to the same network ("cliques") vote similarly on proxy items. The effect of interactions between funds within the same institution described in this paper is more direct than the effects considered in previous literature. I also contribute to the growing literature on mutual fund family ties, which generally focuses on transactions between funds within a fund family (Gaspar, Massa and Matos, 2006; Goncalves-Pinto and Schmidt, 2013; Aggarwal

[8] Despite evidence that institutional investors positively affect firm governance through the channels of voice and exit (Stein, 1988, 1989, Gillan and Starks, 2003; Ferreira and Matos 2008; Hartzel and Starks, 2008; Admati and Pfleiderer, 2009; Edmans, 2009; Edmans and Manso, 2010; Aggarwal, Erel, Ferreira, and Matos, 2011; Manso, 2011; Aggarwal, Saffi, and Sturgess, 2015; Bena, Ferreira, Matos, and Pires, 2015; Boone and White, 2015; Harford, Kecskes, and Mansi, 2015; Dasgupta and Piacentino, 2015; Gianetti and Yu, 2016), some authors argue that the short-termism of some institutional investors is detrimental to firm value (Cella, 2009; Asker, Farre-Mensa, and A. Ljungqvist, 2014).

and Zhao, 2016; Goncalves-Pinto and Sotes-Paladino, 2016) and is largely oriented towards the effect of family ties on fund performance. This paper provides a different perspective on the importance of mutual fund family ties.

4.2. Theoretical framework

To theoretically identify the mechanisms through which mutual fund family ties may impact firm value, I largely follow Maug's (1998) model for two reasons: first, because it is a widely used model in the corporate finance literature that shows that blockholders are able to impact firm governance through the "voice" channel. Second, because the model allows me to calculate the probability that a blockholder will monitor a firm. In this model, blockholders decide whether to monitor a firm by weighing its benefits and costs. Monitoring is costly, but it increases firm value. The blockholder monitors a firm when the benefits of monitoring outweigh its costs. If the blockholder decides to monitor a firm, she buys additional shares of the firm when uninformed investors suffer a liquidity shock and realizes a profit if she can camouflage her trade and buy shares for a price below the firm's intrinsic value. If the blockholder decides not to monitor a firm, she sells shares to uninformed investors and realizes a profit if she can camouflage her trade and sell the shares for a price above the intrinsic value. The setting and notation below follow Maug (1998).

I assume an economy that has only one firm. The payoff of the firm's assets is $\tilde{v}$. In their current use, the assets are worth L. However, the firm can be restructured so that the expected payoff of its assets increases to H, where $L < H$. The incumbent manager of the firm is assumed not to be willing to restructure the firm. In Maug's (1998) model there are two types of investor: a blockholder F and a continuum of households. I add to Maug (1998) by introducing another type of blockholder, f. The two blockholders model, respectively, a non-index and an index mutual fund.[9] Below,

[9] I use the term "blockholders" because mutual funds have large ownership stakes in firms. There is little consensus in the literature about which ownership threshold identifies a blockholder (see Edmans and Holderness, 2017 for a survey of the literature). Most studies use the threshold of 5%. The ownership stake of several mutual funds (both active and passive) is higher than this threshold.

I define the characteristics of these two types of blockholders and present comparative statics of two situations: in the first situation, the two blockholders act together and share payoffs at the end of the game. In the second situation, the two blockholders act separately and each collects its own payoff at the end of the game. This represents the two blockholders either belonging to the same mutual fund family or acting independently.[10]

The number of shares in the firm is normalized to 1. Blockholders F and f hold respectively a_F and a_f, $a_F + a_f = a$, of the firm's shares, and a continuum of households holds an equal amount of shareholdings, totalizing $1 - a$. All investors are risk neutral and also invest in a risk-free asset. Blockholder F distinguishes itself from households and blockholder f in that it can monitor the firm for a cost c_M, thereby raising the expected payoff of the firm to H.[11] In this model, monitoring represents all different activities aimed at increasing firm value, and can consist of direct confrontations with management (public, e.g. a proxy fight, or private, e.g. "jawboning"), researching how to vote in an annual meeting, and/ or replacing management. Monitoring is, however, costly. Costs of monitoring include, but are not limited to, fundamental analysis of the firm, research aimed at reaching voting decisions, and approaching other investors to achieve support in a proxy fight.[12]

4.2.1. Timing of events

The model consists of a game with five periods. The timing of events is given in Figure 4.1. At $t = 1$, the shares of the firm are sold for a price P_0. At $t = 2$, blockholder F

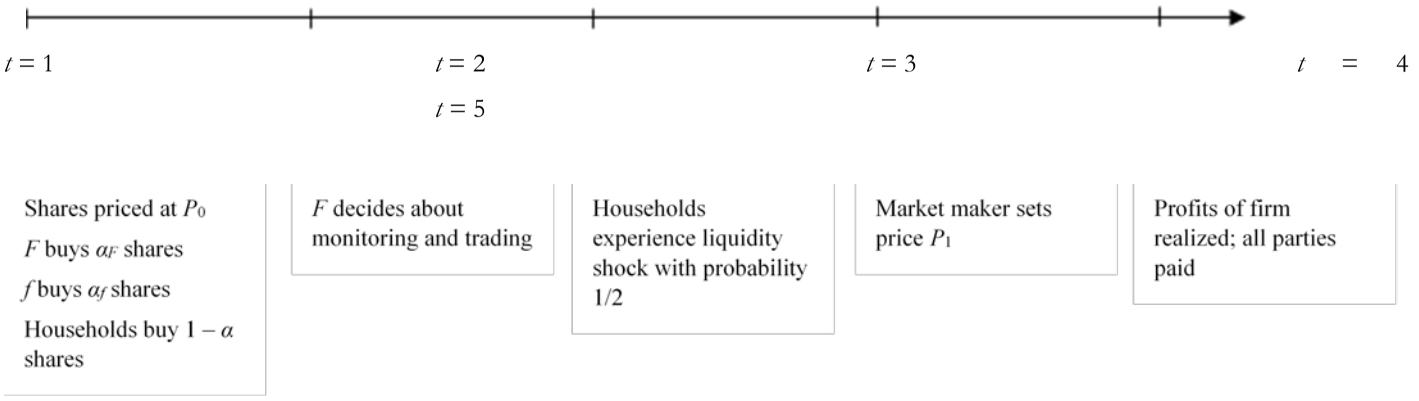
[10] As I show later, the assumption that the two blockholders share payoffs at the end of the game is not a necessary condition for the predictions of the model to hold.

[11] The assumption that blockholder f cannot monitor the firms follows the intuition that any monitoring cost incurred by an index fund would deteriorate its performance relative to the benchmark.

12 There is abundant empirical evidence to support the argument that institutional investors can alleviate information asymmetry and agency problems through monitoring and engagement with managers (Gillan and Starks, 2003; Ferreira and Matos 2008; Hartzel and Starks, 2008; Aggarwal, Erel, Ferreira, and Matos, 2011; Manso, 2011; Aggarwal, Saffi, and Sturgess, 2015; Bena, Ferreira, Matos, and Pires, 2015; Boone and White, 2015; Harford, Kecskes, and Mansi, 2015; Gianetti and Yu, 2016). Aghion, Van Reenen, and Zingales (2013), and Wang and Zhao (2015) find that active institutional ownership has a positive effect on innovation by mitigating career concerns.

Figure 4.1. Theoretical framework: timing of events

The figure below depicts the sequence of events as described in section 4.2, which largely follows Maug (1998).



decides whether or not to monitor the firm and whether to trade. At $t = 3$, with a probability 1/2, ϕ households, $0 < \phi < 1$, suffer a liquidity shock that forces them to sell their assets. The ex-ante probability that a household will suffer a liquidity shock is therefore $\phi/2$. Unlike households, blockholders are not subject to liquidity shocks.[13] As in Kyle (1985), market participants submit their orders to a market maker who observes total net order flow y. Unlike blockholder F, blockholder f does not trade with households, it just holds the firm passively.[14] The market maker sets the price of the security at $t = 4$, according to its expected value, conditional on the order flow: $P_1 = E(\tilde{v}|y)$. At the end of the game ($t = 5$), the firm's profits are realized and all parties are paid.

4.2.2. Expected payoffs from monitoring and buying additional shares

I solve the model backwards, initially taking blockholder F's initial stake as exogeounsly given. In the next section, I endogenize this stake. The initial stake of the other players at $t = 1$ is also taken as given, and takes the values mentioned above. With probability 1/2, ϕ households suffer a liquidity shock at $t = 3$, and sell a total of $\phi(1 - a)$ shares. The more shares the blockholders hold, the lower the sales of households when a liquidity shock hits. This impacts blockholder F's monitoring and trading decision at $t = 2$.

Blockholder F's strategy with respect to monitoring and trading is modelled as in Maug (1998): with probability q, blockholder F buys a quantity $x_B > 0$ shares in the firm and monitors ("buying and monitoring"; with probability $1 - q$, blockholder F buys a quantity $x_S < 0$ (sells) shares in the firm and does not monitor ("selling and not monitoring"). As shown in Maug (1998) and below equation (2.9), these two strategies dominate the strategies of "buying and not monitoring", and "selling and monitoring".

13 This simplifying assumption (which may seem unrealistic because mutual funds are, in reality, also subject to liquidity shocks) does not alter the results of the model. As long as the probability of suffering a liquidity shock is lower than (or uncorrelated with) the probability that households suffer a liquidity shock, F will still trade with households when it decides to monitor and does not suffer a liquidity shock.
14 This is a simplified way of representing the fact that these funds simply hold a benchmark and cannot use the "exit" channel.

To be effective in its monitoring, F needs to control a sufficient number of shares μ. This number of shares does not need to be 0.5. It can either be larger, e.g., if the decision requires a larger amount of votes, or lower, because F may be able to influence the voting of other shareholders. Voting coordination between index and non-index funds within the same family can, therefore, be interpreted in this model in two ways: a decrease in the cost of monitoring, c_M, or a decrease in the threshold μ.[15]

At $t = 3$, blockholder F and the households submit their trading orders anonymously, and the market maker sets prices according to the total order flow received. Note that although an extra participant is present, blockholder f, order flows and the pricing process remain unchanged, since blockholder f does not trade. To be able to profit from trading, blockholder F must be able to camouflage its order flow. This implies that:

$$x_B - x_S = \phi(1 - a) \tag{2.1}$$

This quantity makes it impossible for the market maker to distinguish between the cases in which blockholder F buys and households sell, and the case in which blockholder F sells and the households are not subject to a liquidity shock. As in Maug (1998), I assume, for simplicity, that blockholder F chooses symmetric trading quantities $x_B = -x_S = \phi(1 - a)/2$. This assumption does not affect the results because blockholder F's trading intensity is co-determined by the randomizing probability q. Define this trading quantity as $u \equiv \phi(1 - a)/2$. Under these circumstances, the three possible realizations of the order flows and prices are as presented in Table 4.1: 1) $P_1 = H$, when total order flow equals u (blockholder F buys and households do not sell); 2) $P_1 = qH + (1 - q)L$, when total order flow is $-u$ and blockholder F is able to camouflage its trade*; and* 3) $P_1 = L$, when total order flow equals -3u (both blockholder

[15] In this analysis, I compare the situation in which both blockholders act individually to the situation in which in which they share payoffs. I assume the costs of monitoring are equal in both situtations. As I show later in the analysis, if monitoring costs are lower when an active and passive mutual fund belong to the same family, the assumption that blockholders share their payoffs is not necessary to justify the predictions of the model.

Table 4.1. Theoretical framework: order flows and market prices

This table presents the possible order flows and prices set by the market maker once households are hit by a liquidity shock, as in Maug (1998). Variable definitions can be found in section 4.2.

Value	Probability	Order flow	Transactions	Price
H	$q/2$	u	F buys u HH sell 0	H
H	$q/2$	$-u$	F buys u HH sell $2u$	$qH + (1-q)L$
L	$(1-q)/2$	$-u$	F sells u HH sell 0	$qH + (1-q)L$
L	$(1-q)/2$	$-3u$	F sells u HH sell $2u$	L

F and households sell). Hence, the expected prices per share when *F* buys and sells are, respectively:

$$E(P|B) = \frac{H}{2} + \frac{qH + (1-q)L}{2} \tag{2.2}$$

$$E(P|S) = \frac{L}{2} + \frac{qH + (1-q)L}{2} \tag{2.3}$$

The expected payoffs from buying and selling will differ in the cases in which blockholder *F* and *f* act together and share profits, and the case in which both blockholders act separately. The expected payoffs from buying in the two cases are, respectively:

$$u[H - E(P|B)] + a_F H - c_M + a_f H = \frac{\phi(1-a)}{2}\ \frac{1-q}{2}(H-L) + a_F H - c_M + a_f H \tag{2.4}$$

$$u[H - E(P|B)] + a_F H - c_M = \frac{\phi(1-a)}{2}\ \frac{1-q}{2}(H-L) + a_F H - c_M \tag{2.5}$$

The first term in both expressions represents the gains from blockholder *F*'s trading. The second term represents the return to her initial portfolio holdings, and the third term represents her monitoring costs. The fourth term in expression (2.4) represents the return on the initial portfolio holdings of blockholder *f*. This term is not present in equation (2.5), when the two blockholders do not act together. Therefore, the expected payoff from buying is higher when blockholders *F* and *f* act together, for any $a_f > 0$.

Similarly, the expected payoff from selling and not monitoring in both cases can be expressed by:

$$-u[L - E(P|S)] + a_F L + a_f L = \frac{\phi(1-a)}{2}\ \frac{q}{2}(H-L) + a_F L + a_f L \tag{2.6}$$

$$-u[L - E(P|S)] + a_F L = \frac{\phi(1-a)}{2}\ \frac{q}{2}(H-L) + a_F L \tag{2.7}$$

For the same reason as above, the expected payoff from selling is higher in the case in which both blockholders act together. The market maker sets prices so as to

make blockholder F be indifferent between buying and selling. Therefore, the randomizing probability q makes (2.4) and (2.6) equal when blockholders F and f act together, and (2.5) and (2.7) equal when the two blockholders act separately. In the two cases, the randomizing probability q assumes, respectively, the values:

$$q_1 = \frac{1}{2} - \frac{2(c_M - a\,(H - L))}{\phi(1 - a)(H - L)} \tag{2.8}$$

$$q_2 = \frac{1}{2} - \frac{2(c_M - a_F\,(H - L))}{\phi(1 - a)(H - L)} \tag{2.9}$$

Assuming blockholder F's total stake after purchasing additional shares is sufficient to exercise voting control (i.e. $\geq \mu$), she monitors with probability q.

If q were higher, it would always be profitable to "sell and not monitor". If q were lower, it would always be profitable to "buy and monitor". Randomizing probability q must lie in the unit interval. If expressions (2.8) and (2.9) exceed 1, then F buys and monitors with certainty ($q = 1$). If expressions (2.8) and (2.9) are negative, then F sells and does not monitor ($q = 0$). In any equilibrium, the price lies between the two payoffs H and L. Therefore, any other strategy is dominated by the two strategies above: "buy and not monitor" yields a profit of $E(P|B) - H \leq 0$ per share, and "sell and monitor" yields a profit of $L - E(P|B) \leq 0$ per share, whereas "sell and not monitor" and "buy and monitor" always yield strictly positive profits per share.

Note that, even if the assumption that mutual fund families maximize the joint payoffs does not hold (in which case the probability that the active fund will monitor the firm is given by (2.8) irrespective of whether or not the fund has family ties with the index fund), the probability that the fund will monitor is still higher due to the lower cost of monitoring when the two funds belong to the same family.

The randomizing probability q can be seen as an indicator of welfare: an increase in q yields a welfare increase of $\Delta q(H - L - c_M) > 0$. The difference in welfare between the two cases in which the two blockholders act together or separately is given by:

$$\Delta q(H - L - c_M) = (q_1 - q_2)(H - L - c_M) = \frac{2a_f}{\phi(1 - a)}\,(H - L - c_M) \tag{2.10}$$

Expression (2.10) is strictly positive. When blockholder *F*'s stake is taken exogenously, welfare is higher when blockholders *F* and *f* act together than when blockholders act separately. The welfare gain is proportional to blockholder *f*'s stake in the firm.

4.2.3. Endogenizing blockholder F's initial stake

In the previous analysis, all initial holdings were assumed to be exogenously given. In this section, I take the initial stake of blockholder *f* and the households as exogenous and endogenize blockholder F's holdings. I proceed as Maug (1998) by setting the initial price to reflect the valuation of households. In case they receive a liquidity shock, with probability $\phi/2$, households expect to receive P_1, set by the market maker. The households loose money if they have to sell their shares at $P_1 = qH + (1 - q)L$ while they are intrinsically worth *H*. This happens with probability $q\phi/2$. Therefore, at $t = 0$, shares are sold at an adverse selection discount, equivalent to *F*'s trading gains per share. P_0 is given by:

$$P_0 = qH + (1 - q)L - \frac{q\phi}{2}\ (qH - (qH + (1 - q)L)) = qH + (1 - q)L - G \qquad (2.11)$$

The expected trading profits of blockholder *F* can be calculated by multiplying the profits from buying at $t = 4$ by *q*, and the profits from selling by $1 - q$:

$$(1 - a)\left[\frac{\phi}{2} q(1 - q)(H - L)\right] \equiv (1 - a)G \qquad (2.12)$$

where *G* represents the expected trading profits per share by households. The expected trading profits are the same irrespectively of whether the two blockholders act together or separately. Expected net trading profits are therefore:

$$(1 - a)\ G\ -\ qc_M \qquad (2.13)$$

Total benefits from the initial purchase are calculated as the initial stake multiplied by the price difference. These benefits include the payoff from the initial purchase of blockholder *f* when the two blockholders act together. When the two blockholders act separately, total benefits of the initial purchase refer solely to the benefits of

blockholder F. Benefits from the initial purchase in the two cases are then given, respectively, by:

$$a(qH + (1 - q)L - P_0) = aG \tag{2.14}$$

$$a(qH + (1 - q)L - P_0) = a_F G \tag{2.15}$$

Adding both sources of profits (trading and initial purchase) yields a total profit of, respectively:

$$(1 - a)G - qc_M + aG = G - qc_M \tag{2.16}$$

$$(1 - a)G - qc_M + a_F G = G(1 - a_F) - qc_M \tag{2.17}$$

Maximizing total profits with respect to blockholder F's initial stake, a_F, results in an endogeneized initial stake, for each of the two cases, of respectively:

$$\hat{a}_{F1} = \frac{c_M}{2(H - L) - c_M} - a_f \tag{2.18}$$

$$\hat{a}_{F2} = \frac{c_M\ (1 - a_f)}{2(H - L)(1 - a_f) - c_M} \tag{2.19}$$

Using the endogenous initial stakes of blockholder F in the two cases to calculate the equilibrium probability q as in (2.8) and (2.9) yields:

$$\hat{q}_1 = \frac{1}{2} - \frac{c_M}{\phi(H - L)} \tag{2.20}$$

$$\hat{q}_2 = \frac{1}{2} - \frac{c_M}{\phi(H - L)(1 - a_f)} \tag{2.21}$$

This result shows that the presence of blockholder f effectively diminishes the probability of buying and monitoring of blockholder F when the two do not act together. This leads to hypothesis 1 of this paper:

HYPOTHESIS 1: *Mutual fund family ties between index and non-index funds lead to higher probability of "buying and monitoring" by non-index funds.*

This effect comes from two sources: first, the reduced cost of monitoring when the two funds belong to the same family. Second, the higher expect payoff when the family maximizes joint profits.

4.2.4. Welfare consequences

Expressions (2.20) and (2.21) can be used to calculate de welfare consequences of the two blockholders acting together in contrast to their acting separately, as in (2.10):

$$\Delta q(H - L - c_M) = (q_1 - q_2)(H - L - c_M) = \frac{c_M a_f}{\phi(H - L)(1 - a_f)} (H - L - c_M) \qquad (2.22)$$

Expression (2.22) leads to hypothesis 2 of this paper:

HYPOTHESIS 2: *Mutual fund family ties between an index and a non-index funds lead to higher firm value. This increase in firm value is positively related to the ownership stake of the index fund.*

The two hypotheses introduced above are empirically testable. Although mutual funds' monitoring activities are not observable, their holdings and firm value are. Mutual fund family ties should lead to additional share purchases by active funds, and higher firm value. In the following section, I empirically test these two hypotheses.

4.3. Sample selection, data sources and summary statistics

4.3.1. Sample of additions

My sample consists of firms added to the S&P Composite 500 (introduced March 31st, 1964), S&P Midcap 400 (June 1st, 1991), and S&P Small cap 600 (October 1st, 1994) indices in the 1995-2011 period[16]. These indices are mutually exclusive in terms of firms included, and together they constitute the S&P Composite 1500 Index (January 1st, 1967). To identify the firms added to each of these indices, I use the COMPUSTAT Index Constituents Database, available from Wharton Research Data Services (WRDS).

4.3.2. Firm characteristics, liquidity, investment, profitability and valuation

Data on firm characteristics, investment, and variables necessary to compute firm profitability (Return on assets) and valuation (Tobin'Q) are gathered from

[16] My sample starts in 1995 because the youngest of the three indices - the S&P Small cap 600 - was introduced in 1994. The sample ends in 2011 for two reasons: 1) my analysis window runs up to three year after firms were added to an index; 2) although data on mutual fund ownership is available until 2015, investment companies often do not report their holdings immediately. Therefore, data reported on the 2015 holdings might be incomplete.

COMPUSTAT, using the firms' GVKEY identifier. Table C.1 in the Appendix reports definitions of all the variables used in the analysis. I collect data on all variables starting four years before the year of addition to the S&P index (necessary to calculate growth variables on the third year before addition to the index), and extended to 3 years after the year of addition, so that I can investigate the long-term effects of the addition.

I construct a measure of the innovation intensity of a firm's industry by using the summary statistics for patent values across industries reported in Kogan, Papanikolaou, Seru, and Stoffman (2017) (reproduced in Table C.2 of the Appendix). I divide the 30 FF industries according to their level of innovation, and construct 3 categories of industry innovation intensity (i.i.i.): highly innovative industries (i.i.i. = 3), innovative industries (i.i.i. = 2) and less innovative industries (i.i.i. = 1).

From CRSP, I collect data on stock returns, bid ask, and trading volume, using the firm's PERMNO. These variables are used to calculate the measures of liquidity, as described in Table C.1 in the Appendix. Data on the number of analysts covering a firm is collected from I/B/E/S.

4.3.3. Mutual fund characteristics and holdings

Following section 30(d) of the Investment Company Act of 1940, mutual funds are required to report their holdings using the N30D, N-30B-2, N-CSR, N-CSRS, and N-Q filings. The Thomson Reuters S12 Mutual Fund Holdings Database, available from WRDS, uses the abovementioned filings as the primary source for mutual fund holdings data. I gather data on mutual fund ownership for the additions in my sample from this database,[17] and merge these funds with the CRSP Mutual Fund data using MFLINKS available on WRDS. From both datasets, I collect data on assets under management and holdings. I identify mutual fund families using CRSP's Mutual Fund database manager names and codes.

[17] The COMPUSTAT Index Constituents Database reports additions by the header CUSIP. I use the Center for Research in Security Prices (CRSP)/ COMPUSTAT Merged (CCM) Database available on WRDS to gather the historical CUSIP numbers of the firms added. I download ownership data for all those historical CUSIP numbers from the Thomson Reuters S12 Database.

4.3.4. S&P index funds

To identify S&P index funds (mutual funds that replicate the S&P indices), I follow a methodology similar to Busse and Tong (2012), Iliev and Lowry (2015), and Appel, Gormley and Kim (2016). I first merge Thomson Reuters S12 data with CRSP Mutual Fund data using MFLINKS available on WRDS. Since I am only interested in mutual funds that fully replicate the S&P indices, I flag funds that contain a string that identifies them as S&P index funds[18] or if the CRSP Mutual Fund database identifies them as S&P index funds. I exclude mutual funds when their name suggests that the fund owns only a specific subset of S&P stocks, or a different S&P index[19]. Furthermore, I verify whether the funds holds 400, 500 or 600 (+/-10%) stocks.

4.3.5. Summary statistics

As Table 4.2 shows, there were 2,466 additions to the three indices in this period. Panel A of Figure 4.2 shows the number of additions per year and per index. Several of these additions correspond to the same firms, which have been added to an index, removed, and re-added later to the same or to another index. The number of unique firms in the sample is 2,070. Table 4.3 shows the number of additions according their sequence since the inception of the first index (S&P Composite 500). The table also reports whether the addition is a "downgrade" (move to a lower index in terms of market capitalization), an "upgrade" (move to a higher index in terms of market capitalization) or a re-addition to the same index, if the addition is not the first. Moreover, I report the number of additions excluding cases in which another addition (deletion) has taken place 3 years after (before) the current addition. The number of unique firms that have a first addition to an index and no deletion 3 years after this first event is 1,034. In the analysis, I consider all firms, and verify the robustness of my results by including only

[18] I use the strings *Index, INDEX, Idx, Indx, Ind_, IND*, *S & P, S and P, S&P, SandP, _SP_, 400, 500, and 600* (where _ indicates a space) to identify mutual fund as a passive mutual funds that follow an S&P index. I use the strings in Appel, Gormley, and Keim (2015) to identify other passive funds.

[19] I drop mutual funds containing the words *100, 1500, REIT, SML, GROWTH, VALUE, QUALITY, ENHANCED, PLUS, STRATEGY, OPPORTUNITIES, STARS, DYNAMIC, SELECT, TRACKER, GLOBAL, EUROPE, NORTH AMERICA, SECTOR*, and funds that mention a specific sector.

Table 4.2. Sample of additions

This table presents the number of firms added to the three S&P indices in the 1995-2011 period. Each row represents a different year. Each column reports the number of firms added to a different index. The first three columns show the total number of additions for each of the three indices across all years. The three columns in the middle show the number of additions that are not followed (preceded) by another addition (deletion) within a period of three years. The last three columns present the number of additions that are not preceded by any other addition since the inception of the corresponding index. The last row of the table shows the total number of unique firms in each of the three categories described above.

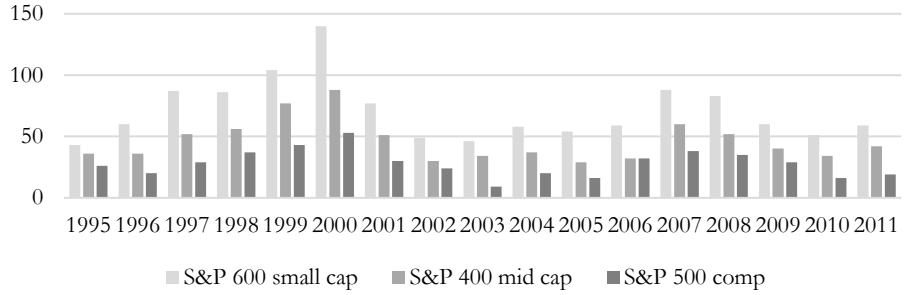
	Total sample			**No other addition (deletion) 3 years later (earlier)**			**First addition, no other addition (deletion) 3 years later (earlier)**		
Year of addition	**S&P 600**	**S&P 400**	**S&P 500**	**S&P 600**	**S&P 400**	**S&P 500**	**S&P 600**	**S&P 400**	**S&P 500**
1995	43	36	26	32	16	22	24	15	9
1996	60	36	20	37	18	14	32	13	7
1997	87	52	29	51	20	23	41	18	10
1998	86	56	37	45	24	24	40	9	4
1999	104	77	43	49	45	25	44	29	4
2000	140	88	53	94	50	28	79	32	10
2001	77	51	30	54	34	21	49	21	11
2002	49	30	24	36	22	19	33	13	9
2003	46	34	9	30	23	7	21	7	3
2004	58	37	20	42	28	13	34	9	3
2005	54	29	16	33	12	13	32	9	4
2006	59	32	32	33	20	21	28	10	14
2007	88	60	38	55	46	27	51	24	14
2008	83	52	35	59	33	25	47	13	9
2009	60	40	29	40	26	23	36	8	9
2010	51	34	16	38	25	14	32	7	3
2011	59	42	19	47	28	13	34	12	5
Subtotal	**1,204**	**786**	**476**	**775**	**470**	**332**	**657**	**249**	**128**
Total		**2,466**			**1,577**			**1,034**	
Unique firms		*2,070*			*1,396*			*1,034*	

Figure 4.2. S&P additions 1995-2011

The figures below depict the number of firms added to the three S&P indices in the 1995-2011 period. Each year is depicted in the x-axis. The y-axis reports the number of firms added to a different index. Panel A shows the total number of additions for each of the three indices across all years. Panel B shows the number of additions that are not followed (preceded) by another addition (deletion) within a period of three years. Panel C presents the number of additions that are not preceded by any other addition since the inception of the corresponding index. The last row of the table shows the total number of unique firms in each of the three categories described above.

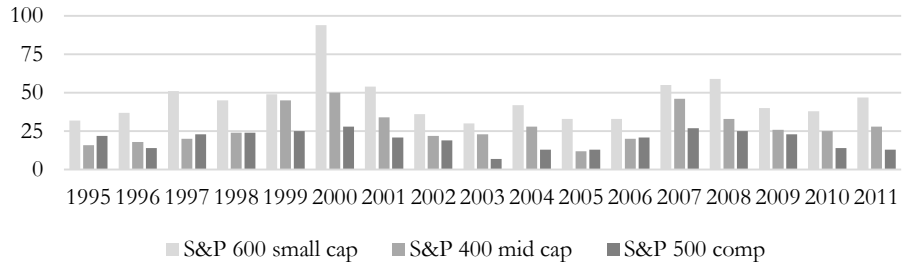
Panel A. Full sample

Total: 2,466 additions
2,070 unique firms



Panel B. No other addition (deletion) 3 years later (earlier)

Total: 1,577 additions
1,396 unique firms



Panel C. First addition, no other addition (deletion) 3 years later (earlier)

Total: 1,034 additions, unique firms

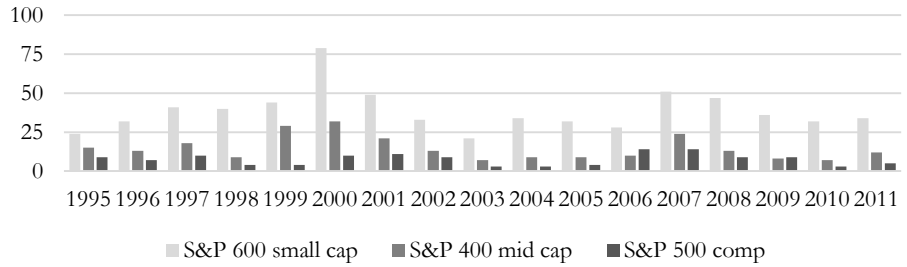


Table 4.3. Sample of additions - sequence

The tables below present the number of additions since the inception of the S&P indices according to the sequence of the addition, for the whole sample period (1995-2011). Panel A presents statistics for the whole sample, Panel B presents statistics for additions that are not followed (preceded) by another addition (deletion) within a period of three years. The first row presents the number of first additions since the inception of the S&P indices to each of the three indices. The following rows present the number of additions that have been preceded by one or several other additions. A second addition can be the result of a re-addition (when the firm has been deleted from the index, and later re-added to the same index), a "downgrade" (when the firm has been deleted from an index for larger firms and added to an index for smaller firms), or an "upgrade" (when a firm has been deleted from an index for smaller firms and added to an index for larger firms). Each column of the table presents the number of additions classified according to those three categories.

(continued on next page)

Table 4.3. Sample of additions - sequence (continued)

Panel A. Full sample

Seq.	S&P 600 small cap		S&P 400 mid cap			S&P 500 large cap		All indices		
# 1	1,038		426			185		1,649		
	Re-addition	Down-grade	Up-grade	Re-addition	Down-grade	Up-grade	Re-addition	Up-grade	Re-addition	Down-grade
# 2	24	121	256	7	58	204	16	460	47	179
# 3	1	17	14	6	13	64	3	78	10	30
# 4	0	3	4	0	1	2	1	6	1	4
# 5	0	0	1	0	0	1	0	2	0	0
Subtotal (#2 - #5)	25	141	275	13	72	271	20	546	58	213
total	1,370		1,146			767		**2,466**		

Panel B. No other addition (deletion) 3 years later (earlier)

Seq.	S&P 600 small cap		S&P 400 mid cap			S&P 500 large cap		All indices		
# 1	657		249			128		**1,034**		
	Re-addition	Down-grade	Up-grade	Re-addition	Down-grade	Up-grade	Re-addition	Up-grade	Re-addition	Down-grade
# 2	16	89	151	2	43	149	10	300	28	132
# 3	1	10	9	3	9	39	3	48	7	19
# 4	0	2	2	0	1	1	1	3	1	3
# 5	0	0	1	0	0	1	0	2	0	0
Subtotal (#2 - #5)	17	101	163	5	53	190	14	353	36	154
total	893		691			536		**1,577**		

the 1,034 first additions around which there are no other events. Additions follow a cyclical pattern. If innovation is also cyclical and the two cycles are correlated, my results could be affected. Therefore, I use year fixed effects in my analysis.

Table 4.4 shows summary statistics of the firms added to the S&P indices, on the addition level (as discussed, several firms are added more than once), for the -/+3 year period around the year of addition. The sample consists of 2,466 additions. Some general trends can be identified: on average, firms' assets more than double. Investment (measure by capital expenditures and R&D expenses scaled by assets) decreases by roughly one percentage point, whereas profitability and valuation both decrease significantly. Figure C.1 in the Appendix illustrates these findings. These statistics are comparable when variables are summarized at the fund-firm relation level (Table 4.5).

Figure C.2 in the Appendix shows summary statistics of firm ownership according to the categories of "S&P funds" (index funds holding the firm after its addition to the index), "non-index funds" (non-index funds holding the firm prior to its addition to the index), and "new funds" (non-index funds holding the firm after its addition to the index, but not prior to it). Prior to the addition of the firm to the index, virtually no funds identified as "S&P funds" owned the firm. The percentage ownership of non-index funds decreases after the firm is added to the index.

Figure C.3 in the Appendix depicts ownership by type of fund: "S&P funds" (index funds holding the firm after its addition to the index), "non-index funds" (non-index funds holding the firm prior to its addition to the index), and "new funds" (non-index funds holding the firm after its addition to the index, but not prior to it), in the 1995-2011 period, when the represented year is the year of addition. The percentage ownership of mutual funds has constantly been increasing over time – it constituted ca. 15% in 1995, and more than 30 % in 2011).

Figure C.4 in the Appendix shows the number of additions in each of the three categories for each of the three S&P indices. As expected, the S&P 600 (small cap) includes firms from more innovative industries. I use these categories to study the impact of family ties on valuation in industries with different innovation intensities.

Table 4.4. S&P additions: summary statistics

This table presents summary statistics of all firms included in the analysis, in the 7-year window around the year of addition. The column on the right presents summary statistics for the full sample of firms. Panels A, B, C, D, and E summarize firm characteristics, liquidity, investment, firm profitability and valuation, and ownership characteristics, respectively. A description of all the variables and their sources can be found in Table C.1 of the Appendix. All variables are winsorized at the top and bottom 1% (except industry innovation intensity, firm age, analyst coverage).

		Years before addition			Year of addition	Years after addition			Total sample
		-3	-2	-1	0	1	2	3	
Panel A. Firm characteristics									
Assets	*Mean*	2,294.4	2,573.1	3,027.4	3,751.4	4,152.0	4,612.5	5,074.9	3,632.1
(millions)	*St. dev.*	5,667.6	6,251.8	7,054.2	8,061.6	8,435.4	9,166.6	9,670.2	7,924.3
	# add.	2,092	2,265	2,337	2,406	2,291	2,181	2,075	15,647
Leverage	*Mean*	0.525	0.509	0.499	0.507	0.515	0.523	0.527	0.514
	St. dev.	0.246	0.240	0.237	0.237	0.239	0.239	0.237	0.240
	# add.	2,086	2,258	2,331	2,395	2,285	2,172	2,063	15,598
Industry innovation intensity	*Mean*	1.468	1.507	1.529	1.536	1.511	1.485	1.462	1.500
	St. dev.	0.681	0.694	0.701	0.701	0.692	0.684	0.678	0.691
	# add.	2,460	2,460	2,460	2,460	2,460	2,460	2,460	17,220
Firm age	*Mean*	11.27	11.28	11.87	12.11	13.15	14.16	15.25	12.70
	St. dev.	10.73	10.81	10.86	10.97	11.06	11.09	11.17	11.04
	# add.	2,092	2,265	2,337	2,411	2,292	2,185	2,075	15,657
Firm risk	*Mean*	0.124	0.124	0.125	0.128	0.133	0.137	0.136	0.130
	St. dev.	0.060	0.058	0.057	0.057	0.058	0.060	0.059	0.059
	# add.	1,404	1,522	1,634	1,738	1,811	1,883	1,924	11,916
‚Payout ratio	*Mean*	40.25	44.36	46.85	45.88	48.88	49.38	55.56	47.34
(%)	*St. dev.*	103.61	111.57	104.96	105.44	121.60	117.41	117.36	112.00
	# add.	1,778	1,954	2,005	2,074	2,017	1,934	1,871	13,633

(continued on next page)

Table 4.4. S&P additions: summary statistics (continued)

		Years before addition			Year of addition	Years after addition			Total sample
		-3	-2	-1	0	1	2	3	
Panel B. Liquidity									
Average spread (%)	*Mean*	8.32	8.50	8.63	9.03	8.99	8.66	8.07	8.61
	St. dev.	4.44	4.14	4.02	4.42	4.63	4.51	4.17	4.35
	# add.	2,101	2,269	2,340	2,460	2,430	2,314	2,195	16,109
Total volume (%)	*Mean*	1.75	1.93	2.22	2.61	2.61	2.55	2.54	2.32
	St. dev.	1.79	1.77	1.90	2.10	2.06	2.03	1.97	1.98
	# add.	2,091	2,260	2,333	2,404	2,289	2,178	2,072	15,627
Analyst coverage	*Mean*	7.11	7.60	8.56	9.34	9.80	10.22	10.41	9.06
	St. dev.	5.38	5.53	5.83	6.10	6.45	6.85	7.15	6.34
	# add.	1,334	1,520	1,599	1,679	1,635	1,596	1,542	10,905
Panel C. Investment									
CAPEX/ Assets	*Mean*	0.061	0.060	0.059	0.059	0.055	0.050	0.046	0.056
	St. dev.	0.066	0.064	0.063	0.064	0.060	0.057	0.053	0.062
	# add.	1,941	2,128	2,201	2,279	2,178	2,086	2,001	14,822
R&D/ Assets	*Mean*	0.067	0.058	0.053	0.050	0.051	0.052	0.050	0.054
	St. dev.	0.083	0.073	0.065	0.061	0.063	0.066	0.065	0.068
	# add.	1,086	1,191	1,234	1,271	1,228	1,178	1,117	8,311
Panel D. Profitability and valuation									
ROA	*Mean*	0.137	0.145	0.157	0.152	0.137	0.126	0.123	0.140
	St. dev.	0.104	0.100	0.097	0.102	0.104	0.102	0.102	0.102
	# add.	2,000	2,173	2,240	2,307	2,195	2,085	1,984	14,992
Tobin's Q	*Mean*	2.350	2.518	2.637	2.407	2.141	1.993	1.904	2.286
	St. dev.	1.803	1.897	2.020	1.845	1.637	1.473	1.282	1.750
	# add.	1,843	2,013	2,058	2,121	2,027	1,936	1,844	13,842

(continued on next page)

Table 4.4. S&P additions: summary statistics (continued)

		Years before addition			Year of addition	Years after addition			Total sample
		-3	-2	-1	0	1	2	3	
Panel A. Institutional ownership									
# institutional investors	*Mean*	99.07	111.66	132.13	166.95	172.63	180.12	188.03	150.07
	St. dev.	74.27	76.28	81.18	95.01	100.73	106.25	112.61	98.64
	# add.	2,111	2,269	2,382	2,405	2,307	2,183	2,090	15,747
Ownership institutional investors *(%)*	*Mean*	51.56	56.20	60.96	66.25	66.45	67.13	67.34	62.33
	St. dev.	24.24	23.08	23.30	20.37	20.47	20.24	20.65	22.54
	# add.	2,111	2,269	2,382	2,405	2,307	2,183	2,090	15,747
Top 5 ownership *(%)*	*Mean*	20.56	21.26	21.55	22.52	23.08	23.28	23.34	22.22
	St. dev.	6.73	6.16	6.55	5.47	5.49	5.51	5.75	6.05
	# add.	2,111	2,269	2,382	2,405	2,307	2,183	2,090	15,747
Panel B. Mutual fund ownership									
# mutual funds *(total)*	*Mean*	102.80	120.65	154.98	214.31	226.81	240.96	252.39	187.50
	St. dev.	114.46	118.41	138.09	182.20	194.66	206.58	216.84	180.23
	# add.	2,104	2,301	2,414	2,409	2,329	2,203	2,106	15,866
Ownership mutual funds *(%)*	*Mean*	15.44	17.26	19.31	21.95	22.32	23.18	23.80	20.48
	St. dev.	10.19	10.35	10.70	10.46	10.82	11.02	11.05	11.04
	# add.	2,104	2,301	2,414	2,409	2,329	2,203	2,106	15,866
# S&P index funds	*Mean*	2.74	2.73	3.07	11.98	13.40	13.97	14.57	8.89
	St. dev.	8.76	8.68	8.75	16.93	18.79	19.27	19.86	16.12
	# add.	2,104	2,301	2,414	2,409	2,329	2,203	2,106	15,866
Ownership S&P index funds *(%)*	*Mean*	0.16	0.17	0.20	0.81	0.95	1.07	1.17	0.65
	St. dev.	0.42	0.44	0.47	0.69	0.74	0.78	0.81	0.76
	# add.	2,104	2,301	2,414	2,409	2,329	2,203	2,106	15,866

Table 4.5. Mutual fund-firm relations: summary statistics

This table presents summary statistics of all fund-firm relations included in the analysis, in the 7-year window around the year of addition. The column on the right presents summary statistics for the full sample of firms. Panels A, B, and C summarize firm characteristics, fund characteristics, and percentage ownership, respectively. A description of all the variables and their sources can be found in Table C.1 of the Appendix.

		Years before addition			Year of addition	Years after addition			Total sample
		-3	-2	-1	0	1	2	3	
Panel A. Firm characteristics									
Assets	*Mean*	4,302.75	4,315.97	4,902.18	6,619.19	7,417.80	8,857.93	9631.64	7,131.67
(millions)	*St. dev.*	8,495.60	8,773.46	9,745.72	11,549.57	12,134.29	13,985.68	14,370.64	12,243.71
	# relations	214,861	276,894	362,683	520,451	534,654	544,585	547,889	3,002,017
ROA	*Mean*	0.145	0.149	0.157	0.155	0.146	0.136	0.136	0.145
	St. dev.	0.095	0.097	0.094	0.103	0.103	0.101	0.100	0.100
	# relations	202,378	262,977	344,305	494,379	506,285	515,395	520,031	2,845,750
Tobin's Q	*Mean*	2.400	2.432	2.647	2.533	2.384	2.249	2.163	2.37
	St. dev.	1.657	1.854	2.122	1.959	1.865	1.752	1.557	1.84
	# relations	191,179	249,026	322,234	463,943	478,202	480,699	479,993	2,665,276
Panel B. Fund characteristics									
Assets	*Mean*	1,632.39	1,787.80	1,783.14	1,896.88	1,996.80	2,275.87	2,571.89	2,042.27
(millions)	*St. dev.*	12,388.09	13,883.79	15,310.21	17,209.98	18,790.06	21,578.64	24,060.03	18,742.03
	# relations	210,819	269,095	349,064	471,313	456,910	445,423	435,389	2,638,013
# holdings	*Mean*	599.38	600.86	566.14	548.03	563.77	563.40	563.43	756.73
	St. dev.	817.53	817.94	792.18	732.65	738.14	736.32	734.25	567.16
	# relations	217,050	277,836	375,191	525,263	538,369	546,852	550,647	3,031,208
Panel C. Ownership									
Ownership	*Mean*	0.150	0.143	0.124	0.101	0.097	0.094	0.091	0.107
(%)	*St. dev.*	0.347	0.335	0.307	0.274	0.271	0.268	0.265	0.287
	# relations	217,126	277,917	375,324	525,537	538,570	547,019	550,957	3,032,450

4.4. Methodology

4.4.1. Identification strategy

The objective of this analysis is to identify the effect of mutual fund family ties on changes in the ownership stake of non-index funds and the effect of mutual fund family ties on firm profitability and valuation. Ideally, I would test hypotheses 1 and 2 by randomly assigning family ties to a group of fund-firm pairs (treatment condition), and compare changes in outcomes in this group before and after the assignment of family ties (treatment) to changes in outcomes before and after the treatment in a group of index fund-firm pairs to which no family ties were assigned (control condition). However, it is impossible to run such an experiment, since it is not feasible to randomly assign family ties to fund-firm pairs. To address this issue, I consider a setting in which a shock leads to a random assignment of fund-firm pairs to the treatment and control conditions: the addition of a firm to an index. Before the firm is added to an index, the index fund does not hold the firm. Therefore, the ties between non-index and index funds within mutual fund family are inexistent. These ties are "activated" once the firm is added to the index, and the index fund starts holding the firm. This is the treatment condition. If no index fund within the mutual fund family holds the firm after its addition to the index, the family tie is not "activated". This is the control condition.

This identification strategy is valid if it is impossible to ex-ante predict when the family tie is going to be "activated" (i.e. it is impossible to ex-ante predict whether an index fund in the non-index funds' family will hold the firm after it is added to the index). This ensures that the effect on the dependent variable is not caused by unobserved variables. Note that the fact that index addition might be predictable is not an issue, since both the treatment and control conditions only include firms that were added to an index, and all index funds start holding these firms after the shock.

A possible issue with this identification strategy might be that larger firms normally have a broader set of investors, and therefore are more likely to be included in the treatment group (the probability that a non-index fund has family ties with an index fund that holds the firm is higher for larger firms). If this is the case, the effect on the

dependent variable can no longer be attributed to family ties, but could be due to other firm characteristics. To mitigate this concern, I exploit the fact that each firm may be attributed to both the treatment and the control condition (depending on whether or not the non-index fund in question has ties with an index fund) by using firm addition fixed effects. Given the fact that larger firms have a higher number of observations (since more non-index funds follow them), I also cluster the standard errors at the firm addition level. To alleviate the concern that time varying firm characteristics may drive my results, I also control for a set of time-varying firm characteristics.

Another possible issue is that if there are no index funds in the mutual fund family (i.e. the family only contains non-index funds), it is possible to predict with certainty that the non-index fund-firm pair will be assigned to the control condition. Conversely, if there are index funds following all three indices (S&P 400, 500, and 600) in the mutual fund family, it is possible to predict with certainty that the non-index fund-firm pair will be assigned to the control condition. Therefore, for each firm, all non-index funds within each mutual fund family will either be assigned to the treatment or the control condition. As a consequence, it is no longer possible to conclude that changes in the dependent variable are caused by family ties. This change could be due to other mutual fund family characteristics.

However, mutual fund families do not always have index funds following each of the three different S&P indices. Because of this, each mutual fund family may be attributed to either the treatment or control condition, depending on which index the firm has been added to. I exploit this feature of my sample by using mutual fund family fixed effects, thereby ruling out the possibility that time-invariant family characteristics may drive my results.

4.4.2. Impact of mutual fund family ties on the ownership stake of non-index funds

Let i denote a firm, f a non-index fund, and t a fiscal year. I estimate the impact of mutual fund family ties on the ownership stake of non-index funds by running the difference-in-differences:

$$O_{ift} = a + \beta_1 P_{it} T_{if} + \beta_2 P_{it} + \beta_3 T_{if} + \iota_i + \theta_t + \delta I'_{it} + \lambda F'_{ft} + \varepsilon_{ift} \quad (4.1)$$

where O_{ift} is the ownership stake of non-index fund f on firm i at time t, P_{it} is a dummy variable that takes the value 0 before and 1 after firm i is added to an index, T_{if} is a dummy variable that takes the value 1 if an index fund in f's family owns firm i after the firm was added to the index, and ε_{ift} is the error term. In the basic specification, I include firm (ι_i) and time (θ_t) fixed effects, as well as time varying firm (I'_{it}) and fund (F'_{ft}) characteristics, and cluster all standard errors at the addition level. In a robustness test, I use mutual fund family fixed effects and cluster the standard errors at the mutual fund family-firm level. Moreover, I use an alternative treatment measure: the ownership stake of the index funds that have family ties with non-index fund f. Note that, since the coefficients in this regression are calculated using data at the fund-firm relation level, each firm and each fund may be assigned to both the treatment and control group. These should alleviate concerns that treatment and control are not exogenously assigned and that the two groups of firms and/ or funds are not identical on all other characteristics except the existence of family ties.

4.4.3. Impact of mutual fund family ties on firm value

To analyze the impact of mutual fund family ties on firm level outcomes, I construct two new measures of treatment at the firm level: the aggregate number and the aggregate ownership of index funds that start holding the firm's shares after its addition to the index and belong to the same family as the non-index funds that held the firm before its addition to the index.

Let i denote a firm, and t a time period. Each firm is owned by several funds. Therefore, firm-level outcomes are determined by several funds simultaneously. Assuming that each fund contributes a certain portion to the aggregate firm level outcome, Y_{it}, and that the effect of each fund on the corresponding portion of the aggregate firm level outcome is constant, the treatment effect is given by the difference-in-differences:

$$Y_{it} = a + \beta_1 P_{it} T_i + \beta_2 P_{it} + \beta_3 \gamma T_i + \iota_i + \theta_t + \delta I'_{it} + \varepsilon_{ift} \quad (4.2)$$

where Y_{it} is firm i's profitability (measured by its ROA) or valuation (measured by log Tobin's Q) at time t, P_{it} is a dummy variable that takes the value 0 before and 1 after firm i is added to an index, T_i is one of the two variables described above, and ε_{ijt} is the error term. I include firm (ι_i) and time (θ_t) fixed effects, as well as time varying firm (I'_{it}) characteristics. All standard errors are clustered at the addition level.

4.4.4. Type of relation with the firm before addition to the index

In my analysis, all funds that are not identified as "S&P funds" are classified as non-index funds. However, some of the non-index funds may not really be "active" funds, in the sense that they may not engage in monitoring at all. To be able to compare the effect of different investment styles, horizons and ownership stakes on the effect of mutual fund family ties on firm level outcomes, I use the data on mutual fund ownership (collected from the Thomson S12 database) to classify each type of mutual fund-firm relation in my sample, in the three years prior to the firm addition to an index, as "dedicated", "transient", or "quasi-indexed".

To achieve this, I follow Bushee's (1998) methodology (the same methodology is used, for example, in Aghion et al., 2013; He and Tian, 2013; Crane et al, 2016. The classification has similarities to other types of classification, such as in Attig, Cleary, El Ghoul, and Guedhami, 2012; Cella, Ellul, and Gianetti, 2013; Fich, Harford and Tran, 2015). Bushee's methodology uses Thomson 13f data (holdings on an institutional level) to classify institutional investors as "dedicated" (large blockholders, with highly concentrated portfolios and low turnover), "transient" (investors with lower stakes in a single firm, more diversified portfolios, and high turnover, which is sensitive to the firm's earnings) and "quasi-indexed" (investors with diversified portfolios and low turnover).

A potential limitation of Bushee's (1998) methodology is that a mutual fund family (eg. Fidelity) is classified as either "dedicated", "transient" or "quasi-indexed", independently of the heterogeneity of the funds in the family, and the heterogeneity of its funds' holdings. Therefore, I modify the methodology to account for this heterogeneity and allow for different types of relation at the mutual fund-firm level. I

classify each of the 1,608,768 fund-firm relations in my sample by allowing each fund to have a different type of relation with the each of the firms in its portfolio.

I first collect data on the same variables as Bushee (1998). Definitions of variables used in the factor analysis can be found in Table C.3 of the Appendix. However, I collect these data on a fund level (using the Thomson S12 database), instead of an institutional level (using the Thomson 13f database, as in Bushee (1998)). I calculate the values of all variables in the 3 year period before each firm in my sample is added to the S&P index, and then perform a factor analysis with an oblique rotation to reduce the 9 variables to three factors: BLOCK (which reflects whether the fund is a blockholder of the firm), PTURN (which reflects the fund's trading activity) and MOMEN (which reflects the sensitivity of the fund's trading to the firm's current earnings).

Using the factor scores that result from the factor analysis, I then perform a k-means cluster analysis to classify the fund-firm relations as "dedicated", "transient", and "quasi-indexed". I redo the analysis considering "dedicated" and "transient" funds spearately, so that I am able to distinguish the effect of mutual fund family ties for different types of investors.

4.5. Results

Table 4.6 presents summary statistics of the sample panel, at the mutual fund-firm relation level. The first column presents summary statistics for the whole sample. Columns 2 to 5 present summary statistics of the periods before and after the firm is added to an index, split by treatment and control group (whether or not the non-index fund has family ties with an index fund that holds the firm after its addition to the index). Column 5 presents the result of the independent samples t-test on the mean difference between treatment and control group before the firm is added to the index. As can be seen, the different groups of family-firm relations vary considerably. This could be either because the assignment to treatment and control is not fully random,

Table 4.6. Sample panel summary statistics for treatment and control

This table presents summary statistics of the sample panel, at the mutual fund-firm relation level. The first column presents summary statistics for the whole sample. Columns 2 to 5 present summary statistics of the periods before and after the firm is added to an index, split by treatment and control group (whether or not the non-index fund has family ties with an index fund that holds the firm after its addition to the index). Column 5 presents the result of the independent samples *t*-test on the mean difference between treatment and control group before the firm is added to the index. Column 6 presents the result of the independent samples *t*-test on the mean difference in changes between the treatment and control group. Description of all the variables and their sources can be found in Table C.1 of the Appendix.

		Full sample *(N=2,136,264)*	**Treatment** *(N=310,389)* *(non-index fund has family ties with index fund that holds firm)*		**Control** *(N=1,825,875)* *(non-index fund has no family ties with index fund that holds firm)*		***t*-test** *independent samples mean diff*		
			Pre	***Post***	***Pre***	***Post***		***T-C Pre***	***ΔT-ΔC***
Panel A. Firm characteristics									
Assets *(millions)*	*Mean*	4,723.25	5,858.53	9,626.27	3,306.11	5,145.09	*Diff*	2,552.42***	0.061***
	St. dev.	9,016.99	9,974.69	13,001.13	7,233.60	9,282.05	*t-stat*	120	-52.78
	# obs.	1,999,038	150,500	150,120	882,751	815,667			
Leverage	*Mean*	0.514	0.527	0.526	0.507	0.517	*Diff*	0.019***	-0.010***
	St. dev.	0.230	0.227	0.222	0.232	0.229	*t-stat*	30.78	-36.66
	# obs.	1,992,224	149,668	149,247	879,944	813,365			
Industry innovation intensity	*Mean*	1.535	1.511	1.521	1.562	1.514	*Diff*	0.051***	0.059***
	St. dev.	0.702	0.696	0.697	0.712	0.693	*t-stat*	26.25	85.73
	# obs.	2,136,264	155,548	154,841	913,112	912,763			
Firm age	*Mean*	14.53	14.26	17.52	12.68	16.03	*Diff*	-1.58***	-0.177***
	St. dev.	11.71	11.95	12.22	11.37	11.60	*t-stat*	-49.48	-28.89
	# obs.	1,999,465	150,500	150,143	882,751	816,071			
Firm risk	*Mean*	0.126	0.118	0.117	0.125	0.130	*Diff*	-0.007***	-0.005***
	St. dev.	0.056	0.057	0.013	0.057	0.056	*t-stat*	-37.00	-49.47
	# obs.	1,663,179	121,776	140,170	646,618	754,615			

(continued on next page)

Table 4.6. Sample panel summary statistics for treatment and control (continued)

		Full sample (N=2,136,264)	Treatment (N=310,389) (non-index fund has family ties with index fund that holds firm)		Control (N=1,825,875) (non-index fund has no family ties with index fund that holds firm)		*t*-test independent samples mean diff		
			Pre	*Post*	*Pre*	*Post*		*T-C Pre*	*ΔT-ΔC*
Payout ratio (%)	*Mean*	52.42	48.72	66.83	47.91	55.14	*Diff*	0.81***	9.69***
	St. dev.	1.17	1.06	1.30	1.10	1.23	*t-stat*	-2.49	41.97
	# obs.	1,800,625	132,363	137,896	782,571	782,571			
Panel B. Liquidity									
Average spread (%)	*Mean*	8.14	7.72	7.51	8.38	8.07	*Diff*	-0.66***	0.16***
	St. dev.	4.07	3.64	3.92	3.95	4.26	*t-stat*	-61.01	19.76
	# obs.	2,045,281	150,684	153,468	883,413	857,716			
Total volume (%)	*Mean*	2.71	2.60	3.25	2.44	2.92	*Diff*	0.16***	0.16***
	St. dev.	2.07	2.07	2.19	2.01	2.07	*t-stat*	28.33	51.66
	# obs.	1,997,697	150,469	150,039	882,202	814,987			
Analyst coverage	*Mean*	10.86	12.34	15.34	9.12	11.48	*Diff*	3.22***	0.73***
	St. dev.	7.07	7.16	8.10	6.09	7.21	*t-stat*	150	69.37
	# obs.	1,475,888	104,617	116,372	615,070	639,829			
Panel C. Investment									
CAPEX/ Assets	*Mean*	0.053	0.058	0.049	0.056	0.049	*Diff*	0.002***	-0.00004
	St. dev.	0.060	0.064	0.057	0.062	0.056	*t-stat*	11.00	-0.51
	# obs.	1,936,456	145,271	146,910	848,832	795,443			
R&D/ Assets	*Mean*	0.052	0.050	0.047	0.056	0.050	*Diff*	-0.006***	0.001***
	St. dev.	0.066	0.067	0.061	0.070	0.062	*t-stat*	-23.15	7.76
	# obs.	1,095,357	80,306	80,961	481,625	452,465			

(continued on next page)

Table 4.6. Sample panel summary statistics for treatment and control (continued)

		Full sample (N=2,136,264)	Treatment (N=310,389) (non-index fund has family ties with index fund that holds firm)		Control (N=1,825,875) (non-index fund has no family ties with index fund that holds firm)			*t*-test independent samples mean diff	
			Pre	*Post*	*Pre*	*Post*		*T-C Pre*	*ΔT-ΔC*
Panel D. Profitability and valuation									
ROA	*Mean*	0.142	0.154	0.142	0.150	0.131	*Diff*	0.004***	0.009***
	St. dev.	0.099	0.095	0.099	0.098	0.100	*t-stat*	13.12	54.99
	# obs.	1,904,091	141,458	140,950	844,440	777,243			
Tobin's Q	*Mean*	2.253	2.576	2.145	2.481	1.968	*Diff*	0.095***	0.031***
	St. dev.	1.711	2.018	1.576	1.901	1.379	*t-stat*	16.70	10.40
	# obs.	1,792,186	132,949	133,335	791,637	734,265			
Panel E. Mutual fund characteristics									
Assets	*Mean*	1,908.23	2,473.83	3,522.27	1,403.53	2,176.01	*Diff*	1,070.30***	38,591***
	St. dev.	8,860.82	10,231.80	11,844.70	6,735.45	10,266.95	*t-stat*	50.28	25.70
	# obs.	1,665,049	139,726	105,536	814,980	604,807			
# holdings	*Mean*	569.30	675.12	694.01	543.09	555.62	*Diff*	132.03***	15.03***
	St. dev.	816.71	861.48	884.19	796.85	813.10	*t-stat*	57.45	29.14
	# obs.	1,921,574	144,294	141,681	841,948	793,651			
Panel F. Institutional investor ownership									
# institutional investors	*Mean*	190.17	211.72	304.94	151.04	207.52	*Diff*	60.68***	38.05***
	St. dev.	110.23	97.11	118.61	88.56	111.83	*t-stat*	240	250
	# obs.	2,004,881	151,436	149,920	885,758	817,767			
Ownership institutional investors *(%)*	*Mean*	69.03	69.21	74.14	65.48	71.89	*Diff*	3.72***	-1.00***
	St. dev.	20.72	21.28	16.16	22.39	18.75	*t-stat*	60.16	-28.31
	# obs.	2,005,236	151,436	149,931	885,758	818,111			

(continued on next page)

Table 4.6. Sample panel summary statistics for treatment and control (continued)

		Full sample (N=2,136,264)	Treatment (N=310,389) (non-index fund has family ties with index fund that holds firm)		Control (N=1,825,875) (non-index fund has no family ties with index fund that holds firm)			*t*-test independent samples mean diff	
			Pre	***Post***	***Pre***	***Post***		***T-C Pre***	***ΔT-ΔC***
Top 5 ownership *(%)*	*Mean*	23.19	22.39	23.60	22.47	24.05	*Diff*	-0.08***	-0.29***
	St. dev.	5.40	5.59	4.55	5.68	5.04	*t-stat*	-5.04	-29.27
	# obs.	2,004,881	151,436	149,920	885,758	817,767			
Panel G. Mutual fund ownership by type of relation									
Total	*Mean*	0.058	0.065	0.048	0.076	0.038	*Diff*	-0.011***	0.020***
	St. dev.	0.162	0.162	0.150	0.181	0.137	*t-stat*	-21.51	76.01
	# obs.	1,998,134	150,478	150,039	882,444	815,173			
Dedicated	*Mean*	0.387	0.495	0.298	0.528	0.225	*Diff*	-0.034***	0.074***
	St. dev.	0.363	0.313	0.349	0.335	0.332	*t-stat*	-8.03	17.11
	# obs.	88,590	7,527	7,355	38,813	34,895			
Transient	*Mean*	0.017	0.016	0.018	0.019	0.015	*Diff*	-0.002***	0.006***
	St. dev.	0.054	0.038	0.065	0.043	0.065	*t-stat*	-18.99	47.40
	# obs.	1,554,697	121,314	119,162	687,483	626,738			
Quasi-indexed	*Mean*	0.166	0.197	0.136	0.222	0.104	*Diff*	-0.025***	0.058***
	St. dev.	0.245	0.218	0.243	0.256	0.221	*t-stat*	-13.16	53.81
	# obs.	318,988	20,374	19,833	147,051	131,730			
Unclassified	*Mean*	0.052	0.065	0.041	0.095	0.035	*Diff*	-0.030***	0.057***
	St. dev.	0.156	0.155	0.135	0.202	0.132	*t-stat*	5.05	16.02
	# obs.	35,859	1,263	3,689	9,097	21,810			

or a result of a higher number of observations for larger firms, with a more dispersed ownership. Hence, it is important to include fixed effects and cluster the standard errors in the difference-in-differences analysis, as described in section 4.2.

Column 6 presents the result of the independent samples t-test on the mean difference in changes between the treatment and control group. Description of all the variables and their sources can be found in Table C.1 of the Appendix. The results show that most variables change differently for both groups. To mitigate the concern that this may affect the results of my analysis, I include time-varying firm and fund controls. Table 4.7 presents correlations between all variables collected. Based on these correlations and the number of observations for which data is available, I construct the set of control variables to be included in the regressions.

Finally, I visually inspect whether the "parallel trends assumption" holds. Figure 4.3 shows the development of profitability and valuation for treatment and control (measured by terciles of family ties measured by index ownership). In the 3 years before the addition to the index, the same increasing trend can be observed for both groups.

4.5.1. Ownership stake

Table 4.8 presents the results of the difference-in-differences (4.1) conducted to evaluate the impact of family ties with index funds on changes in the ownership stake of non-index funds. In the first four columns, family ties are measured by a dummy that takes the value 1 if there is an index fund within the same family that starts holding the firm after its addition to the index. In the following four columns, family ties are measured by the log percentage ownership of the index funds within the same family that start holding the firm after its addition to the index. All standard errors are clustered at the addition level.

For each treatment measure, the first two columns present results that include all non-index fund-firm relations. The specification in the second column includes more time-varying controls than the first one, but has less observations. The results show that the existence of family ties is associated with a 1 percentage point higher non-index ownership stake. Given that the average non-index ownership stake before the stock

Table 4.7. Correlations sample panel

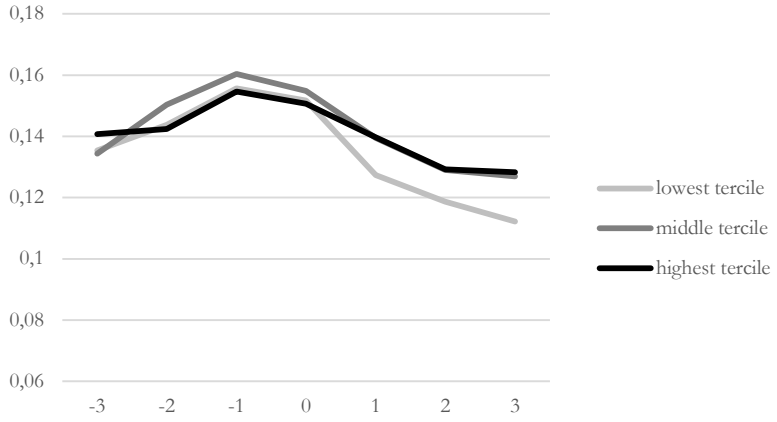
This table presents correlations between all variables collected. Description of all the variables and their sources can be found in Table C.1 of the Appendix.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)
(1) Firm assets	1.00																		
(2) Leverage	0.29	1.00																	
(3) Ind. Innov. Int.	-0.01	-0.05	1.00																
(4) Age	0.16	0.17	0.05	1.00															
(5) Risk	-0.21	-0.19	0.05	-0.31	1.00														
(6) Payout ratio	0.13	0.03	-0.07	-0.01	-0.13	1.00													
(7) Av. Spread	-0.16	-0.10	0.00	-0.17	0.57	-0.09	1.00												
(8) Total volume	0.00	-0.05	-0.03	-0.17	0.40	0.05	0.42	1.00											
(9) Analyst coverage	0.32	-0.09	-0.07	-0.15	0.06	0.07	0.03	0.37	1.00										
(10) CAPEX/assets	-0.15	-0.11	-0.22	-0.09	-0.02	0.00	0.08	0.06	0.12	1.00									
(11) R&D/assets	-0.19	-0.23	0.28	-0.17	0.35	-0.04	0.27	0.23	0.08	-0.05	1.00								
(12) ROA	-0.11	-0.13	-0.15	-0.02	-0.27	0.11	-0.19	-0.07	0.12	0.34	-0.19	1.00							
(13) Tobin's Q	-0.19	-0.30	0.12	-0.21	0.21	-0.05	0.17	0.06	0.19	0.14	0.39	0.35	1.00						
(14) M. fund assets	0.00	0.00	0.00	0.01	-0.01	0.00	-0.01	0.00	0.00	0.00	0.00	0.00	0.00	1.00					
(15) # holdings	-0.11	-0.02	-0.01	0.02	0.00	-0.01	-0.01	-0.06	-0.17	-0.02	-0.04	-0.02	-0.07	0.13	1.00				
(16) # Inst. Investors	0.58	0.06	0.03	0.11	-0.23	0.13	-0.18	0.18	0.62	-0.07	-0.06	0.19	0.19	0.00	-0.17	1.00			
(17) Inst. Own. Firm	0.07	0.08	0.04	-0.04	-0.20	0.03	-0.22	0.27	0.20	-0.07	-0.08	0.08	-0.04	0.00	-0.05	0.36	1.00		
(18) Top 5 owners	-0.06	0.10	0.07	-0.04	-0.10	0.02	-0.07	0.13	-0.07	-0.02	0.04	-0.09	-0.12	0.01	0.03	-0.07	0.57	1.00	
(19) M. fund ownership	-0.08	-0.03	0.00	-0.01	0.00	-0.02	0.00	-0.05	-0.08	0.01	0.00	0.01	0.00	0.17	0.05	-0.12	-0.02	0.02	1.00

Figure 4.3. Profitability and valuation around year of addition

The figures below depict the development of the measures of profitability and valuation (return on assets, and log Tobin's Q), in the years around the addition to the index, for all index funds in the sample. The treatment variable, based on the aggregate ownership of index funds that start holding the firm after its addition to the index and belong to the same family as the non-index funds that held the firm before its addition to the index, is split into terciles. The highest tercile corresponds to the firms for which the treatment measure is the highest. Definitions of the variables are presented in Table C.1 of the Appendix.

Panel A. Return on assets



Panel B. log Tobin's Q

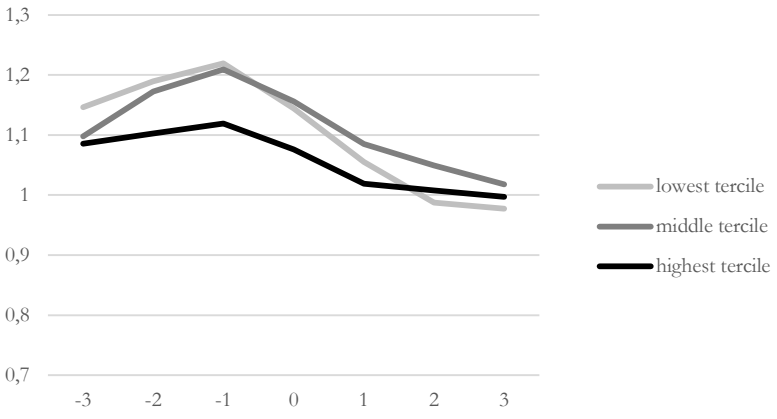


Table 4.8. Impact of family ties with index funds on non-index ownership

This table presents the results of the difference-in-differences conducted to evaluate the impact of family ties with index funds on changes in the ownership stake of non-index funds. The treatment group is composed by non-index fund-firm relations if an index fund in the family starts holding the firm after its addition to an index. The control group is composed by non-index fund-firm relations if no index fund in the family starts holding the firm after its addition to an index. The "post" dummy takes the value 1 in the three years after the addition (including the year of addition), and 0 in the three years prior to the addition. In the first four columns, family ties are measured by a dummy that takes the value 1 if there is an index fund within the same family starts holding the firm after its addition to the index. In the following four columns, family ties are measured by the log percentage ownership of the index funds within the same family that start holding the firm after its addition to the index. For each treatment measure, the first two columns present results that include all non-index fund-firm relations. The third column presents results for "dedicated" funds only. The fourth column presents results for transient funds only. A description of all the variables can be found in Table C.1 of the Appendix. All standard errors are clustered at the addition level (***, **, and * indicate significance at the 1%, 5%, and 10% level).

(continued on next page)

Table 4.8. Impact of family ties with index funds on non-index ownership (continued)

	Ownership							
	Family ties dummy				Family ties measured by log % ownership index funds			
	All non-index funds		Dedicated	Transient	All non-index funds		Dedicated	Transient
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Treatment * post	**0.01*** (14.25)**	**0.01*** (12.93)**	**0.08*** (10.12)**	**0.01*** (13.83)**	**1.52*** (6.01)**	**1.54*** (6.03)**	**6.55*** (6.34)**	**0.52*** (5.05)**
Treatment	-0.01***	-0.01***	-0.01**	-0.003***	0.25	0.28*	3.45***	-0.08
	(-18.76)	(-17.87)	(-2.57)	(-20.78)	(1.60)	(1.76)	(4.77)	(-1.34)
Post	-0.06***	-0.06***	-0.31***	-0.01***	-0.06***	-0.06***	-0.35***	-0.02***
	(-53.62)	(-48.58)	(-36.99)	(-31.16)	(-47.76)	(-44.22)	(-32.46)	(-34.96)
Log fund assets	0.03***	0.03***	0.03***	0.01***	0.03***	0.03***	0.02***	0.01***
	(121.13)	(119.57)	(21.13)	(100.84)	(116.20)	(114.35)	(15.10)	(96.57)
Log firm assets	-0.003***	-0.004***	0.03***	-0.002***	-0.001	-0.003***	0.03***	-0.001***
	(-2.85)	(-4.11)	(3.73)	(-6.38)	(-1.21)	(-2.64)	(4.72)	(-3.67)
Log firm age		-0.004***	0.01	0.0003		-0.01***	-0.01	-0.001**
		(-3.00)	(0.96)	(0.55)		(-5.12)	(-0.72)	(-2.19)
Log average spread		0.002	-0.01	0.001***		0.003**	-0.01	0.002***
		(1.42)	(-1.30)	(2.66)		(2.50)	(-0.61)	(4.04)
Log CAPEX/assets		-0.02*	0.07	-0.01**		-0.02*	0.08	-0.01
		(-1.67)	(1.03)	(-2.23)		(-1.72)	(1.01)	(-1.40)
Inst. Ownership		0.04***	-0.05**	0.03***		0.04***	-0.05*	0.03***
		(11.41)	(-2.08)	(18.34)		(12.17)	(-1.92)	(18.97)
Top 5 Inst. Own.		-0.05***	0.28***	-0.05***		-0.07***	0.24***	-0.06***
		(-4.96)	(4.42)	(-13.88)		(-7.11)	(3.12)	(-15.75)
Mutual fund own.	0.23***	0.20***	1.05***	0.06***	0.21***	0.18***	1.02***	0.05***
	(35.42)	(30.05)	(25.38)	(25.99)	(29.88)	(24.81)	(21.07)	(22.71)
Index fund ownership		0.21***	0.76	0.02		0.36***	1.62***	0.10***
		(2.86)	(1.57)	(0.93)		(4.25)	(2.74)	(3.87)
Constant	-0.22***	-0.22***	-0.20***	-0.06***	-0.17***	-0.17***	-0.15***	-0.06***
	(-28.53)	(-25.01)	(-4.07)	(-18.81)	(-20.61)	(-17.76)	(-2.86)	(-16.51)
Observations	1,550,961	1,493,448	73,590	1,131,645	1,170,900	1,126,922	47,950	866,668
R-squared	0.17	0.17	0.31	0.08	0.16	0.16	0.33	0.08
Year FE	YES	YES	YES	YES	YES	YES	YES	YES
Addition FE	YES	YES	YES	YES	YES	YES	YES	YES
Clustered SE	YES	YES	YES	YES	YES	YES	YES	YES

is added to the index is around 0.056%, this result is not only statistically, but also economically significant. Table C.4 in the Appendix shows that the results remain unaffected when using mutual fund family fixed effects and clustering the standard errors at the mutual fund family-addition level. Table C.5 in the Appendix shows the results hold even when restricting the sample to firms that were added to an index for the first time, and if they were not deleted from the index in the 3 year period after their addition to the index.

Importantly, both the control and the treatment group reduce their ownership stake after a firm is added to an index. However, consistent with hypothesis 1, the probability that a fund buys additional shares is higher when the non-index fund has family ties with an index fund that holds the same firm. Although not providing direct evidence that non-index funds monitor more when they have family ties with index funds that hold the same firm, these results are consistent with the theoretical prediction that such non-index funds have a higher probability of "buying and monitoring".

4.5.2. The impact of index fund family ties on firm profitability and valuation

Tables 4.9 and 4.10 present the results of the difference-in-differences (4.2) conducted to evaluate the impact of family ties with index funds on firm profitability and valuation. Profitability is measured by return on assets, valuation is measured by Tobin's Q. In the first four columns, family ties are measured by the log of the aggregate number of index funds that start holding the firm after its addition to the index and belong to the same family as the non-index funds that held the firm before its addition to the index. In the following four columns, family ties are measured by the log of the aggregate ownership of index funds that start holding the firm after its addition to the index and belong to the same family as the non-index funds that held the firm before its addition to the index.

For each treatment measure, the first two columns present results that include all aggregate non-index fund-firm relations. Consistent with hypothesis 2, family ties are associated with higher firm value. The average firm in my sample is owned by 125 non-

Table 4.9. Impact of family ties with index funds on firm profitability

This table presents the results of the difference-in-differences conducted to evaluate the impact of family ties with index funds on firm profitability. Profitability is measured by ROA. In the first four columns, family ties are measured by the log of the aggregate number of index funds that start holding the firm after its addition to the index and belong to the same family as the non-index funds that held the firm before its addition to the index. In the following four columns, family ties are measured by the log of the aggregate ownership of index funds that start holding the firm after its addition to the index and belong to the same family as the non-index funds that held the firm before its addition to the index. The "post" dummy takes the value 1 in the three years after the addition (including the year of addition), and 0 in the three years prior to the addition. For each treatment measure, the first two columns present results that include all aggregate non-index fund-firm relations. The third column presents results for "dedicated" funds only. The fourth column presents results for transient funds only. A description of all the variables can be found in Table C.1 of the Appendix. All standard errors are clustered at the addition level (***, **, and * indicate significance at the 1%, 5%, and 10% level).

(continued on next page)

Table 4.9. Impact of family ties with index funds on firm profitability (continued)

	Profitability (ROA)							
	Family ties measured by log # index funds				Family ties measured by log % ownership index funds			
	All non-index funds		Dedicated	Transient	All non-index funds		Dedicated	Transient
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Treatment * post	**0.003** **(2.18)**	**0.005*** **(2.81)**	**0.014*** **(2.85)**	**0.006*** **(3.06)**	**0.043*** **(1.69)**	**0.056**** **(2.06)**	**0.454*** **(2.99)**	**0.047** **(1.32)**
Post	-0.03*** (-6.94)	-0.03*** (-6.80)	-0.03*** (-6.26)	-0.03*** (-6.68)	-0.03*** (-7.77)	-0.03*** (-6.91)	-0.02*** (-6.69)	-0.02*** (-6.65)
Log firm assets	-0.01** (-2.21)	-0.01*** (-3.54)	-0.01*** (-3.49)	-0.01*** (-3.49)	-0.01** (-2.00)	-0.01*** (-3.22)	-0.01*** (-3.22)	-0.01*** (-3.15)
Log firm age		-0.004 (-1.47)	-0.004 (-1.25)	-0.004 (-1.41)		-0.005 (-1.60)	-0.005 (-1.42)	-0.005 (-1.63)
Log average spread		-0.02*** (-4.46)	-0.02*** (-4.56)	-0.01*** (-4.27)		-0.02*** (-4.45)	-0.02*** (-4.51)	-0.02*** (-4.28)
Log CAPEX/assets		0.22*** (5.41)	0.23*** (5.35)	0.23*** (5.52)		0.22*** (5.43)	0.23*** (5.42)	0.23*** (5.51)
Inst. Ownership		0.12*** (11.55)	0.12*** (11.05)	0.13*** (11.77)		0.12*** (11.33)	0.12*** (10.73)	0.12*** (11.49)
Top 5 Inst. Own.		-0.30*** (-10.67)	-0.30*** (-10.39)	-0.31*** (-10.67)		-0.30*** (-10.69)	-0.30*** (-10.31)	-0.31*** (-10.70)
Mutual fund own.	0.13*** (8.09)	0.06*** (3.11)	0.06*** (3.26)	0.06*** (3.12)	0.13*** (7.99)	0.06*** (3.11)	0.06*** (3.34)	0.06*** (3.04)
Index fund ownership		-0.16 (-0.66)	-0.25 (-0.94)	-0.18 (-0.73)		-0.09 (-0.36)	-0.13 (-0.52)	-0.004 (-0.02)
Constant	0.15*** (8.06)	0.22*** (10.64)	0.22*** (10.72)	0.21*** (10.45)	0.15*** (7.78)	0.22*** (10.32)	0.22*** (10.34)	0.21*** (10.24)
Observations	12,417	11,713	10,766	11,234	12,417	11,713	10,643	11,234
R-squared	0.73	0.73	0.72	0.72	0.73	0.73	0.72	0.72
Year FE	YES	YES	YES	YES	YES	YES	YES	YES
Addition FE	YES	YES	YES	YES	YES	YES	YES	YES
Clustered SE	YES	YES	YES	YES	YES	YES	YES	YES

Table 4.10. Impact of family ties with index funds on firm valuation

This table presents the results of the difference-in-differences conducted to evaluate the impact of family ties with index funds on firm valuation. Valuation is measured by Tobin's Q. In the first four columns, family ties are measured by the log of the aggregate number of index funds that start holding the firm after its addition to the index and belong to the same family as the non-index funds that held the firm before its addition to the index. In the following four columns, family ties are measured by the log of the aggregate ownership of index funds that start holding the firm after its addition to the index and belong to the same family as the non-index funds that held the firm before its addition to the index. The "post" dummy takes the value 1 in the three years after the addition (including the year of addition), and 0 in the three years prior to the addition. For each treatment measure, the first two columns present results that include all aggregate non-index fund-firm relations. The third column presents results for "dedicated" funds only. The fourth column presents results for transient funds only. A description of all the variables can be found in Table C.1 of the Appendix. All standard errors are clustered at the addition level (***, **, and * indicate significance at the 1%, 5%, and 10% level).

(continued on next page)

Table 4.10. Impact of family ties with index funds on firm valuation (continued)

	Valuation (log Tobin's Q)							
	Family ties measured by log # index funds				Family ties measured by log % ownership index funds			
	All non-index funds		Dedicated	Transient	All non-index funds		Dedicated	Transient
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Treatment * post	**0.02*** (3.06)**	**0.03*** (4.92)**	**0.06*** (3.96)**	**0.03*** (5.05)**	**0.13 (1.56)**	**0.28*** (3.18)**	**1.78*** (4.05)**	**0.24** (2.12)**
Post	-0.14***	-0.12***	-0.13***	-0.14***	-0.11***	-0.09***	-0.08***	-0.08***
	(-8.30)	(-7.79)	(-7.32)	(-7.72)	(-8.63)	(-6.78)	(-6.45)	(-6.38)
Log firm assets	-0.14***	-0.15***	-0.16***	-0.15***	-0.13***	-0.15***	-0.16***	-0.15***
	(-11.72)	(-13.64)	(-13.74)	(-13.45)	(-11.44)	(-13.14)	(-13.67)	(-12.99)
Log firm age		-0.08***	-0.08***	-0.07***		-0.08***	-0.08***	-0.08***
		(-5.58)	(-5.25)	(-5.25)		(-5.79)	(-5.30)	(-5.51)
Log average spread		0.04***	0.04***	0.04***		0.04***	0.04***	0.04***
		(3.61)	(3.13)	(3.62)		(3.62)	(3.13)	(3.60)
Log CAPEX/assets		0.74***	0.75***	0.74***		0.74***	0.76***	0.74***
		(5.68)	(5.52)	(5.65)		(5.65)	(5.58)	(5.59)
Inst. Ownership		0.68***	0.69***	0.69***		0.66***	0.67***	0.68***
		(15.54)	(15.97)	(15.95)		(15.43)	(15.53)	(15.77)
Top 5 Inst. Own.		-1.92***	-1.91***	-1.94***		-1.93***	-1.92***	-1.95***
		(-18.10)	(-17.73)	(-18.16)		(-18.15)	(-17.65)	(-18.20)
Mutual fund own.	0.84***	0.60***	0.60***	0.60***	0.84***	0.60***	0.60***	0.58***
	(14.02	(8.86)	(8.69)	(8.79)	(13.92)	(8.79)	(8.64)	(8.62)
Index fund ownership		-3.29***	-2.99***	-3.21***		-2.54***	-2.29**	-2.10**
		(-3.86)	(-3.19)	(-3.75)		(-2.94)	(-2.54)	(-2.46)
Constant	1.69***	1.86***	1.89***	1.85***	1.68***	1.85***	1.89***	1.85***
	(22.75)	(24.18)	(23.94)	(24.02)	(22.56)	(23.83)	(23.56)	(23.80)
Observations	11,471	11,331	10,435	10,885	11,471	11,331	10,324	10,885
R-squared	0.77	0.80	0.80	0.80	0.77	0.80	0.80	0.80
Year FE	YES	YES	YES	YES	YES	YES	YES	YES
Addition FE	YES	YES	YES	YES	YES	YES	YES	YES
Clustered SE	YES	YES	YES	YES	YES	YES	YES	YES

index funds before it is added to an index, of which 21 have family ties with index funds that hold the firm after it is added to the index. If this number increases by 50% to 31 funds, the firm's ROA increases from 13.9% to 14.5%, and its average Tobin's Q increases from 2.28 to 2.35. Although the profitability and valuation of both the treatment and control group decrease after the firm is added to an index, the existence of mutual fund family ties mitigates this decrease. Tables C.6 and C.7 in the Appendix show the results hold even when restricting the sample to firms that were added to an index for the first time, and if they were not deleted from the index in the 3 year period after their addition to the index.

4.5.3. Type of relation with the firm before addition to the index

There is a total of 1,608,768 mutual fund-firm relations in my sample. 971,353 of these relations were not present before the firm was added to the index. Another 55,297 are "index" relations. For the remaining 582,118 relations, I perform a factor and cluster analysis to classify the type of relation between the mutual fund and the firm. Panel A of Table 4.11 shows summary statistics of the variables used for the factor analysis, and the resulting rotated factor loadings. In line with Bushee's (1998) findings, the variables equity (EQ), concentration (CONC), percentage holding (PH), and large percentage holding (LPH) load heavily on the blockholding factor (BLOCK). The variables turnover (TURN) and instability (INSTAB) load heavily on the turnover factor (PTURN). The variables on current earnings trading sensitivity (CETS 1, 2, and 3) load heavily on the momentum factor (MOMEN).

Panel B of Table 4.11 shows the results of the cluster analysis. As in Bushee (1998), the three clusters are characterized by 1) a high factor score on the blockholding factor (BLOCK) – "dedicated" fund-firm relations; 2) high factor scores on the turnover and momentum factors (PTURN and MOMEN) – "transient" fund-firm relations; and 3) average factor scores on all three measures – "quasi-indexed" fund-firm relations. A total of 17,491 relations are classified as "dedicated", 466,519 as "transient", 69,377 as "quasi-indexed", and 28,731 remain unclassified (due to the absence of data on the

Table 4.11. Results of factor and cluster analysis for classification of the fund-firm relation

The tables below present the results of the factor (Panel A) and cluster analysis (Panel B) conducted to classify the fund-firm relations in the sample, based on ownership data in the 4 years prior to addition. Panel A shows summary statistics of the variables included in the factor analysis, and the rotated factor loadings for the three pre-defined factors: BLOCK, PTURN, and MOMEN (blockholding, portfolio turnover, and momentum). Variable descriptions and their sources can be found in Tables C.1 and C.3 of the Appendix. Panel B shows the results of the k-means cluster analysis conducted to classify the type of fund-firm relation (dedicated, transient or quasi-indexed). Unclassified fund-firm relations are fund-firm relations for which it was not possible to calculate the abovementioned factors, due to missing data on the variables used to calculate the factors. The number of fund-firm relations included in each cluster, the mean factor scores, and its standard deviation are presented. Figure C.5 in the Appendix shows scatter plots of the cluster analysis.

Panel A. Summary statistics of variables and rotated factor loadings

	Summary statistics *N=1,746,354*			**Rotated factor loadings** *N = 553,387*			
Variable	**# fund-firm relations**	**Mean**	**St.dev.**	**BLOCK**	**PTURN**	**MOMEN**	***Unique variance***
EQ	567,156	1,279,672	3,527,224	0.755	-0.059	0.017	*0.391*
CONC	564,531	0.003	0.005	0.252	-0.236	-0.008	*0.833*
PH	566,821	0.0007	0.002	0.869	0.019	-0.004	*0.259*
LPH	566,821	0.150	0.357	0.763	0.022	-0.004	*0.432*
TURN	567,027	0.455	0.180	0.092	0.354	-0.079	*0.883*
INSTAB	566,821	-1.473	0.711	-0.127	0.401	0.057	*0.781*
CETS1	555,959	0.0001	0.001	0.005	-0.021	0.974	*0.049*
CETS2	555,969	0.0003	0.002	0.011	0.033	0.979	*0.044*
CETS3	558,088	0.231	0.745	-0.078	-0.074	0.534	*0.703*

Panel B. Factor scores by cluster

Cluster (type of relation)	**fund-firm**	**# fund-firm relations**		**Factor scores**		
				BLOCK	**PTURN**	**MOMEN**
Active	Dedicated	17,491	*Mean*	3.907	-1.609	-0.015
			St. dev.	0.965	0.833	0.930
	Transient	466,519	*Mean*	-0.325	0.127	0.005
			St. dev.	0.141	0.474	1.002
Passive	Quasi-indexed	69,377	*Mean*	1.200	-0.448	-0.028
			St. dev.	0.510	0.663	0.870
	Unclassified	*28,731*				

input variables necessary to conduct the factor and cluster analysis).

For each treatment measure, the third and fourth columns of Table 4.8 present results for, respectively, "dedicated" and "transient" fund-firm relations. Consistent with the conjecture that investors with higher ownership stakes are better able to monitor, the effect of mutual fund family ties on non-index fund ownership is 8-12 times higher for "dedicated" than for "transient" fund-firm relations. However, family ties are also associated with an increase in the ownership stake of "transient" funds.

For each treatment measure, the third and fourth columns of Tables 4.9 and 4.10 present results for, respectively, "dedicated" and "transient" funds. The effect of family ties seems particularly strong for "dedicated" fund-firm relations. The effect of family ties on valuation is around 10 times higher than the effect of family ties for "transient" relations. The theory developed in this paper focuses on the monitoring channel. Given these results, future research could reveal whether family ties also benefit firms through the channel of exit.

4.5.4. The impact of index fund family ties on valuation by industry innovation intensity and index

Table 12 presents the results of the difference-in-differences (4.2) conducted to evaluate the impact of family ties with index funds on firm valuation, split by industry innovation intensity. Firms in highly innovative industries benefit the most from mutual fund family ties: the effect is more than three times larger for these firms than for firms in the least innovative industries. Family ties are more important when non-index funds have a "dedicated" relation with the firm. These results suggest that mutual fund family ties are particularly important for the type of firms that can benefit the most from monitoring ex-ante.

4.6. Conclusion

The rapid increase in assets managed by passive mutual funds raises questions about the consequences this development may have for the firms in which they invest. This paper highlights the importance of not considering the impact of index funds in

Table 4.12. Impact of family ties with index funds on firm valuation by industry innovation intensity

This table presents the results of the difference-in-differences conducted to evaluate the impact of family ties with index funds on firm valuation by industry innovation intensity. Valuation is measured by Tobin's Q. Family ties are measured by the log of the aggregate ownership of index funds that start holding the firm after its addition to the index and belong to the same family as the non-index funds that held the firm before its addition to the index. The "post" dummy takes the value 1 in the three years after the addition (including the year of addition), and 0 in the three years prior to the addition. The first three columns present the results for less innovative industries. The following three columns present the results for industries with average innovation intensity. The last three columns present the results for highly innovative industries. For each innovation intensity category, the first column presents results that include all aggregate non-index fund-firm relations. The second column presents results for "dedicated" funds only. The third column presents results for transient funds only. A description of all the variables can be found in Table C.1 of the Appendix. All standard errors are clustered at the addition level (***, **, and * indicate significance at the 1%, 5%, and 10% level).

(continued on next page)

Table 4.12. Impact of family ties with index funds on firm valuation by industry innovation intensity (continued)

	Valuation (log Tobin's Q)								
	Less innovative industry			Innovative industry			Highly innovative industry		
	All	Dedicated	Transient	All	Dedicated	Transient	All	Dedicated	Transient
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Treatment * post	**0.19***	**1.43*****	**0.19**	**0.19**	**1.39**	**0.10**	**0.62****	**2.82****	**0.66***
	(1.88)	**(2.80)**	**(1.40)**	**(1.12)**	**(1.48)**	**(0.43)**	**(2.28)**	**(2.03)**	**(1.72)**
Post	-0.07***	-0.07***	-0.07***	-0.12***	-0.12***	-0.12***	-0.05	-0.04	-0.05
	(-4.83)	(-4.88)	(-4.66)	(-4.47)	(-4.21)	(-4.22)	(-1.46)	(-1.12)	(-1.31)
Log firm assets	-0.12***	-0.13***	-0.11***	-0.19***	-0.19***	-0.19***	-0.16***	-0.16***	-0.16***
	(-7.22)	(-7.81)	(-7.09)	(-10.01)	(-9.91)	(-9.96)	(-5.71)	(-5.72)	(-5.48)
Log firm age	-0.06***	-0.06***	-0.06***	-0.12***	-0.14***	-0.12***	-0.03	-0.02	-0.03
	(-4.19)	(-3.86)	(-4.04)	(-3.85)	(-4.02)	(-3.65)	(-0.99)	(-0.55)	(-0.82)
Log average spread	0.02*	0.02	0.02*	0.04*	0.05*	0.04*	0.07**	0.07**	0.07*
	(1.67)	(1.11)	(1.78)	(1.77)	(1.91)	(1.74)	(2.05)	(2.00)	(1.96)
Log CAPEX/assets	0.84***	0.80***	0.82***	0.58**	0.70**	0.61**	0.22	0.23	0.22
	(5.74)	(5.32)	(5.63)	(2.08)	(2.41)	(2.13)	(0.53)	(0.51)	(0.53)
Inst. Ownership	0.46***	0.47***	0.46***	0.82***	0.86***	0.85***	0.86***	0.80***	0.87***
	(9.55)	(9.49)	(9.54)	(9.20)	(9.45)	(9.61)	(7.91)	(7.07)	(7.87)
Top 5 Inst. Own.	-1.51***	-1.51***	-1.53***	-2.11***	-2.12***	-2.12***	-2.46***	-2.49***	-2.50***
	(-12.02	(-11.78)	(-12.21)	(-10.02)	(-9.73)	(-10.07)	(-8.30)	(-8.22)	(-8.35)
Mutual fund own.	0.45***	0.49***	0.46***	0.82***	0.76***	0.77***	0.38*	0.41**	0.36*
	(5.63	(5.98)	(5.70)	(6.06)	(5.49)	(5.73)	(1.96)	(2.04)	(1.86)
Index fund ownership	-1.87*	-1.77*	-1.70*	-0.33	-0.10	0.47	-6.88**	-6.59**	-6.34**
	(-1.89	(-1.72)	(-1.74)	(-0.20)	(-0.06)	(0.29)	(-2.51)	(-2.24)	(-2.32)
Constant	1.68***	1.75***	1.68***	1.92***	1.89***	1.93***	1.98***	1.99***	1.96***
	(16.55)	(17.10)	(16.48)	(12.46)	(11.77)	(12.49)	(11.07)	(10.95)	(11.02)
Observations	6,272	5,686	6,034	3,535	3,248	3,389	1,524	1,390	1,462
R-squared	0.81	0.81	0.81	0.78	0.78	0.78	0.80	0.80	0.80
Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES
Addition FE	YES	YES	YES	YES	YES	YES	YES	YES	YES
Clustered SE	YES	YES	YES	YES	YES	YES	YES	YES	YES

isolation. Mutual fund family ties seem to mitigate the negative effect of decreased monitoring as a result of an increase in passive ownership seem to mitigate the negative effect of decreased monitoring as a result of an increase in passive ownership. I find that, theoretically, family ties with index funds have a positive impact on the monitoring activity of non-index funds. Non-index funds have a higher probability of adopting a "buying and monitoring" strategy when there is an index fund in the same family that holds the firms in which they invest. My empirical results show that family ties lead to a higher ownership stake of non-index funds after a firm is added to an index.

This increased probability of monitoring has important welfare consequences: firms held by these funds have higher profitability and higher valuations. This effect is larger when the non-index funds have larger ownership stakes in the firm and trade less frequently ("dedicated" relation). This result contributes to the ongoing literature about the effects of different types of investors on monitoring and firm value. Ties of both "dedicated" and "transient" investors lead to higher firm value, but the effect is considerably larger for "dedicated" fund-firm relations. However, the effect of "transient" investors' ties is also significant. Future research could reveal whether this type of ties affects firm value through the "exit" channel.

Firms in more innovative industries benefit the most from non-index fund family ties. This result is consistent with the hypothesis that firms in more innovative industries stand to benefit the most from increased monitoring. Here too, future research could determine the channels through which this effect occurs.

My results suggest that analyzing the effect of index ownership on firm value in isolation may lead to too simplistic conclusions. Future research should consider the possibility that other contextual factors affect the relation between index ownership and firm value. More research remains necessary to fully understand the real impact of index ownership on firm innovation, which is particularly important given the fact that competitive success increasingly depends on intangible assets such as human capital and R&D capabilities (Zingales, 2000) and that innovation can positively affect

economic growth (King and Levine, 1993). Given the large increase in assets managed by index funds, this is a timely and relevant research area.

Chapter 5.

Summary and concluding remarks

This dissertation consists of three empirical studies on the determinants and consequences of international financial market development. The first study analyzes the determinants of success and failure of newly established stock markets in 59 countries around the World since 1975. The second study focuses on the political consequences of stock market development in African countries. In the third study, I analyze the governance role of institutional investors in the U.S..

The first study shows that "nascent markets" differ considerably in their success, as measured by the number of listed companies, market capitalization, and trading activity. Long-term success (15-20 years after stock markets are opened) is partly determined by early success: a high initial number of listings and trading activity are necessary, though not sufficient, conditions for long-term success. Furthermore, banking sector development at the time of establishment and the development of national savings over the life of the stock market are the two most reliable predictors of success. Unlike studies focused on more mature markets, we find little evidence that structural factors such as legal and political institutions matter for long-term success: stock markets can thrive in countries with different types of legal origin, both in democracies and autocracies, and in countries with different levels of investor protection.

However, as the second study shows, the ex-ante level of democracy may have an impact on the political consequences of stock market development. Using a sample of 367 political leaders across the 54 African countries, we find that incumbent political leaders in autocracies stay longer in office when they open a stock exchange. This suggests that, rather than opposing stock market development, incumbent political leaders may have incentives to promote the opening of stock exchanges. Consistent with the view that newly established stock exchanges in autocracies disproportionally

benefit the incumbent elite, we find that the opening of a stock exchange in African autocracies is associated with subsequent slowing down of the democratization process, especially when the listed companies are concentrated in a certain industry (particularly banking).

In the third study, I focus on the impact of firm governance by institutional investors on firm profitability and firm value. Using a sample of U.S. firms included in S&P indices, I analyze the impact of ties between index and non-index funds within the same mutual fund family on the value of firms in which both funds invest. My results show that such ties increase the probability that non-index funds remain owners of the firm when the firm is added to an index, which is consistent with the theory that predicts that non-index funds are more likely to be able to influence management when index funds in the same family hold the same firm. Furthermore, firms held by funds with family ties are more profitable and have higher valuations. The effect of family ties on valuation is larger for "dedicated" fund-firm relations and for firms in highly innovative industries, for which the potential gains from monitoring are the highest ex-ante.

Taken together, these studies highlight the relevance of analyzing the determinants and consequences of financial market development from different perspectives and in an international context, since some of the findings contradict stylized facts based on studies of more mature stock markets. I would like my future research agenda to further build upon these findings.

Nederlandse samenvatting (Summary in Dutch)

Dit proefschrift bestaat uit drie empirische studies over de determinanten en consequenties van de ontwikkeling van internationale financiële markten. De eerste studie analyseert de determinanten van succes en falen van nieuw gevestigde aandelenmarkten in 59 landen over de hele wereld sinds 1975. De tweede studie richt zich op de politieke gevolgen van de ontwikkeling van aandelenmarkten in Afrikaanse landen. In de derde studie analyseer ik de "governance"-rol van institutionele beleggers in de VS.

De eerste studie toont aan dat "nascent markets" aanzienlijk verschillen in hun succes, gemeten door het aantal beursgenoteerde ondernemingen, marktkapitalisatie en handelsactiviteiten. Langdurig succes (15-20 jaar na opening van de beurzen) wordt mede bepaald door het vroege succes: een hoog eerste aantal listings en handelsactiviteiten zijn noodzakelijke, maar niet voldoende, voorwaarden voor succes op lange termijn. Daarnaast zijn het ontwikkelingsniveau van de bankensector ten tijde van de oprichting en de ontwikkeling van nationale besparingen gedurende de looptijd van de aandelenmarkt de twee betrouwbare voorspellers van succes. Anders dan studies gericht op meer "volwassen" markten, vinden we er weinig aanwijzingen voor dat structurele factoren zoals juridische en politieke instituties belangrijk zijn voor succes op lange termijn: aandelenmarkten kunnen gedijen in landen met verschillende soorten rechtssystemen, zowel in democratieën als in autocratieën, en in landen met verschillende niveaus van beleggersbescherming.

Echter, zoals het tweede onderzoek aantoont, kan het *ex-ante* niveau van democratie een impact hebben op de politieke gevolgen van de ontwikkeling van een aandelenmarkt. Met behulp van een steekproef van 367 politieke leiders in de 54 Afrikaanse landen, vinden we dat zittende politieke leiders in autocratieën langer in functie blijven als ze een aandelenmarkt openen. Dit suggereert dat, in plaats van zich te verzetten tegen de ontwikkeling van aandelenmarkten, zittende politieke leiders

mogelijk motieven hebben om de opening van beurzen te bevorderen. In overeenstemming met het standpunt dat nieuw opgerichte beurzen in autocratieën onevenredig ten goede komen aan de zittende elite, vinden we dat de opening van een beurs in Afrikaanse autocratieën gepaard gaat met een daaropvolgende vertraging van het democratiseringsproces, vooral wanneer de beursgenoteerde ondernemingen geconcentreerd zijn in een bepaalde industrie (met name het bankwezen).

In de derde studie concentreer ik me op de impact van "governance" door institutionele beleggers op bedrijfswinst en bedrijfswaarde. Aan de hand van een steekproef van Amerikaanse bedrijven die zijn opgenomen in S&P-indices, analyseer ik de impact van banden tussen index- en niet-indexfondsen binnen dezelfde beleggingsfondsenfamilie op de waarde van bedrijven waarin beide fondsen beleggen. Mijn resultaten tonen aan dat dergelijke banden de kans vergroten dat niet-indexfondsen eigenaar blijven van het bedrijf wanneer het bedrijf wordt toegevoegd aan een index, wat consistent is met de theorie die voorspelt dat niet-indexfondsen meer kans hebben om het management van een bedrijf te beïnvloeden wanneer indexfondsen in dezelfde beleggingsfondsenfamilie dezelfde onderneming aanhouden. Bovendien zijn bedrijven die door fondsen met familiebanden worden aangehouden winstgevender en hebben hogere waarderingen. Het effect van familiebanden op waardering is groter voor "toegewijde" relaties tussen fondsen en bedrijven en voor bedrijven in zeer innovatieve industrieën, waarvoor de potentiële voordelen van monitoring *ex-ante* het hoogst zijn.

Samengevat benadrukken deze studies de relevantie van het analyseren van de determinanten en de gevolgen van de ontwikkeling van financiële markten vanuit verschillende perspectieven en in een internationale context, aangezien sommige bevindingen in tegenspraak zijn met gestileerde feiten op basis van studies van meer "volwassen" aandelenmarkten. Ik zou graag zien dat mijn toekomstige onderzoeksagenda voortbouwt op deze bevindingen.

Appendices

Appendix A.

Nascent markets: understanding the success and failure of new stock markets

Table A.1. Variable definitions and data sources

This table presents the variable definition and data sources for the success measures (Panel A), economic indicators (Panel B), openness indicators (Panel C), public finance indicators (Panel D), political indicators (Panel E), legal indicators (Panel F), financial indicators (Panel G), demand and supply of capital indicators (Panel H), technology and innovation indicators (Panel I), demographic indicators (Panel J), socio-cultural indicators (Panel K), geographic indicators (Panel L), stock exchange initiative (Panel M), and market design indicators (Panel N).

Variable	Source	Definition
Panel A. Success measures		
Number of listings	World Development Indicators	Number of domestic listed companies. Listed domestic companies are the domestically incorporated companies listed on the country's stock exchanges at the end of the year. This indicator does not include investment companies, mutual funds, or other collective investment vehicles.
Market capitalization	World Development Indicators	Market capitalization (% GDP). Market capitalization (also known as market value) is the share price times the number of shares outstanding. Listed domestic companies are the domestically incorporated companies listed on the country's stock exchanges at the end of the year. Listed companies does not include investment companies, mutual funds, or other collective investment vehicles.
Turnover	World Development Indicators	Stocks traded, turnover ratio (%). Turnover ratio is the total value of shares traded during the period divided by the average market capitalization for the period. Average market capitalization is calculated as the average of the end-of-period values for the current period and the previous period.
Panel B. Economic indicators		
GDP	World Development Indicators	GDP, current USD. Sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. Dollar figures for GDP are converted from domestic currencies using single year official exchange rates.

(continued on next page)

Table A.1. Variable definitions and data sources (continued)

Variable	Source	Definition
GDP per capita	World Development Indicators	GDP per capita, current USD. GDP per capita is gross domestic product divided by midyear population.
GDP growth	World Development Indicators	GDP growth (annual %). Annual percentage growth rate of GDP at market prices based on constant local currency. Aggregates are based on constant 2005 U.S. dollars. GDP is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. It is calculated without making deductions for depreciation of fabricated assets or for depletion and degradation of natural resources.
Real interest rate (st.dev.)	World Development Indicators	Standard deviation of real interest rate, measured over the previous 15 years. Real interest rate is the lending interest rate adjusted for inflation as measured by the GDP deflator.
Inflation (st.dev.)	World Development Indicators	Standard deviation of inflation, measured over the previous 15 years. Inflation as measured by the consumer price index reflects the annual percentage change in the cost to the average consumer of acquiring a basket of goods and services that may be fixed or changed at specified intervals, such as yearly. The Laspereyes formula is generally used.
Transition economy	World Bank Social Indicators and Fixed Factors	Dummy variable. Takes the value "1" for economies in transition and "0" otherwise.
Exporters of fuels	World Bank Social Indicators and Fixed Factors	Exporters of fuels (mainly oil). Dummy variable. Takes the value "1"for exporters of fuel, and "0"otherwise. Major export category: Major exports are those that account for 50 percent or more of total exports of goods and services from one category, in the period 1988-92. The categories are: nonfuel primary (SITC 0,1,2,4, plus 68), fuels (SITC 3), manufactures (SITC 5 to 9, less 68), and services (factor and nonfactor service receipts plus workers' remittances). If no single category accounts for 50 percent or more of total exports, the economy is classified as diversified.
World GDP growth	World Development Indicators	World total value of GDP growth (annual %).
Panel C: Openness indicators		
Globalization index	KOF Index of Globalization	Measures the three main dimensions of globalization: economic, social and political. Sub-indices: actual economic flows, economic restrictions, information flows, personal contact, cultural proximity.

(continued on next page)

Table A.1. Variable definitions and data sources (continued)

Variable	Source	Definition
Equity market liberalization	Bekaert, Harvey, and Lundblad (2005).	Corresponding to a date of formal regulatory change after which foreign investors officially have the opportunity to invest in domestic equity securities. This chronology is based on over 50 different source materials.
Trade openness	World Development Indicators	Sum of exports and imports (% of GDP).
Panel D: Public finance indicators		
Government expenditure	World Development Indicators	General government final consumption expenditure (% of GDP). General government final consumption expenditure (formerly general government consumption) includes all government current expenditures for purchases of goods and services (including compensation of employees). It also includes most expenditures on national defense and security, but excludes government military expenditures that are part of government capital formation.
Government debt	World Development Indicators	Central government debt, total (% of GDP). Debt is the entire stock of direct government fixed-term contractual obligations to others outstanding on a particular date. It includes domestic and foreign liabilities such as currency and money deposits, securities other than shares, and loans. It is the gross amount of government liabilities reduced by the amount of equity and financial derivatives held by the government. Because debt is a stock rather than a flow, it is measured as of a given date, usually the last day of the fiscal year.
Cash surplus/ deficit	World Development Indicators	Cash surplus or deficit is revenue (including grants) minus expense, minus net acquisition of nonfinancial assets.
Panel E: Political indicators		
Government effectiveness	World Governance Indicators	Perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies.
Political stability	World Governance Indicators	Political Stability and Absence of Violence/Terrorism measures perceptions of the likelihood that the government will be destabilized or overthrown by unconstitutional or violent means, including politically-motivated violence and terrorism.

(continued on next page)

Table A.1. Variable definitions and data sources (continued)

Variable	Source	Definition
Democracy	Polity IV	Polity IV – Polity2 Score. Revised Combined Polity Score: The POLITY score is computed by subtracting the AUTOC (autocracy) score from the DEMOC (democracy) score; the resulting unified polity scale ranges from +10 (strongly democratic) to -10 (strongly autocratic).
Transition period	Polity IV	Dummy variable. Takes the value "1"if a country is in a transition period, and "0"otherwise. Some new polities are preceded by a "transition period" during which new institutions are planned, legally constituted, and put into effect. Democratic and quasi-democratic polities are particularly likely to be so established, in a procedure involving constitutional conventions and referenda.
Control of corruption (ICRG)	International Country Risk Guide	This is an assessment of corruption within the political system.
Freedom of the press	World Press Freedom – Freedom House	The press freedom index that Reporters Without Borders publishes every year measures the level of freedom of information in 180 countries. It reflects the degree of freedom that journalists, news organizations and netizens enjoy in each country, and the efforts made by the authorities to respect and ensure respect for this freedom. It is based partly on a questionnaire that is sent to our partner organizations (18 freedom of expression NGOs located in all five continents), to our network of 150 correspondents, and to journalists, researchers, jurists and human rights activists.
War	UCDP/PRIO Armed Conflict Dataset v.4-2015, 1946 – 2014	Dummy variable that takes the value "1" if an armed conflict where at least one party is the government of a state is registered in that year, and "0" otherwise. Only conflicts with more than 1,000 deaths included.
Panel F: Legal indicators		
Legal origin	LaPorta, et al. (1999)	Dummy variable. Takes the value "1"if the country has a "civil law" origin and "0"if it has a "common law" origin.
Regulatory quality	World Governance Indicators	Perceptions of the ability of the government to formulate and implement sound policies and regulations that permit and promote private sector development.
Rule of law	World Governance Indicators	Perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence.

(continued on next page)

Table A.1. Variable definitions and data sources (continued)

Variable	Source	Definition
Voice and accountability	World Governance Indicators	Perceptions of the extent to which a country's citizens are able to participate in selecting their government, as well as freedom of expression, freedom of association, and a free media.
Law and order	International Country Risk Guide	"Law and Order" form a single component, but its two elements are assessed separately, with each element being scored from zero to three points. To assess the "Law" element, the strength and impartiality of the legal system are considered, while the "Order" element is an assessment of popular observance of the law. Thus, a country can enjoy a high rating – 3 – in terms of its judicial system, but a low rating – 1 – if it suffers from a very high crime rate if the law is routinely ignored without effective sanction (for example, widespread illegal strikes).
Panel G: Financial indicators		
Private credit	Financial Development and Structure Dataset	Private credit by deposit money banks and other financial institutions to GDP.
Bank concentration	Financial Development and Structure Dataset	Assets of three largest banks as a share of assets of all commercial banks.
Shadow economy	Financial Development and Structure Dataset	Includes all market-based legal production of goods and services that are deliberately concealed from public authorities for any of the following reasons: (1) to avoid payment of income, value added or other taxes, (2) to avoid payment of social security contributions, (3) to avoid having to meet certain legal labor market standards, such as minimum wages, maximum working hours, safety standards, etc., and (4) to avoid complying with certain administrative procedures, such as completing statistical questionnaires or other administrative forms.
Black market premium	Global Development Network Growth Database	Black Market Premium (%). Levine and Renelt. World's Currency Yearbook (for 1985, 1990-93); Adrian Wood, Global trends in real exchange rates: 1960-84, WB Discussion paper no. 35. 1988 (filling in missing observations); Global Development Finance & World Development Indicators (for 1996-1997, calculated as (parallel Xrate/official Xrate-1)*100); values for industrial countries are added as 0).
Offshore deposits	Financial Development and Structure Dataset	Offshore bank deposits to domestic bank deposits (%). Offshore bank deposit data from October 2008 version of BIS Statistical Appendix Table 7B: External loans and deposits of reporting banks vis-à-vis the non-bank sector; bank deposits from IFS (IFS lines 24 and 25).

(continued on next page)

Table A.1. Variable definitions and data sources (continued)

Variable	Source	Definition
Panel H: Demand and supply of capital indicators		
Number of MSME's	MSME Country indicators	Number of MSME's per 1000 people. Where possible, MSMEs are defined as follows: micro enterprises: 1-9 employees; small: 10-49 employees; and medium: 50-249 employees. However, in the majority of countries, this definition did not match the local definition, in which cases the local definition took precedence. Only firms with at least one employee are included.
National savings	World Development Indicators	Net national savings (% of GNI). Net national savings are equal to gross national savings less the value of consumption of fixed capital.
Life insurance premium	Financial Development and Structure Dataset	Life insurance premium volume to GDP. Premium data is taken from various issues of Sigma reports (Swiss Re). Data on GDP in US dollars is from the electronic version of the World Development Indicators.
Panel I: Technology and innovation indicators		
High technology exports	World Development Indicators	High Technology Exports (% of manufactured exports). High-technology exports are products with high R&D intensity, such as in aerospace, computers, pharmaceuticals, scientific instruments, and electrical machinery.
Scientific and technical articles	World Development Indicators	Scientific and technical journal articles. Scientific and technical journal articles refer to the number of scientific and engineering articles published in the following fields: physics, biology, chemistry, mathematics, clinical medicine, biomedical research, engineering and technology, and earth and space sciences.
Secondary schooling	World Development Indicators	School enrollment, secondary (% net). Net enrollment rate is the ratio of children of official school age who are enrolled in school to the population of the corresponding official school age. Secondary education completes the provision of basic education that began at the primary level, and aims at laying the foundations for lifelong learning and human development, by offering more subject- or skill-oriented instruction using more specialized teachers.

(continued on next page)

Table A.1. Variable definitions and data sources (continued)

Variable	Source	Definition
Panel J: Demographic indicators		
Population	World Development Indicators	Total population. Total population is based on the de facto definition of population, which counts all residents regardless of legal status or citizenship--except for refugees not permanently settled in the country of asylum, who are generally considered part of the population of their country of origin. The values shown are midyear estimates.
Population density	World Development Indicators	Population density is midyear population divided by land area in square kilometers. Population is based on the de facto definition of population, which counts all residents regardless of legal status or citizenship - except for refugees not permanently settled in the country of asylum, who are generally considered part of the population of their country of origin. Land area is a country's total area, excluding area under inland water bodies, national claims to continental shelf, and exclusive economic zones. In most cases the definition of inland water bodies includes major rivers and lakes.
Life expectancy	World Development Indicators	Life expectancy at birth, total (years). Life expectancy at birth indicates the number of years a newborn infant would live if prevailing patterns of mortality at the time of its birth were to stay the same throughout its life.
Panel K: Socio-cultural indicators		
Power distance	Hofstede et al. (2010)	The extent to which the less powerful members of organizations and institutions (like the family) accept and expect that power is distributed unequally. This represents inequality (more versus less), but defined from below, not from above.
Individuality	Hofstede et al. (2010)	The degree to which individuals are integrated into groups. On the individualist side we find societies in which the ties between individuals are loose: everyone is expected to look after her/himself and her/his immediate family. On the collectivist side, we find societies in which people from birth onwards are integrated into strong, cohesive in-groups, often extended families (with uncles, aunts and grandparents) which continue protecting them in exchange for unquestioning loyalty.
Masculinity	Hofstede et al. (2010)	Refers to the distribution of emotional roles between the genders which is another fundamental issue for any society to which a range of solutions are found.

(continued on next page)

Table A.1. Variable definitions and data sources (continued)

Variable	Source	Definition
Uncertainty avoidance	Hofstede et al. (2010)	Society's tolerance for uncertainty and ambiguity. It indicates to what extent a culture programs its members to feel either uncomfortable or comfortable in unstructured situations. Unstructured situations are novel, unknown, surprising, different from usual.
Long-term orientation	Hofstede et al. (2010)	Research by Michael Bond and colleagues among students in 23 countries led him in 1991 to adding a fifth dimension called Long- versus Short-Term Orientation. In 2010, research by Michael Minkov allowed to extend the number of country scores for this dimension to 93, using recent World Values Survey data from representative samples of national populations. Long- term oriented societies foster pragmatic virtues oriented towards future rewards, in particular saving, persistence, and adapting to changing circumstances. Short-term oriented societies foster virtues related to the past and present such as national pride, respect for tradition, preservation of "face", and fulfilling social obligations.
Panel K: Socio-cultural indicators (continued)		
Indulgence	Hofstede et al. (2010)	Indulgence versus restraint. Also based on Minkov's World Values Survey data analysis for 93 countries. Indulgence stands for a society that allows relatively free gratification of basic and natural human drives related to enjoying life and having fun. Restraint stands for a society that suppresses gratification of needs and regulates it by means of strict social norms.
Ethno-linguistic fractionalization	La Porta et al. (1999)	Average value of five different indices of ethnolinguistic fractionalization. Its value ranges from 0 to 1. The five component indices are: (1) index of ethnolinguistic fractionalization in 1960, which measures the probability that two randomly selected people from a given country will not belong to the same ethnolinguistic group (the index is based on the number and size of population groups as distinguished by their ethnic and linguistic status); (2) probability of two randomly selected individuals speaking two different languages; (3) probability of two randomly selected individuals do not speak the same language; (4) percent of the population not speaking the official language; and (5) percent of the population not speaking the most widely used language. Sources: Easterly and Levine, 1997. The sources of the components of the average index are (1) Atlas Narodov Mira, 1964; (2) Muller, 1964; (3) Roberts, 1963; (4) and (5) Gunnemark, 1991.

(continued on next page)

Table A.1. Variable definitions and data sources (continued)

Variable	Source	Definition
Catholic *Protestant* *Muslim* *Other religion*	La Porta et al. (1999)	Identifies the percentage of the population of each country that belonged to the three most widely spread religions in the world in 1980. For countries of recent formation, the data is available for 1990-1995. The numbers are in percent (scale from 0 to 100). The three religions identified here are (1) Roman Catholic; (2) Protestant; and (3) Muslim. The residual is called "other religions". Sources: Barrett, 1982, Worldmark Encyclopedia of Nations 1995, Statistical Abstract of the World 1995, United Nations, 1995, CIA 1996.
Distrust	Aghion et al. (2010)	Share of people who answer "need to very careful in dealing with people" to the question: "Generally speaking, would you say that most people can be trusted or that you need to be very careful in dealing with people?". Average country level of distrust over the four waves of the WVS [World Values Survey].
Settler mortality	Acemoğlu et al. (2003)	Log of estimated mortality for European settlers during the early period of European colonization (before 1850). Settler mortality is calculated from the mortality rates of European-born soldiers, sailors and bishops when stationed in colonies.
GINI index	World Development Indicators	Gini index measures the extent to which the distribution of income (or, in some cases, consumption expenditure) among individuals or households within an economy deviates from a perfectly equal distribution. A Lorenz curve plots the cumulative percentages of total income received against the cumulative number of recipients, starting with the poorest individual or household. The Gini index measures the area between the Lorenz curve and a hypothetical line of absolute equality, expressed as a percentage of the maximum area under the line. Thus a Gini index of 0 represents perfect equality, while an index of 100 implies perfect inequality.
HIV prevalence	World Development Indicators	Prevalence of HIV, total (% of population ages 15-49). Prevalence of HIV refers to the percentage of people ages 15-49 who are infected with HIV.
Health expenditure	World Development Indicators	Health expenditure per capita (current US$). Total health expenditure is the sum of public and private health expenditures as a ratio of total population. It covers the provision of health services (preventive and curative), family planning activities, nutrition activities, and emergency aid designated for health but does not include provision of water and sanitation. Data are in current U.S. dollars.

(continued on next page)

Table A.1. Variable definitions and data sources (continued)

Variable	Source	Definition
Panel L: Geographic indicators		
Latitude	World Bank Social Indicators and Fixed Factors	Geographic coordinate in degrees.
Landlocked	World Bank Social Indicators and Fixed Factors	Dummy variable. Takes the value "1" if the country is landlocked, and "0"otherwise.
Sub-Saharan Africa *Europe & Central Asia* *Middle East & North Africa*	World Development Indicators	Region dummies
Panel M: Stock exchange initiative		
Government initiative *Private initiative* *Both government and private initiative*	Minier (2009)	Initiative of opening the exchange. Dummy variables that indicate whether the exchange was opened by government initiative, private initiative or both.
Panel N: Market design indicators		
Insider trading laws	Bhattacharya et al. (2002)	Dummy that takes the value "0" before insider trading laws are implement, and "1" thereafter. Dates come from Bhattacharya et al. (2002). Dates came from the answers given by all national regulators and officials of stock markets of the world in March 1999 to the question "When (mm/yy), if at all, were insider trading laws established in your exchange".
Insider trading law enforcement	Bhattacharya et al. (2002)	Dummy that takes the value "0" before insider trading laws are enforced, and "1" thereafter. Dates come from Bhattacharya et al. (2002). Dates came from the answers given by all national regulators and officials of stock markets of the world in March 1999 to the question "If answer to (1) above is YES, when (mm/yy), if at all, was the first prosecution under these laws?".

Appendix B.

The political consequences of financial market development: Evidence from the opening of African stock exchanges

Table B.1. Variable definitions and data sources

This picture the variable definition and data sources for the country characteristics (Panel A), stock exchange characteristics (Panel B), listed companies (Panel C), and political leader characteristics (Panel D).

Variable	Definition	Data Source
	Panel A. Country characteristics	
GDP	GDP, current USD. Sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. Dollar figures for GDP are converted from domestic currencies using single year official exchange rates.	World Development Indicators (WDI) (World Bank)
GDP per capita	GDP per capita, current USD. GDP per capita is gross domestic product divided by midyear population.	WDI (World Bank)
GDP growth	GDP growth (annual %). Annual percentage growth rate of GDP at market prices based on constant local currency. Aggregates are based on constant 2005 U.S. dollars. GDP is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. It is calculated without making deductions for depreciation of fabricated assets or for depletion and degradation of natural resources.	WDI (World Bank)
Private credit / GDP	Domestic credit to private sector (% of GDP). Private credit by deposit money banks and other financial institutions to GDP.	WDI (World Bank)
Polity score	Polity IV – Polity2 Score. Revised Combined Polity Score: The POLITY score is computed by subtracting the AUTOC (autocracy) score from the DEMOC (democracy) score; the resulting unified polity scale ranges from +10 (strongly democratic) to -10 (strongly autocratic).	Polity IV dataset (2017 update)

(continued on next page)

Table B.1. Variable definitions and data sources (continued)

Variable	Definition	Data Source
Panel B. Stock Exchange		
Date of opening	Year in which the Stock Exchange was officially opened.	Several sources, including Stock Exchange website.
First IPO	Year in which the first Initial Public Offering took place.	
Panel C. Political leaders		
Political leader	In Parliamentary regimes, the Prime Minister is coded as the ruler, in Presidential systems, the president. In communist states the Chairman of the Party is generally coded as the effective ruler.	Database of Political Institutions (Scartascini, Cruz, and Keefer, 2017)
Political leader's date of birth	The leader's birth year.	
Term in office	The STARTDATE and ENDDATE variable from ARCHIGOS indicate the beginning and end of one leader-spell.	ARCHIGOS (Goemans, Gleditsch, and Chiozza, 2009)
Power transfer mode	The manner in which transfers between rulers occur. The variable EXITCODE records in more detail how the leader lost power. See Table C.5 in the Appendix for the different codes.	
Panel D. Listed companies		
Listed companies	Number of companies listed in the Stock Exchange.	Stock Exchanges' websites.
Sector	Bureau van Dijk's sector code of the listed company: 01) Primary Sector (agriculture, mining, etc.); 02) Food, beverages, tobacco; 03) Textiles, wearing apparel, leather; 04) Wood, cork, paper; 05) Publishing, printing; 06) Chemicals, rubber, plastics, non-metallic products; 07) Metals & metal products; 08) Machinery, equipment, furniture, recycling; 09) Gas, Water, Electricity; 10) Construction; 11) Wholesale and retail sale; 12) Hotels & restaurants; 13) Transport; 14) Post and telecommunications; 15) Banks; 16) Insurance Companies; 17) Other services; 18) Public administration and defence; 19) Education, Health	Orbis (Bureau van Dijk)

Table B.2. Political leaders at the time of opening of a stock exchange (1961-2016)

This table presents the sample of African countries that officially opened a stock exchange in the 1961-2016 period, sorted by the year in which the stock exchange was officially opened. For each country, we report the name of the country's political leader in the year in which the stock exchange was officially opened, the year of the beginning of the political leader's term in office, the year of the end of the political leader's term in office, the exit mode, and the Polity scores of the country on the years in which the political leader started and ended his term in office.

	Political leader	Term (present=2016)	Exit mode	Polity score	
				Start term	End term*
Tunisia	Habib Ali Bourguiba	1957-87	Irregular (8)	n.a.	-8
Botswana	Quett Ketumile Joni Masire	1980-98	Regular	6	8
Mauritius	Anerood Jugnauth	1982-95	Regular	10	10
Ghana	Jerry John Rawlings	1981-2001	Regular	6	6
Swaziland	Mswati III	1986-present	Still in Office	-10	-9
Namibia	Samuel Daniel Nujoma	1990-2005	Regular	6	6
Zambia	Frederick J. T. Chiluba	1991-2002	Regular	6	5
Sudan	Umar al-Hasan Ahmad al-Bashir	1989-present	Still in Office	-7	-4
Malawi	Elson Bakili Muluzi	1994-2004	Regular	6	5
Benin	Mathieu Kérékou	1996-2006	Regular	-7	0
Burkina Faso	Blaise Compaoré	1987-2014	Regular	-7	0
Cote d'Ivoire	Aimé Henri Konan Bédié	1993-99	Irregular (6)	-7	-6
Guinea-Bissau	João Bernardo Vieira	1980-99	Irregular (6)	-7	0
Mali	Alpha Oumar Konaré	1992-2002	Regular	7	6
Niger	Ibrahim Baré Maïnassara	1996-99	Irregular (6)	-6	-6
Senegal	Abdou Diouf	1981-2000	Regular	-1	-1
Togo	Gnassingbé Eyadéma	1967-2005	Regular	-7	-2
Tanzania	Benjamin William Mkapa	1995-2005	Regular	-1	-1
Algeria	Liamine Zéroual	1994-99	Regular	-7	-3
Uganda	Yoweri Kaguta Museveni	1986-present	Still in Office	-7	-1
Cape Verde	Carlos Alberto de Carvalho Veiga	1991-2000	Regular	8	8
Mozambique	Joaquim Alberto Chissano	1986-2005	Regular	-7	5
Cameroon	Paul Biya	1982-present	Still in Office	-7	-4
Cent. Afr. Rep.	François Bozizé	2003-13	Irregular (10)	-1	-1
Chad	Idriss Déby Itno	1990-present	Still in Office	-7	-2
Congo, Rep.	Denis Sassou-Nguesso	1997-present	Still in Office	-8	-1
Equatorial Guinea	Teodoro Obiang Nguema Mbasogo	1979-present	Still in Office	-7	-6
Gabon	Omar Bongo Ondimba	1967-2009	Regular	-7	-4
Rwanda	Paul Kagame	1994-present	Still in Office	-4	-3
Libya	Muammar Muhammad al-Gaddafi	1969-2010	Irregular (10)	-7	-7
Sierra Leone	Ernest Bai Koroma	2007-present	Still in Office	7	7
Somalia	Shaykh Sharif Shaykh Ahmad	2009-2011	N.a.	0	N.a.
Seychelles	James Alix Michel	2004-present	Still in Office	N.a.	N.a.
Angola	José Eduardo dos Santos	1979-present	Still in Office	-7	-2

*2016 if political leader was still in office in 2016

Table B.3. Transfer of power codes Archigos

This table presents the codes for transfers of power between political leaders used in Archigos (Goemans, Gleditsch, and Chiozza, 2009).

	Transfer codes Archigos
1	Assassination by Unsupported Individual
2	Irregular, Other
3	Popular Protest, without Foreign Support
4	Regular
5	Removed by Military, with Foreign Support
6	Removed by Military, without Foreign Support
7	Removed by Other Government Actors, with Foreign Support
8	Removed by Other Government Actors, without Foreign Support
9	Removed by Rebels, with Foreign Support
10	Removed by Rebels, without Foreign Support
11	Removed in Military Power Struggle Short of Coup
12	Removed through Threat of Foreign Force
13	Still in Office

Table B.4. Probit of opening of a stock exchange used for matching procedure

This table presents the results of probit regression (2) used to calculate the probability that a given country will open a stock exchange in a given year based on its size and level of economic, political, and financial development. We use a panel that includes all African countries, starting in 1960 and ending in the year in which a stock exchange was officially opened. The dependent variable is a dummy that takes the value 1 in the year in which the stock exchange was officially opened, and zero otherwise. Coefficients of the probit regression are presented in the first column. The second column presents the marginal increase in probability implied by the probit coefficients evaluated at the sample mean, which is presented in the third column. The fourth column presents the standard deviation of each variable. We refer to Table B.1 of the Appendix for variable definitions and data sources. Z-statistics are presented in parenthesis (***, **, and * indicate significance at the 1%, 5%, and 10% level).

	Opening a stock exchange			
	Coefficients	Marginal increase in probability	Mean	St.dev.
Ln GDP	0.18**	0.0062**	21.08	1.39
	(2.57)			
Ln GDP per capita	0.21**	0.0073**	5.86	0.90
	(2.08)			
GDP growth	0.01*	0.0005*	3.79	8.96
	(1.95)			
Ln private credit/ GDP	-0.18	-0.0015	2.48	2.48
	(-1.57)			
Polity score	0.04***	0.0015***	-3.38	5.52
	(2.98)			
Constant	-6.58***			
	(-4.90)			
Observations	1,303			
LR chi2(5)	35.76			
Prob > chi2	0.0000			
Ln likelihood	-128.64			
Pseudo R2	0.122			

Table B.5. Quality of matching procedure – summary statistics

This table presents the statistics used to evaluate the quality of the matching procedure. For each variable included in probit regression (2), we report the mean and the standard deviation in the treatment and control group, as well as the difference between the means of the two groups and the p-value of the t-test for difference in means (***, **, and * indicate significance at the 1%, 5%, and 10% level). Panel A presents the statistics in the year that the matching takes place (one year before the opening of the exchange). Panel B presents the statistics for the full 10-year pre-period, used in the difference-in-differences analysis. We refer to Table B.1 of the Appendix for variable definitions and data sources.

Panel A. Year of match (before opening)					
		treatment *N=26*	control *N=26*	difference	p-value
Ln GDP	mean	21.63	21.80	-0.17	0.58
	st. dev.	0.92	1.25		
Ln GDP pc	mean	6.18	6.19	-0.01	0.96
	st. dev.	0.92	0.94		
GDP growth (%)	mean	6.02	5.05	0.97	0.49
	st. dev.	5.31	4.67		
Ln private credit / GDP	mean	2.37	2.33	0.04	0.86
	st. dev.	0.66	0.92		
Polity score	mean	-0.35	-0.31	-0.04	0.98
	st. dev.	5.97	6.20		
Panel B. 10 year pre-period					
		treatment *N=260*	control *N=260*	difference	p-value
Ln GDP	mean	21.43	21.48	-0.05	0.63
	st. dev.	1.06	1.20		
Ln GDP pc	mean	6.13	6.00	0.13	0.11
	st. dev.	0.84	0.95		
GDP growth (%)	mean	5.17	2.29	2.88***	0.00
	st. dev.	12.89	5.75		
Ln private credit / GDP	mean	2.44	2.52	-0.08	0.26
	st. dev.	0.68	0.84		
Polity score	mean	-2.58	-2.25	-0.33	0.54
	st. dev.	5.81	6.34		

Table B.6. Summary statistics of listed companies

This table presents, for each stock exchange in our sample (sorted by year in which the stock exchange was officially opened), the number of companies listed in the stock exchange's website, and the number of listed companies included in the Orbis database (Bureau van Dijk) in 2018. For the companies included in the Orbis database, we report the number of banks, the number of banks scaled by the number of companies, the number of sectors represented in the stock exchange, and the sector concentration of the stock exchange (sector concentration is the Herfindahl-Hirschman-index of the sectors represented in each stock exchange, calculated as $I = \sum_{s=1}^{19}(N_s/N)^2$, where *s* represents each of the 19 sectors in Bureau van Dijk's sector classification, *N* represents the total number of companies included in the Orbis database, and N_s represents the total number of companies in sector *s*). Panel A presents summary statistics for democracies (countries with a Polity score higher than zero in the year before the opening of the stock exchange). Panel B presents summary statistics for autocracies (countries with a Polity score lower than or equal to zero in the year before the opening of the stock exchange).

Panel A. Democracies

	# listed companies 2018		Orbis 2018			
Country	Website	Orbis	# banks	# banks/ # listed companies	# sectors	sector concentr.
Botswana	29	26	3	11.5%	9	0.263
Mauritius	110	107	13	12.1%	13	0.169
Namibia	40	12	3	25.0%	4	0.347
Zambia	31	22	4	18.2%	11	0.116
Malawi	14	13	4	30.8%	6	0.195
Benin	1	1	1	100.0%	1	1.000
Guinea-Bissau	0	0	0	0.0%	0	0.000
Mali	1	0	0			
Niger	1	1	1	100.0%	1	1.000
Cape Verde	4	4	2	50.0%	2	0.375
Mozambique	6	3	0	0.0%	3	0.333
Cent. Afr. Rep.	0	0	0	0.0%	0	0.000
Sierra Leone	1	0	0			
Total	**238**	**189**	**31**			
Average	18.3	14.5	2.58	31.6%	4.55	0.345
Average weighted by # of listed companies			8.76	16.4%	10.65	0.205

Table B.6. Summary statistics of listed companies (continued)

Panel B. Autocracies

	# listed companies 2018		Orbis 2018			
Country	Website	Orbis	# banks	# banks/ # listed companies	# sectors	sector concentr.
Tunisia	82	78	19	24.4%	17	0.128
Ghana	41	36	7	19.4%	11	0.127
Swaziland	7	7	1	14.3%	4	0.388
Sudan	59	13	12	92.3%	2	0.852
Burkina Faso	2	2	1	50.0%	2	0.500
Cote d'Ivoire	31	31	4	12.9%	11	0.116
Senegal	3	3	1	33.3%	3	0.333
Togo	1	0	0			
Tanzania	27	19	5	26.3%	9	0.130
Algeria	5	5	0	0.0%	4	0.280
Uganda	16	8	2	25.0%	5	0.172
Cameroon	na	3	0	0.0%	1	1.000
Chad	0	0	0	0.0%	0	0.000
Congo, Rep.	0	0	0	0.0%	0	0.000
Eq. Guinea	0	0	0	0.0%	0	0.000
Gabon	1	0	0			
Rwanda	8	4	2	50.0%	3	0.375
Libya	10	1	1	100.0%	1	1.000
Somalia	2	0	0			
Angola	0	0	0	0.0%	0	0.000
Total	**295**	**210**	**55**			
Average	15.5	10	2.62	26.3%	4.29	0.318
Average weighted by # of listed companies			10.22	26.2%	11.32	0.213

Table B.7. Robustness: summary statistics of political leader survival using first IPO

This table presents summary statistics of the political leaders' survival in office. "Failure" occurs when a political leader's term in office ends. Panel A presents summary statistics for the full sample, Panel B presents summary statistics for autocracies (country-years for which the Polity score is lower than or equal to zero), and Panel C presents summary statistics for democracies (country-years for which the Polity score is higher than zero). Survival statistics of political leaders are presented for country-years in which: 1) there was no stock exchange during the political leader's term in office ("No exchange"), 2) a stock exchange was opened during the political leader's term in office and the first initial public offering took place during that period ("Political leader opened exchange"), 3) a stock exchange was opened during the political leader's term in office but the first initial public offering did not take place during that period ("Political leader opened exchange, no IPO"), 4) a stock exchange was officially opened before the political leader's term in office and the first initial public offering had already taken place ("Exchange opened by prior political leader"), and 5) a stock exchange was officially opened before the political leader's term in office but the first initial public offering has not taken place during the political leader's term in office ("Exchange opened by prior political leader, no IPO"). For each category, we present the time at risk (total number of years in office), the incidence rate (number of "failures"/time at risk), the number of political leaders at risk ("# of political leaders") and the survival time (in years) of the 25th, 50th and 75th percentiles.

	Time at risk (years)	Incidence rate (%)	# of political leaders	Survival time (years)		
				25%	50%	75%
Panel A. Full sample						
No exchange	1,845	10.95	247	1	5	14
Political leader opened exchange	102	6.86	23	3	9	19
Political leader opened exchange, no IPO	222	7.66	24	6	10	19
Exchange opened by prior political leader	39	38.46	20	1	1	4
Exchange opened by prior political leader, no IPO	595	11.93	98	1	5	11
Total	2,803	11.13	366	1	5	13
Panel B. Autocracies						
No exchange	1,430	10.07	182	1	6	16
Political leader opened exchange	90	4.44	16	5	10	38
Political leader opened exchange, no IPO	137	5.11	13	3	3	3
Exchange opened by prior political leader	8	62.50	6	1	1	2
Exchange opened by prior political leader, no IPO	281	12.10	40	1	1	11
Total	1,946	9.97	230	1	5	14
Panel C. Democracies						
No exchange	415	13.98	86	2	5	10
Political leader opened exchange	12	25.00	9	3	3	9
Political leader opened exchange, no IPO	85	11.76	12	10	11	15
Exchange opened by prior political leader	31	32.26	14	1	2	4
Exchange opened by prior political leader, no IPO	314	11.78	64	3	8	10
Total	857	13.77	166	2	5	10

Table B.8. Robustness: survival analysis using first IPO

This table presents the results of the survival analysis that tests the impact of opening a stock exchange on the political leaders' survival in office for the full sample, autocracies (country-years for which the Polity score is lower than or equal to zero), and democracies (country-years for which the Polity score is higher than zero). "Failure" occurs when a political leader's term in office ends. "Opened exchange" is a dummy variable that takes the value 1 if a stock exchange was opened during the political leaders' term in office and the first initial public offering (IPO) took place in that period, and zero otherwise. "Opened exchange, no IPO" is a dummy variable that takes the value 1 if a stock exchange was opened during the political leaders' term in office but the IPO did not take place in that period, and zero otherwise. "Exchange open" is a dummy variable that takes the value 1 if a stock exchange was already open when the political leader started his term in office and the first IPO took place until the end of his term, and zero otherwise. "Exchange open, no IPO" is a dummy variable that takes the value 1 if a stock exchange was already open when the political leader started his term in office and the first IPO did not take place until the end of his term, and zero otherwise. The first three columns present the results of a Cox proportional hazards model. Beginning year (year in which the political leader started his term in office) and country fixed effects are included. The last three columns present the results of a Weibull regression, where the estimated ancillary parameter is a function of two decade and country dummies. Standard errors are clustered at the political leader level, and reported in parentheses (***, **, and * indicate significance at the 1%, 5%, and 10% level). We refer to Table B.1 of the Appendix for variable definitions and data sources.

(continued on next page)

Table B.8. Robustness: survival analysis using first IPO (continued)

	Full sample		Autocracy		Democracy	
	Cox	Weibull	Cox	Weibull	Cox	Weibull
	(1)	(2)	(3)	(4)	(5)	(6)
Opened exchange	0.502**	-0.921***	0.410	-1.047*	0.315**	-1.347***
	(-2.59)	(-3.39)	(-1.48)	(-1.72)	(-2.11)	(-2.90)
Opened exchange, no IPO	0.432	-0.580	0.352	-1.102**	1.057	0.141
	(-1.62)	(-1.37)	(-1.69)	(-2.17)	(0.04)	(0.18)
Exchange open	0.884	-0.390	0.964	-0.093	0.774	-1.004
	(-0.44)	(-1.53)	(-0.07)	(-0.23)	(-0.41)	(-2.11)
Exchange open, no IPO	3.250***	0.846***	1.912	0.303	20.608***	1.139**
	(2.78)	(2.85)	(0.78)	(0.66)	(3.20)	(2.18)
Age political leader	1.017**	0.013	1.029***	0.029	1.008	0.012
	(2.52)	(1.72)	(3.42)	(2.75)	(0.58)	(0.73)
Log GDP	0.419	0.065	0.575	-0.085	1.129	0.007
	(-1.17)	(0.68)	(-0.41)	(-0.70)	(0.10)	(0.04)
Log GDP per capita	2.699	-0.201	2.118	0.029	1.360	-0.086
	(1.30)	(-1.44)	(0.52)	(0.16)	(0.23)	(-0.33)
GDP growth	0.974***	-0.035***	0.976	-0.020***	0.969	-0.043
	(-3.53)	(-7.06)	(-2.66)	(-3.94)	(-1.15)	(-2.53)
Log private credit/ GDP	0.998	0.047	0.960	0.114	2.178**	0.542
	(-0.01)	(0.38)	(-0.22)	(0.73)	(2.21)	(1.92)
Polity score	1.034**	0.037**	1.142	0.178***	0.922	-0.062
	(2.12)	(2.22)	(3.74)	(4.97)	(-1.26)	(-1.00)
# of observations	2,147	2,147	1,464	1,464	683	683
# of political leaders	309	309	191	191	141	141
Log (pseudo)likelihood	-1,149.54	-392.75	-602.80	-230.63	-323.07	-116.17
Beg. year f.e.	YES		YES		YES	
Country f.e.	YES		YES		YES	
Clustered s.e. (polit. leader)	YES	YES	YES	YES	YES	YES
/ln_p: two decade		YES		YES		YES
/ln_p: Country		YES		YES		YES

Table B.9. Robustness: survival analysis excluding political leaders who died after illness or accident

This table presents the results of the survival analysis that tests the impact of opening a stock exchange on the political leaders' survival in office for the full sample, autocracies (country-years for which the Polity score is lower than or equal to zero), and democracies (country-years for which the Polity score is higher than zero). "Failure" occurs when a political leader's term in office ends. Political leaders whose "failure" coincided with death due to illness or accident are excluded. "Opened exchange" is a dummy variable that takes the value 1 if a stock exchange was opened during the political leaders' term in office, and zero otherwise. "Exchange open" is a dummy variable that takes the value 1 if a stock exchange was already open when the political leader started his term in office, and zero otherwise. The first three columns present the results of a Cox proportional hazards model. Beginning year (year in which the political leader started his term in office) and country fixed effects are included. The last three columns present the results of a Weibull regression, where the estimated ancillary parameter is a function of two decade and country dummies. Standard errors are clustered at the political leader level, and reported in parentheses (***, **, and * indicate significance at the 1%, 5%, and 10% level). We refer to Table B.1 of the Appendix for variable definitions and data sources.

(continued on next page)

Table B.9. Robustness: survival analysis excluding political leaders who died after illness or accident (continued)

	Full sample		Autocracies		Democracies	
	Cox	Weibull	Cox	Weibull	Cox	Weibull
	(1)	(2)	(3)	(4)	(5)	(6)
Opened exchange	0.540**	-0.612***	0.357**	-1.002**	0.630	-0.506
	(-2.49)	(-2.60)	(-1.97)	(-2.26)	(-0.94)	(-1.19)
Exchange open	1.149	0.071	1.103	0.105	1.871	0.092
	(0.48)	(0.28)	(0.17)	(0.30)	(0.98)	(0.20)
Age political leader	1.018**	0.016**	1.036***	0.034***	1.006	0.010
	(2.47)	(1.98)	(3.53)	(2.89)	(0.42)	(0.64)
Ln GDP	0.132**	-0.067	0.059**	-0.122	0.325	-0.264
	(-2.53)	(-0.75)	(-1.98)	(-1.05)	(-0.93)	(-1.63)
Ln GDP per capita	8.491***	-0.126	21.839**	-0.007	4.664	0.033
	(2.60)	(-0.89)	(2.03)	(-0.04)	(1.20)	(0.12)
GDP growth	0.972***	-0.036***	0.976**	-0.020***	0.974	-0.033
	(-4.11)	(-7.47)	(-2.58)	(-4.00)	(-1.04)	(-2.07)
Ln private credit/ GDP	0.943	-0.024	0.959	0.164	1.211	0.195
	(-0.41)	(-0.20)	(-0.23)	(0.99)	(0.52)	(0.71)
Polity score	1.033*	0.033**	1.124***	0.175***	0.895*	-0.081
	(1.95)	(1.97)	(2.98)	(4.54)	(-1.65)	(-1.22)
# of observations	1,982	1,982	1,335	1,335	647	647
# of political leaders	292	292	181	181	133	133
Ln pseudolikelihood	-1,066.24	-377.91	-553.58	-216.00	-296.94	-116.43
Beg. year f.e.	YES		YES		YES	
Country f.e.	YES		YES		YES	
Clustered s.e. (pol. leader)	YES	YES	YES	YES	YES	YES
/ln_p: two decade		YES		YES		YES
/ln_p: Country		YES		YES		YES

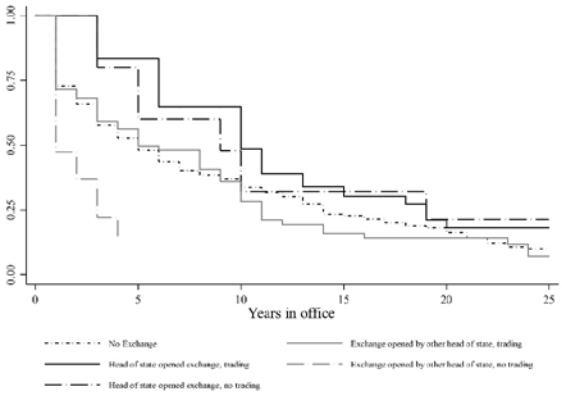
Figure B.1. Political leaders in office and Polity scores at the time of opening of a stock exchange (1961-2016)

This figure depicts, for all 34 countries that opened a stock exchange in the 1961-2016 period, all political leaders in office in the year in which the stock exchange was officially opened, as well as their names, the names of the stock exchanges, the years in which the stock exchanges were officially opened, and the Polity score of the country in the year before the stock exchange was opened. Red characters are used for countries that were autocracies in the year before the stock exchange was opened (Polity score was lower than or equal to zero), green characters are used for countries that were democracies in the year before the stock exchange was opened (Polity score was higher than zero). White characters are used if there is no Polity score in the year before the stock exchange was opened. The white borders mark leaders of countries that are part of one of the two regional stock exchanges.

Figure B.2. Robustness: Kaplan-Meier survival functions using first IPO

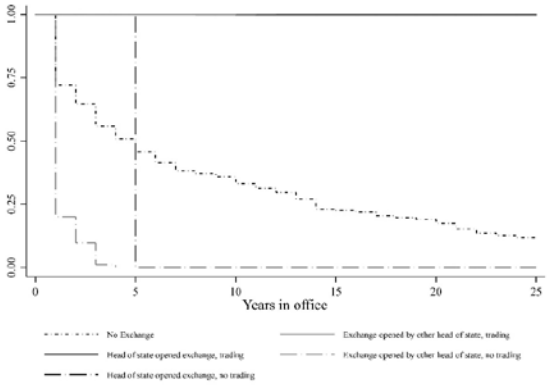
This picture presents political leaders' Kaplan-Meier survival functions during the first 25 years in office (horizontal axis). "Failure" occurs when a political leader's term in office ends. The dash-dotted line represents the survival function of political leaders in countries where there was no stock exchange during the political leader's term in office. The black line represents the survival function of political leaders if a stock exchange was opened during their term in office, and the first initial public offering (IPO) took place during that period. The black dash-dotted line represents the survival function of political leaders if a stock exchange was opened during their term in office, but the first IPO did not take place during that period. The gray line represents the survival function of political leaders in countries where a stock exchange was officially opened before the political leader's term in office, and the first IPO took place during his term in office. The gray dash-dotted line represents the survival function of political in countries where a stock exchange was officially opened before the political leader's term in office, but the first IPO has not taken place until the end of his term in office. Panel A presents unadjusted survivor functions. Panel B presents survival functions adjusted for the political leader's age, as well as the country's Ln GDP, Ln GDP per capita, GDP growth, and Ln private credit/ GDP. We refer to Table B.1 of the Appendix for variable definitions and data sources.

Panel A. Unadjusted survivor functions



Panel B. Adjusted survivor functions

Adjusted for age, GDP growth, and Ln GDP per capita



Appendix C.

Do index funds' family ties benefit the firms they own?

Table C.1. Variable definitions and data sources

This table presents all variable definitions and data sources. Panel A includes several firm characteristics, Panels B, C, and D include firm liquidity, investment, profitability, and valuation measures, respectively, Panel E includes mutual fund characteristics, and Panel F includes mutual fund ownership.

Variable	Definition	Data source
Panel A. Firm characteristics		
Assets, total	Total value of assets reported on the Balance Sheet (AT)	Compustat
Firm age	Difference between current year and year of first report date on Compustat database (LINKDT)	Compustat
Firm risk	Standard deviation of past 5 year monthly returns (RET)	CRSP
Liabilities, total	Current liabilities plus long-term debt plus other noncurrent liabilities, including deferred taxes and investment tax credit (LT)	Compustat
Leverage	Total liabilities/ Total assets (LT/AT)	Compustat
Payout ratio	Dividends (DVC+DVP) plus purchase of shares (PRSTKC) scaled by net income (NI)	Compustat
Shares outstanding	Number of shares outstanding (CSHO)	Compustat
Panel B. Liquidity		
Average spread (%)	Yearly average of monthly spread (%). Montlhy spread (%) calculated as the absolute value of the difference between the low price and the mid price, scaled by the mid price: |BIDLO – [(BIDLO + ASKHI)/2]|/[(BIDLO + ASKHI)/2]	CRSP
Monthly ask high	Highest daily price of the month (ASKHI). Dropped if it takes a negative value in database.	CRSP
Monthly bid low	Lowest daily price of the month (BIDLO). Dropped if it takes a negative value in database	CRSP
Total volume (%)	Total number of shares sold in the year, calculated as the sum of the total number of monthly shares sold (VOL), scaled by the total number of shares outstanding (CSHO)	CRSP
Analyst coverage	Number of EPS estimates	I/B/E/S
End-of-year close price	Calendar year close price (PRCC_F)	Compustat

(continued on next page)

Table C.1. Variable definitions and data sources (continued)

Variable	Definition	Data source
Panel C. Investment		
CAPEX/Assets	Cash outflow or the funds used for additions to the company's property, plant and equipment, excluding amounts arising from acquisitions, reported in the Statement of Cash Flows (CAPX), scaled by total assets (AT)	Compustat
R&D/Assets	All costs incurred during the year that relate to the development of new products or services (XRD), scaled by total assets (AT)	Compustat
Panel D. Profitability and Valuation		
Net income	Income after all expenses, including special items, income taxes, and minority interest, but before provisions for common and/or preferred dividends (NI)	Compustat
ROA	Return on assets, defined as operating income before depreciation (OIBDP) scaled by total assets (AT).	Compustat
Tobin's Q	Market value of assets/ book value of assets (AT), where market value of assets equals the sum of the book value of assets (AT) and the market value of equity (PRCC_F * CSHO), minus the sum of the book value of equity (AT - LT) and deferred taxes (TXDB)	Compustat
Panel E. Mutual fund characteristics		
Assets	Mutual fund's assets	Thomson S12
# holdings	Number of holdings	CRSP mutual fund database
Panel F. Mutual fund ownership		
Shares	Number of shares of firm held by mutual fund	Thomson S12

Table C.2. Industry innovation intensity classification

This table presents the industries belonging to the different industry innovation intensity classifications. I construct this measure using the summary statistics for patent values across industries reported in Kogan, Papanikolaou, Seru, and Stoffman (2017). I divide the 30 FF industries according to their level of innovation: highly innovative industries (i.i.i. = 3), innovative industries (i.i.i. = 2) and less innovative industries (i.i.i. = 1).

Category	**Fama-French 30 industry portfolio**	θ^{cm}	θ^{sm}
Highly innovative	08 Healthcare, medical equipment, pharmaceutical products	9.09	9.13
	09 Chemicals	6.67	3.66
	14 Electrical equipment	8.09	4.58
	15 Automobiles and trucks	6.22	3.85
	16 Aircraft, ships, and railroad equipment	7.45	7.19
Innovative	06 Consumer goods	4.02	3.48
	13 Fabricated products and machinery	4.67	2.72
	22 Personal and business services	2.15	2.25
	23 Business equipment	4.02	3.48
	24 Business supplies and shipping containers	2.78	2.39
Less innovative	All others	≤ 2.25	≤ 2.10

Table C.3. Variables for classification of fund-firm relation

This table presents a description of all variables used in the factor analysis conducted to classify the different types of firm-fund relation. Variables are based on Bushee (1998), and adapted to reflect a fund-firm relation instead of an institutional investor type. Definitions and sources of the variables used can be found in Table C.1 of the Appendix.

Variable	Definition	
$w_{f,i,t}$	Mutual fund's equity invested in the firm	$Shares_{f,i,t}$ *stock $price_{i,t}$
Equity (EQ)	Average market value of the mutual fund's equity invested in the firm in the 3 years prior to addition.	$1/t * \Sigma w_{f,i,t}$
Concentration (CONC)	Average percentage of the mutual fund's equity invested in the firm in the 3 years prior to addition.	$1/t * \Sigma w_{f,i,t} / Assets_{f,t}$
Percentage holding (PH)	Average size of the mutual fund's ownership position in the firm in the 3 years prior to addition.	$1/t * \Sigma(Shares_{f,i,t}/Shares\ outstanding_{i,t})$
Large block holding (LBH)	Dummy that takes the value 1 if the average mutual fund's ownership position in the firm in the 3 years prior to addition is greater than 0.001 and zero otherwise.	$1 \mid 1/t \Sigma PH_{f,i,t} > 0.001; 0 \mid 1/t \Sigma PH_{f,i,t} \leq 0.001$
Turnover (TURN)	Average absolute change in the mutual fund's position in the firm, scaled by the total position of the mutual fund in the firm in the 3 years prior to addition.	$1/t \Sigma [\mid \Delta w_{f,i,t} \mid / (w_{f,i,t} + w_{f,i,t-1})]$
Instability (INSTAB)	Number of years in which the mutual fund invested in the firm in the 3 years prior to addition (x -1)	$- \Sigma n_t; n_t=1 \mid PH_{f,i,t} >0; n_t=0 \mid PH_{f,i,t} =0$
Trading sensitivity to current earnings (CETS1)	Average of the interaction between the change of the mutual fund's position in the firm and the change in net income per share of the firm, scaled by the absolute value of the change in the mutual fund's position in the firm in the 3 years prior to addition.	$1/t *\Sigma (\Delta Shares_{f,i,t} * \Delta NIps_{i,} / \mid \Delta Shares_{f,i,t} \mid)$
Average earnings change of buys vs sells (CETS2)	Difference between the average change in net income per share of the firm when the change in the mutual fund's position in the firm was positive in the 3 years prior to addition and the average change in net income per share of the firm when the change in the mutual fund's position in the firm was negative in the 3 years prior to addition.	$1/t *\Sigma \Delta NIps_i \mid \Delta Shares_{f,i,t}>0 - 1/t *\Sigma \Delta NIps_i \mid \Delta Shares_{f,i,t}<0$
Change in holding when earnings are positive vs. negative (CETS3)	Difference between the change in the mutual fund's ownership position in the firm when the firm had positive net income change per share and the change in the mutual fund's ownership position in the firm when the firm had negative net income change per share, scaled by the absolute value of the change in the mutual fund's ownership position in the firm in the 3 years prior to addition.	$1/t * \Sigma [(\Delta PH_{f,i,t} \mid \Delta NIps_i>0 - \Delta PH_{f,i,t} \mid \Delta NIps_i>0) / \mid \Delta PH_{f,i,t} \mid]$

Table C.4. Impact of family ties with index funds on non-index ownership using family fixed effects

This table presents the results of the difference-in-differences conducted to evaluate the impact of family ties with index funds on changes in the ownership stake of non-index funds. The treatment group is composed by non-index fund-firm relations if an index fund in the family starts holding the firm after its addition to an index. The control group is composed by non-index fund-firm relations if no index fund in the family starts holding the firm after its addition to an index. The "post" dummy takes the value 1 in the three years after the addition (including the year of addition), and 0 in the three years prior to the addition. In the first four columns, family ties are measured by a dummy that takes the value 1 if there is an index fund within the same family starts holding the firm after its addition to the index. In the following four columns, family ties are measured by the log percentage ownership of the index funds within the same family that start holding the firm after its addition to the index. For each treatment measure, the first two columns present results that include all non-index fund-firm relations. The third column presents results for "dedicated" funds only. The fourth column presents results for transient funds only. A description of all the variables can be found in Table C.1 of the Appendix. All standard errors are clustered at the mutual fund family-addition level (***, **, and * indicate significance at the 1%, 5%, and 10% level).

(continued on next page)

Table C.4. Impact of family ties with index funds on non-index ownership using family fixed effects (continued)

	Ownership							
	Family ties dummy				Family ties measured by log % ownership index funds			
	All non-index funds		Dedicated	Transient	All non-index funds		Dedicated	Transient
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Treatment * post	**0.02*** **	**0.02*** **	**0.10*** **	**0.01*** **	**1.74*** **	**1.72*** **	**7.40*** **	**0.55*** **
	(19.86)	**(22.27)**	**(13.04)**	**(14.99)**	**(6.87)**	**(6.72)**	**(7.15)**	**(5.33)**
Treatment	-0.02***	-0.02***	-0.08***	-0.01***	-0.17	-0.05	-2.82***	-0.54***
	(-23.79)	(-20.83)	(-14.69)	(-22.05)	(-0.78)	(-0.21)	(-3.10)	(-6.95)
Post	-0.04***	-0.04***	-0.28***	-0.00***	-0.05***	-0.04***	-0.31***	-0.01***
	(-102.08)	(-85.87)	(-69.29)	(-13.50)	(-114.17)	(-96.98)	(-67.99)	(-27.65
Log fund assets	0.04***	0.04***	0.03***	0.01***	0.03***	0.03***	0.03***	0.01***
	(188.41)	(185.61)	(21.95)	(122.61)	(176.49)	(173.63)	(17.25)	(108.03)
Log firm assets	-0.01***	-0.01***	-0.02***	-0.01***	-0.01***	-0.01***	-0.02***	-0.01***
	(-72.74)	(-71.19)	(-11.35)	(-53.60)	(-76.82)	(-72.76)	(-10.32)	(-52.97)
Log firm age		0.001***	0.01***	0.0001*		0.00	0.01***	0.00
		(4.67)	(6.39)	(1.81)		(0.09)	(3.72)	(0.02)
Log average spread		-0.02***	-0.08***	-0.003***		-0.01***	-0.07***	-0.002***
		(-25.81)	(-18.08)	(-13.88)		(-17.65)	(-13.37)	(-8.28)
Log CAPEX/assets		-0.04***	-0.02	-0.01***		-0.04***	-0.04	-0.01***
		(-10.38)	(-0.79)	(-7.46)		(-10.05)	(-1.27)	(-6.23)
Inst. Ownership		-0.02***	-0.19***	0.01***		-0.01***	-0.16***	0.01***
		(-12.40)	(-15.18)	(8.95)		(-4.90)	(-10.88)	(13.02)
Top 5 Inst. Own.		0.07***	0.38***	-0.01***		0.03***	0.25***	-0.02***
		(13.90)	(9.23)	(-6.73)		(6.58)	(5.25)	(-10.76)
Mutual fund own.	0.13***	0.15***	0.80***	0.04***	0.12***	0.13***	0.74***	0.03***
	(65.74	(61.21)	(40.00)	(41.25)	(59.77)	(52.75)	(33.01)	(36.86)
Index fund ownership		-0.51***	-1.23***	-0.14***		-0.29***	-0.51*	-0.08***
		(-16.99)	(-4.65)	(-12.72)		(-10.07)	(-1.76)	(-7.40)
Constant	-0.18***	-0.14***	0.34***	-0.03***	-0.13***	-0.10***	0.35***	-0.02***
	(-40.29)	(-29.59)	(10.79)	(-16.96)	(-28.75)	(-21.02)	(10.50)	(-12.28)
Observations	1,550,961	1,493,448	73,590	1,131,645	1,170,900	1,126,922	47,950	866,668
R-squared	0.20	0.20	0.27	0.09	0.18	0.18	0.29	0.08
Year FE	YES	YES	YES	YES	YES	YES	YES	YES
Mff FE	YES	YES	YES	YES	YES	YES	YES	YES
Clustered SE	YES	YES	YES	YES	YES	YES	YES	YES

Table C.5. Impact of family ties with index funds on non-index ownership – robustness

This table presents a robustness test to the results presented in Table 4.9. The sample is restricted to firms that were added to an index for the first time, and if they were not deleted from the index in the 3 year period after their addition to the index. The treatment group is composed by non-index fund-firm relations if an index fund in the family starts holding the firm after its addition to an index. The control group is composed by non-index fund-firm relations if no index fund in the family starts holding the firm after its addition to an index. The "post" dummy takes the value 1 in the three years after the addition (including the year of addition), and 0 in the three years prior to the addition. In the first four columns, family ties are measured by a dummy that takes the value 1 if there is an index fund within the same family starts holding the firm after its addition to the index. In the following four columns, family ties are measured by the log percentage ownership of the index funds within the same family that start holding the firm after its addition to the index. For each treatment measure, the first two columns present results that include all non-index fund-firm relations. The third column presents results for "dedicated" funds only. The fourth column presents results for transient funds only. A description of all the variables can be found in Table C.1 of the Appendix. All standard errors are clustered at the addition level (***, **, and * indicate significance at the 1%, 5%, and 10% level).

(continued on next page)

Table C.5. Impact of family ties with index funds on non-index ownership – robustness (continued)

	Ownership							
	Family ties dummy				Family ties measured by log % ownership index funds			
	All non-index funds		Dedicated	Transient	All non-index funds		Dedicated	Transient
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Treatment * post	**0.03*** **	**0.02*** **	**0.15*** **	**0.01*** **	**2.50*** **	**2.53*** **	**6.32*** **	**0.49*** **
	(13.47)	**(10.51)**	**(8.99)**	**(8.36)**	**(5.4889)**	**(5.46)**	**(3.62)**	**(2.62)**
Treatment	-0.02***	-0.02***	-0.01	-0.005***	0.50*	0.53*	6.60***	-0.38***
	(-10.15)	(-9.11)	(-1.29)	(-15.27)	(1.84)	(1.92)	(4.59)	(-3.57)
Post	-0.07***	-0.08***	-0.34***	-0.02***	-0.07***	-0.08***	-0.39***	-0.02***
	(-36.61)	(-26.64)	(-19.42)	(-15.43)	(-31.25)	(-26.53)	(-18.25)	(-20.26)
Log fund assets	0.04***	0.04***	0.02***	0.01***	0.03***	0.03***	0.02***	0.01***
	(69.69)	(68.89)	(10.77)	(51.47)	(63.59)	(62.68)	(6.94)	(49.52)
Log firm assets	-0.002	-0.004*	0.03*	-0.002**	0.00	-0.003	0.04**	-0.001
	(-0.72)	(-1.82)	(1.81)	(-2.46)	(0.02)	(-1.39)	(2.40)	(-1.04)
Log firm age		0.001	0.003	-0.001		-0.002	-0.02	-0.002**
		(0.65)	(0.20)	(-1.48)		(-0.73)	(-1.37)	(-2.32)
Log average spread		0.003	-0.01	0.003***		0.003	-0.01	0.003***
		(1.61)	(-0.59)	(2.96)		(1.24)	(-0.75)	(3.39)
Log CAPEX/assets		-0.02	0.23**	-0.01		-0.02	0.28**	-0.01
		(-1.11)	(2.47)	(-1.54)		(-0.88)	(2.32)	(-1.13)
Inst. Ownership		0.05***	-0.04	0.03***		0.07***	-0.02	0.04***
		(7.66)	(-1.09)	(12.22)		(8.88)	(-0.51)	(13.40)
Top 5 Inst. Own.		-0.07***	0.52***	-0.07***		-0.11***	0.53***	-0.09***
		(-4.38)	(5.61)	(-11.05)		(-5.93)	(4.56)	(-12.58)
Mutual fund own.	0.26***	0.21***	0.91***	0.06***	0.24***	0.17***	0.82***	0.05***
	(17.92)	(13.20)	(12.69)	(12.62)	(13.93)	(9.55)	(9.54)	(9.44)
Index fund ownership		1.01***	2.98**	0.16**		1.57***	5.47***	0.39***
		(4.65)	(2.49)	(1.97)		(6.76)	(3.81)	(5.10)
Constant	-0.24***	-0.25***	-0.12	-0.07***	-0.19***	-0.19***	-0.08	-0.07***
	(-16.75)	(-14.70)	(-1.20)	(-10.91)	(-12.16)	(-10.99)	(-0.80)	(-9.65)
Observations	542,531	521,157	27,676	372,275	397,504	381,571	17,516	276,122
R-squared	0.17	0.17	0.33	0.08	0.15	0.16	0.36	0.08
Year FE	YES	YES	YES	YES	YES	YES	YES	YES
Addition FE	YES	YES	YES	YES	YES	YES	YES	YES
Clustered SE	YES	YES	YES	YES	YES	YES	YES	YES

Table C.6. Impact of family ties with index funds on firm profitability - robustness

This table presents a robustness test to the results presented in Table 4.10. The sample is restricted to firms that were added to an index for the first time, and if they were not deleted from the index in the 3 year period after their addition to the index. Profitability is measured by ROA. In the first four columns, family ties are measured by the log of the aggregate number of index funds that start holding the firm after its addition to the index and belong to the same family as the non-index funds that held the firm before its addition to the index. In the following four columns, family ties are measured by the log of the aggregate ownership of index funds that start holding the firm after its addition to the index and belong to the same family as the non-index funds that held the firm before its addition to the index. The "post" dummy takes the value 1 in the three years after the addition (including the year of addition), and 0 in the three years prior to the addition. For each treatment measure, the first two columns present results that include all aggregate non-index fund-firm relations. The third column presents results for "dedicated" funds only. The fourth column presents results for transient funds only. A description of all the variables can be found in Table C.1 of the Appendix. All standard errors are clustered at the addition level (***, **, and * indicate significance at the 1%, 5%, and 10% level).

(continued on next page)

Table C.6. Impact of family ties with index funds on firm profitability - robustness (continued)

	Profitability (ROA)							
	Family ties measured by log # index funds				Family ties measured by log % ownership index funds			
	All non-index funds		Dedicated	Transient	All non-index funds		Dedicated	Transient
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Treatment * post	**0.002**	**0.005**	**0.02***	**0.01***	**0.03**	**0.12***	**1.00*****	**0.14***
	(0.57)	**(1.40)**	**(1.84)**	**(1.85)**	**(0.61)**	**(1.94)**	**(3.58)**	**(1.76)**
Post	-0.03***	-0.02***	-0.03***	-0.03***	-0.03***	-0.02***	-0.01**	-0.02***
	(-4.03)	(-3.30)	(-3.21)	(-3.46)	(-5.05)	(-2.92)	(-2.15)	(-2.92)
Log firm assets	-0.02***	-0.03***	-0.03***	-0.03***	-0.02***	-0.03***	-0.03***	-0.03***
	(-3.83)							
		(-4.94)	(-5.12)	(-5.01)	(-3.78)	(-4.86)	(-5.10)	(-4.89)
Log firm age		-0.005	-0.004	-0.01		-0.005	-0.004	-0.01
		(-0.96)	(-0.69)	(-1.07)		(-0.91)	(-0.77)	(-0.97)
Log average spread		-0.01	-0.01	-0.01		-0.01	-0.01	-0.01
		(-1.61)	(-1.60)	(-1.54)		(-1.54)	(-1.45)	(-1.51)
Log CAPEX/assets		0.20***	0.21***	0.21***		0.20***	0.22***	0.21***
		(3.21)	(3.27)	(3.29)		(3.21)	(3.31)	(3.27)
Inst. Ownership		0.16***	0.17***	0.17***		0.16***	0.17***	0.17***
		(9.01)	(8.87)	(9.28)		(8.93)	(8.87)	(9.19)
Top 5 Inst. Own.		-0.37***	-0.36***	-0.38***		-0.37***	-0.36***	-0.38***
		(-8.43)	(-8.00)	(-8.42)		(-8.35)	(-7.91)	(-8.39)
Mutual fund own.	0.14***	0.02	0.03	0.03	0.14***	0.02	0.03	0.03
	(5.97)	(0.85)	(1.01)	(1.00)	(5.90)	(0.87)	(1.06)	(0.88)
Index fund ownership		-1.05*	-1.27**	-1.33**		-1.39**	-1.51***	-1.37**
		(-1.75)	(-2.14)	(-2.18)		(-2.27)	(-2.67)	(-2.19)
Constant	0.22***	0.30***	0.30***	0.29***	0.22***	0.30***	0.30***	0.29***
	(7.30)	(9.02)	(9.18)	(8.94)	(7.22)	(8.88)	(9.15)	(8.81)
Observations	5,255	4,951	4,417	4,623	5,255	4,951	4,365	4,623
R-squared	0.72	0.73	0.73	0.72	0.72	0.73	0.73	0.72
Year FE	YES	YES	YES	YES	YES	YES	YES	YES
Addition FE	YES	YES	YES	YES	YES	YES	YES	YES
Clustered SE	YES	YES	YES	YES	YES	YES	YES	YES

Table C.7. Impact of family ties with index funds on firm valuation - robustness

This table presents a robustness test to the results presented in Table 4.11. The sample is restricted to firms that were added to an index for the first time, and if they were not deleted from the index in the 3 year period after their addition to the index. Valuation is measured by Tobin's Q. In the first four columns, family ties are measured by the log of the aggregate number of index funds that start holding the firm after its addition to the index and belong to the same family as the non-index funds that held the firm before its addition to the index. In the following four columns, family ties are measured by the log of the aggregate ownership of index funds that start holding the firm after its addition to the index and belong to the same family as the non-index funds that held the firm before its addition to the index. The "post" dummy takes the value 1 in the three years after the addition (including the year of addition), and 0 in the three years prior to the addition. For each treatment measure, the first two columns present results that include all aggregate non-index fund-firm relations. The third column presents results for "dedicated" funds only. The fourth column presents results for transient funds only. A description of all the variables can be found in Table C.1 of the Appendix. All standard errors are clustered at the addition level (***, **, and * indicate significance at the 1%, 5%, and 10% level).

(continued on next page)

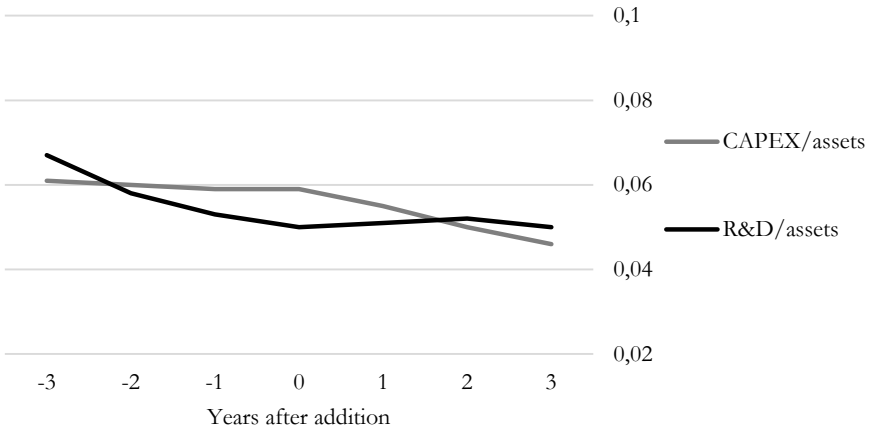
Table C.7. Impact of family ties with index funds on firm valuation - robustness (continued)

	Valuation (log Tobin's Q)							
	Family ties measured by log # index funds				Family ties measured by log % ownership index funds			
	All non-index funds		Dedicated	Transient	All non-index funds		Dedicated	Transient
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Treatment * post	**0.01**	**0.03*** **	**0.05***	**0.03****	**0.04**	**0.35***	**2.85*** **	**0.30**
	(0.96)	**(2.63)**	**(1.70)**	**(2.51)**	**(0.22)**	**(1.66)**	**(3.42)**	**(1.09)**
Post	-0.13***	-0.10***	-0.11***	-0.11***	-0.11***	-0.08***	-0.06**	-0.08***
	(-5.09)	(-4.12)	(-3.66)	(-4.02)	(-5.97)	(-3.35)	(-2.43)	(-3.27)
Log firm assets	-0.20***	-0.23***	-0.23***	-0.23***	-0.20***	-0.22***	-0.23***	-0.22***
	(-11.38)	(-13.72)	(-13.50)	(-13.42)	(-11.34)	(-13.48)	(-13.69)	(-13.24)
Log firm age		-0.12***	-0.12***	-0.12***		-0.12***	-0.11***	-0.12***
		(-5.65)	(-5.09)	(-5.55)		(-5.49)	(-5.07)	(-5.42)
Log average spread		0.06***	0.06***	0.06***		0.06***	0.06***	0.06***
		(3.64)	(3.39)	(3.48)		(3.72)	(3.47)	(3.53)
Log CAPEX/assets		0.74***	0.67***	0.76***		0.73***	0.70***	0.75***
		(3.84)	(3.43)	(3.89)		(3.81)	(3.58)	(3.86)
Inst. Ownership		0.81***	0.82***	0.83***		0.81***	0.81***	0.84***
		(12.83)	(12.21)	(12.83)		(12.84)	(12.15)	(12.82)
Top 5 Inst. Own.		-2.16***	-2.11***	-2.18***		-2.16***	-2.10***	-2.18***
		(-14.59)	(-13.87)	(-14.59)		(-14.56)	(-13.85)	(-14.59)
Mutual fund own.	1.06***	0.59***	0.61***	0.61***	1.05***	0.57***	0.62***	0.58***
	(11.08	(5.50)	(5.29)	(5.60)	(11.02)	(5.28)	(5.38)	(5.22)
Index fund ownership		-5.19**	-3.71	-5.10**		-4.57*	-4.65**	-3.58
		(-2.41)	(-1.59)	(-2.32)		(-1.82)	(-2.00)	(-1.42)
Constant	1.99***	2.19***	2.21***	2.20***	1.99***	2.19***	2.21***	2.19***
	(19.45)	(20.80)	(20.54)	(20.64)	(19.48)	(20.63)	(20.25)	(20.50)
Observations	5,021	4,967	4,461	4,664	5,021	4,967	4,410	4,664
R-squared	0.75	0.79	0.79	0.79	0.75	0.79	0.79	0.79
Year FE	YES	YES	YES	YES	YES	YES	YES	YES
Addition FE	YES	YES	YES	YES	YES	YES	YES	YES
Clustered SE	YES	YES	YES	YES	YES	YES	YES	YES

Figure C.1. Investment, profitability and valuation around year of addition

The figures below depict the development of the measures of investment (Panel A), and profitability and valuation (panel B) used in this paper, in the 7-year window around the year of addition to the index. Definitions of the variables are presented in Table C.1. of the Appendix.

Panel A. Investment



Panel B. Profitability and valuation

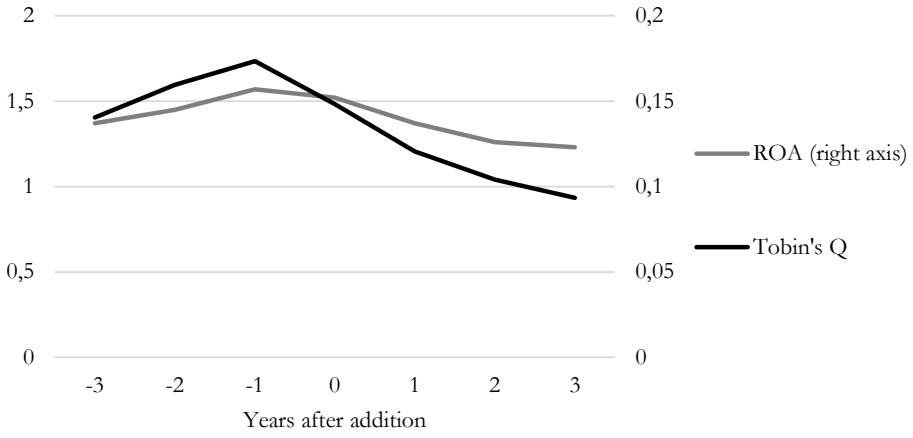
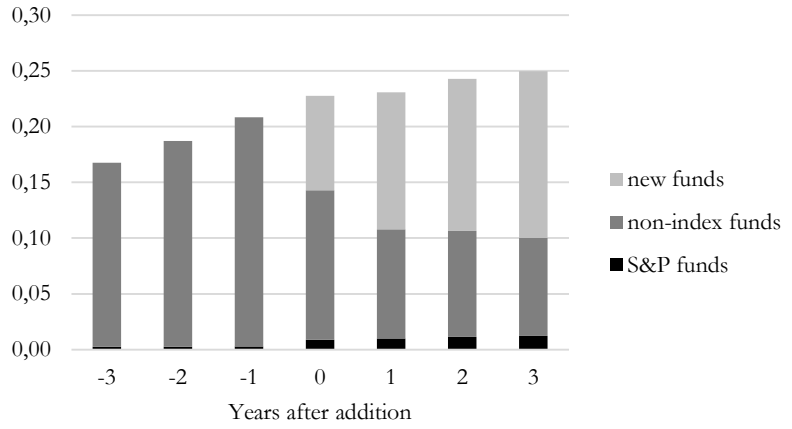


Figure C.2. Mutual fund ownership around year of addition

The figures below depict fund-firm ownership according to the categories of "S&P funds" (index funds holding the firm after its addition to the index), "non-index funds" (non-index funds holding the firm prior to its addition to the index), and "new funds" (non-index funds holding the firm after its addition to the index, but not prior to it), in the 7-year window around the year of addition. Panel A depicts the average ownership of each type of fund-firm relation. Panel B depicts the average number of funds for each type of fund-firm relation.

Panel A. Mutual fund ownership



Panel B. Number of mutual funds

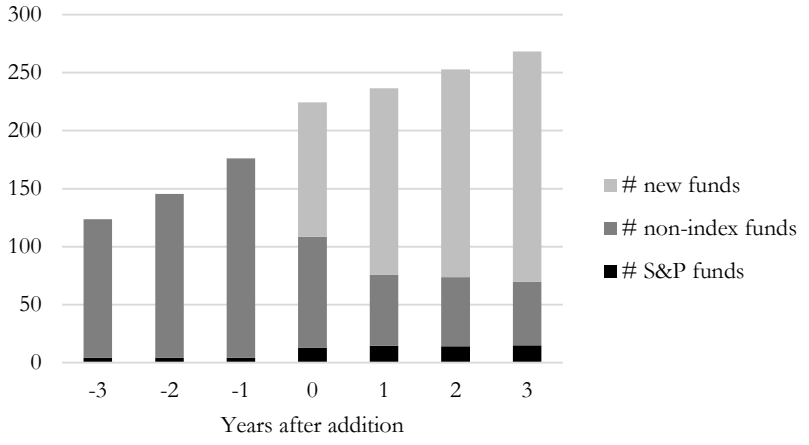
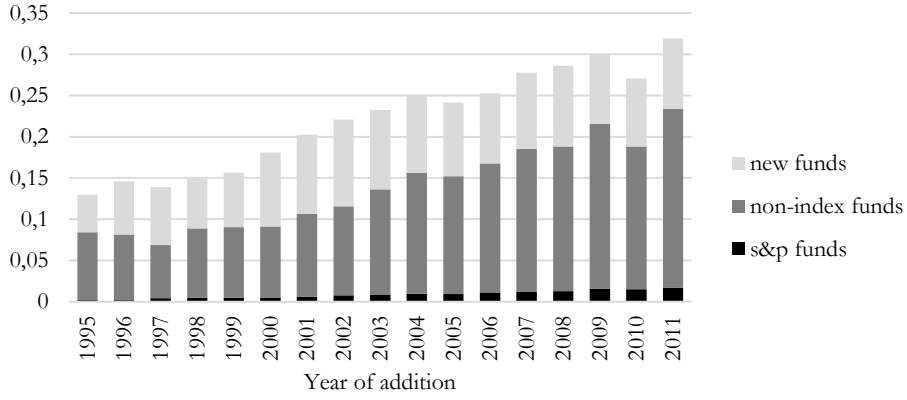


Figure C.3. Mutual fund ownership by year of addition

The figures below depict fund-firm ownership according to the categories of "S&P funds" (index funds holding the firm after its addition to the index), "non-index funds" (non-index funds holding the firm prior to its addition to the index), and "new funds" (non-index funds holding the firm after its addition to the index, but not prior to it), in the 1995-2011 period, when the represented year is the year of addition. Panel A depicts the average ownership of each type of fund-firm relation. Panel B depicts the average number of funds for each type of fund-firm relation.

Panel A. Mutual fund ownership



Panel B. Number of mutual funds

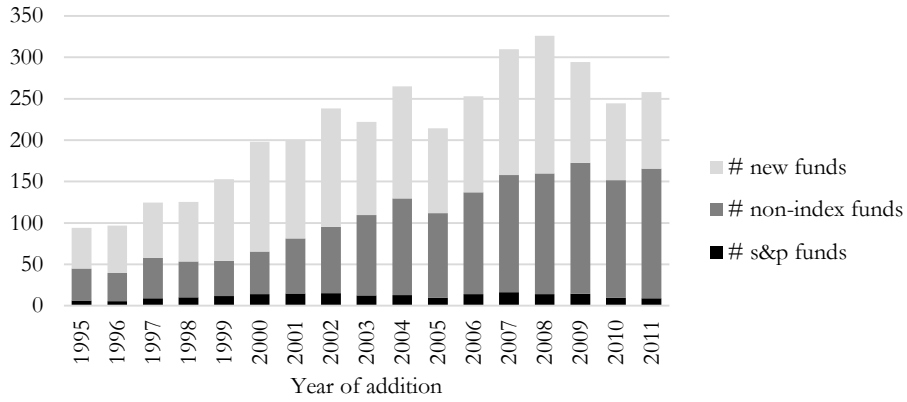
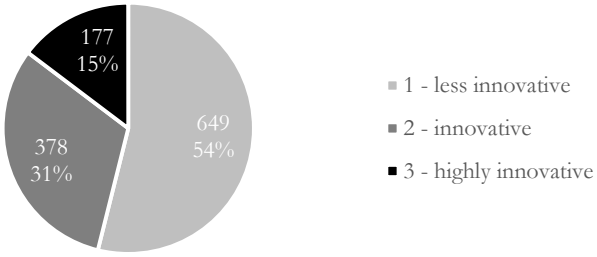


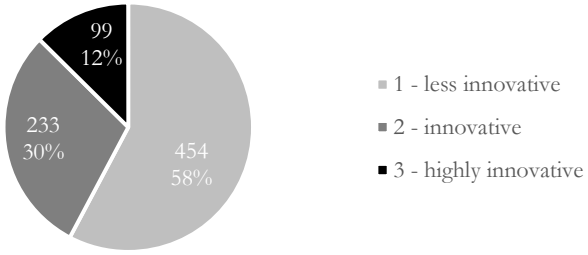
Figure C.4. S&P additions by industry innovation intensity

The figures below depict the number and percentage of additions to the three different S&P indices (S&P 600 in panel A, S&P 400 in panel B, and S&P 500 in panel C), according to the innovation intensity of the industry in which the firm operates, as defined in Table C.2 of the Appendix.

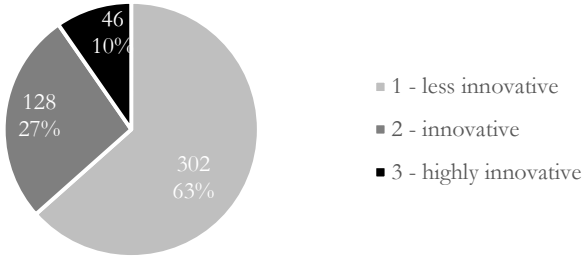
Panel A. S&P 600 – small cap



Panel B. S&P 400 – mid cap



Panel C. S&P 500 – large cap



Internet Appendix

Table 0.1. Cross-sectional regressions to explain long-term nascent market success (11-15 years after establishment), individual variables

This table presents the results of cross-sectional regressions similar to Table 6 of the paper of the three success measures (number of listings, market cap to GDP, and turnover, presented in the table columns) as the dependent variables on a large number of individual explanatory variables (presented in the table rows). Each panel presents the results of a different category of independent variables. The success measures as dependent variables are measured as the averages over the period 11-15 years after establishment of the stock market and are expressed in logs. All regressions include *log Population*, *log GDP per capita*, and *World GDP growth* (averages over the 5-year period around the year of establishment) as controls. The table reports the coefficients, economic significance (standardized coefficients), statistical significance based on White standard errors (***, **, and * indicate significance at the 1%, 5%, and 10% level), the R^2, and the number of observations. We refer to Table A.1 of the Appendix for variable definitions and data sources.

(continued on next page)

Table I.1. Cross-sectional regressions to explain long-term nascent market success (11-15 years after establishment), individual variables (continued)

	Number of listings (11-15y)				*Market cap (11-15y)*				*Turnover (11-15y)*			
	Coeff.	**Econ. Signif.**	**R^2**	**# Obs.**	**Coeff.**	**Econ. Signif.**	**R^2**	**# Obs.**	**Coeff.**	**Econ. Signif.**	**R^2**	**# Obs.**
Panel A: Initial success measures												
Number of listings (1-5y)	0.55***	0.54	0.29	39	-0.04	-0.05	0.27	39	0.21	0.21	0.14	39
Market capitalization (1-5y)	-0.30	-0.24	0.05	41	0.46***	0.51	0.44	41	-0.08	-0.07	0.06	41
Turnover (1-5y)	0.56**	0.55	0.26	38	-0.01	-0.02	0.25	38	0.62***	0.60	0.41	38
Panel B: Economic indicators												
GDP	0.58***	0.62	0.37	51	0.11	0.15	0.27	51	0.52***	0.56	0.35	51
GDP per capita	0.12	0.11	0.03	51	0.32***	0.39	0.25	51	0.28*	0.27	0.08	51
GDP growth	-0.003	-0.01	0.03	29	0.01	0.06	0.24	29	0.07	0.25	0.13	29
Real interest rate (st. dev.)	-0.03	-0.14	0.27	24	-0.04	-0.22	0.41	24	-0.04	-0.17	0.29	24
Inflation (st. dev.)	-0.01	-0.12	0.04	34	-0.03**	-0.36	0.44	34	-0.01	-0.15	0.19	34
Transition economy	0.57	0.21	0.07	51	-0.53*	-0.25	0.31	51	0.67	0.24	0.13	51
Exporters of fuels	-0.13	-0.03	0.03	51	-0.20	-0.07	0.26	51	0.07	0.02	0.08	51
World GDP growth	-0.16	-0.13	0.03	51	0.23*	0.25	0.25	51	-0.05	-0.04	0.08	51
Panel C: Openness indicators												
Globalization index	-0.02	-0.15	0.04	51	0.01	0.09	0.26	51	0.004	0.04	0.08	51
Trade openness	-0.21	-0.07	0.03	50	-0.06	-0.02	0.28	50	0.09	0.03	0.07	50
Panel D: Public finance indicators												
Government expenditure	-0.37	-0.11	0.04	51	0.34	0.12	0.27	51	0.55	0.16	0.10	51
Government debt	-0.22	-0.17	0.36	12	0.11	0.10	0.11	12	-0.33	-0.21	0.19	12

(continued on next page)

Table I.1. Cross-sectional regressions to explain long-term nascent market success (11-15 years after establishment), individual variables (continued)

	Number of listings (11-15y)				*Market cap (11-15y)*				*Turnover (11-15y)*			
	Coeff.	Econ. Signif.	R^2	# Obs.	Coeff.	Econ. Signif.	R^2	# Obs.	Coeff.	Econ. Signif.	R^2	# Obs.
Panel D: Public finance indicators (continued)												
Cash surplus/ deficit	0.002	0.01	0.30	13	0.07	0.35	0.30	13	-0.15	-0.54	0.32	13
Panel E: Political indicators												
Government effectiveness	-0.48	-0.22	0.23	16	-0.21	-0.14	0.42	16	-0.68	-0.35	0.53	16
Political stability	0.73	0.40	0.29	16	-0.08	-0.07	0.42	16	0.16	0.10	0.48	16
Democracy	-0.005	-0.02	0.07	46	-0.0004	-0.003	0.25	46	-0.06**	-0.31	0.21	46
Control of corruption	0.32	0.24	0.14	31	0.21	0.22	0.34	31	0.35	0.28	0.33	31
Freedom of the press	-0.03***	-0.39	0.18	45	0.01	0.18	0.30	45	-0.02*	-0.26	0.17	45
Panel F: Legal indicators												
Common law	-0.70*	-0.26	0.10	50	0.34	0.17	0.29	50	-0.46	-0.17	0.12	50
Regulatory quality	-0.06	-0.03	0.21	16	0.11	0.08	0.42	16	-0.39	-0.21	0.50	16
Rule of law	0.09	0.04	0.21	16	-0.02	-0.01	0.42	16	0.92	0.43	0.57	16
Voice and accountability	0.14	0.07	0.21	16	-0.02	0.01	0.42	16	-0.37	-0.20	0.51	16
Law and order	0.15	0.14	0.11	31	0.14	0.18	0.32	31	0.30*	0.29	0.33	31
Panel G: Financial indicators												
Private credit	0.53	0.41	0.14	42	0.24*	0.24	0.33	42	0.86***	0.65	0.38	42
Bank concentration	0.01	0.08	0.80	6	0.02	0.21	0.64	6	0.04	0.38	0.96	6
Shadow economy	0.08***	1.04	0.99	7	-0.09*	-1.30	0.91	7	0.001	0.01	0.84	7
Black market premium	0.09	0.07	0.03	37	0.01	0.01	0.19	37	-0.26	-0.20	0.24	37
Offshore deposits	-0.22	-0.15	0.19	16	0.18	0.18	0.34	16	-0.30	-0.22	0.40	16
Panel H: Demand and supply of capital indicators												
Number of MSME's	-0.06	-0.04	0.05	11	0.03	0.04	0.32	11	0.33	0.29	0.49	11
National savings	0.01	0.10	0.04	41	0.02**	0.29	0.38	41	0.02	0.17	0.08	41
Life insurance premium	-0.83	-0.18	0.07	21	0.67	0.27	0.22	21	0.95	0.25	0.42	21
Panel I: Technology and innovation indicators												
High technology exports	-0.43	-0.27	0.16	25	0.16	0.15	0.27	25	-0.19	-0.13	0.22	25

(continued on next page)

Table I.1. Cross-sectional regressions to explain long-term nascent market success (11-15 years after establishment), individual variables (continued)

	Number of listings (11-15y)				*Market cap (11-15y)*				*Turnover (11-15y)*			
	Coeff.	**Econ. Signif.**	**R^2**	**# Obs.**	**Coeff.**	**Econ. Signif.**	**R^2**	**# Obs.**	**Coeff.**	**Econ. Signif.**	**R^2**	**# Obs.**
Panel I: Technology and innovation indicators (continued)												
Scientific and technical articles	0.42***	0.57	0.33	44	0.06	0.12	0.28	44	0.44***	0.64	0.43	44
Secondary schooling	0.02	0.36	0.16	13	0.01	0.21	0.59	13	-0.02	-0.32	0.33	13
Panel J: Demographic indicators												
Total population	0.06	0.09	0.03	51	0.08	0.14	0.25	51	0.07	0.09	0.08	51
Population density	0.03	0.04	0.03	51	0.13**	0.22	0.30	51	0.10	0.12	0.09	51
Life expectancy	0.10***	0.62	0.23	51	-0.02	-0.14	0.26	51	0.07**	0.43	0.17	51
Panel K: Socio-cultural indicators												
Power distance	0.01	0.23	0.10	31	0.001	0.05	0.19	31	0.01	0.15	0.22	31
Individuality	-0.002	-0.04	0.05	31	0.01	0.18	0.21	31	0.0001	0.001	0.20	31
Masculinity	0.02*	0.23	0.10	31	0.01	0.15	0.21	31	0.02	0.27	0.27	31
Uncertainty avoidance	-0.001	-0.02	0.05	31	-0.01	-0.23	0.22	31	-0.004	-0.08	0.21	31
Long-term orientation	0.03***	0.50	0.20	28	0.002	0.06	0.28	28	0.01	0.27	0.15	28
Indulgence	-0.03*	-0.40	0.14	27	0.01	0.19	0.33	27	-0.01	-0.19	0.17	27
Ethno-linguistic fractionalization	-4.18***	-0.58	0.31	32	0.72	0.16	0.34	32	-2.47*	-0.41	0.23	32
Catholic	-0.01**	-0.29	0.10	51	-0.003	-0.10	0.26	51	-0.02***	-0.40	0.21	51
Protestant	-0.02***	-0.39	0.18	51	0.0004	0.01	0.25	51	-0.02**	-0.29	0.16	51
Muslim	0.002	0.06	0.04	51	0.001	0.02	0.25	51	0.02***	0.45	0.23	51
Other religion	0.02***	0.52	0.24	51	0.002	0.08	0.26	51	0.01	0.16	0.10	51
Distrust	-7.95*	-0.68	0.33	13	-0.60	-0.11	0.55	13	-8.67***	-0.89	0.73	13
Settler mortality	-1.10***	-0.87	0.61	18	-0.23	-0.23	0.46	18	-0.98**	-0.78	0.47	18
GINI index	-2.37**	-0.47	0.27	27	-0.32	-0.11	0.11	27	-0.97	-0.21	0.17	27
HIV prevalence	-0.69***	-0.55	0.37	23	0.15	0.15	0.16	23	-0.51	-0.41	0.15	23
Health expenditure	-0.21	-0.20	0.17	18	0.01	0.02	0.32	18	-0.35	-0.35	0.32	18
Panel L: Geographic indicators												
Latitude	0.02**	0.42	0.17	46	-0.01	-0.14	0.27	46	0.02**	0.34	0.22	46
Landlocked	-0.75*	-0.27	0.09	51	-0.43	-0.20	0.29	51	-0.20	-0.07	0.08	51
Sub-Saharan Africa	-1.68***	-0.50	0.24	51	0.18	0.07	0.26	51	-1.18***	-0.35	0.18	51

(continued on next page)

Table I.1. Cross-sectional regressions to explain long-term nascent market success (11-15 years after establishment), individual variables (continued)

	Number of listings (11-15y)				*Market cap (11-15y)*				*Turnover (11-15y)*			
	Coeff.	**Econ. Signif.**	**R^2**	**# Obs.**	**Coeff.**	**Econ. Signif.**	**R^2**	**# Obs.**	**Coeff.**	**Econ. Signif.**	**R^2**	**# Obs.**
Panel L: Geographic indicators (continued)												
Europe & Central Asia	0.57	0.21	0.07	51	-0.51*	-0.24	0.31	51	0.60	0.22	0.12	51
Middle East & North Africa	-0.10	-0.03	0.03	51	0.63**	0.24	0.29	51	0.73	0.22	0.11	51
Panel M: Stock exchange initiative												
Government initiative	1.06**	0.32	0.15	32	0.83***	0.44	0.56	32	0.93**	0.31	0.32	32
Private initiative	-0.47	-0.08	0.06	32	-1.27***	-0.39	0.53	32	-1.28***	-0.25	0.29	32
Both govern. and private initiative	-1.15**	-0.31	0.14	32	-0.50*	-0.23	0.43	32	-0.62	-0.18	0.27	32

Table I.2. Panel regressions to explain development of nascent market success (1-15 years after establishment), individual variables

This table presents the results of panel regressions similar to Table 7 of the paper of the three success measures (number of listings, market cap to GDP, and turnover, presented in the table columns) as the dependent variables on a large number of individual explanatory variables (presented in the table rows). Each panel presents the results of a different category of independent variables. The success measures as dependent variables are measured as the moving averages of 5-year windows in the first 15 years after establishment of the stock market and are expressed in logs. Independent variables as "dynamic conditions" (Δ, t-1) are calculated as the percentage growth between the average of the five years around establishment and the average of the 5-year period that is lagged one year relative to the period over which the dependent variables are measured. Independent variables as "initial conditions" (t0) are used as controls, and are calculated as the average of the variable over the 5-year period around the year of establishment. All regressions further include log Population, log GDP per capita, and World GDP growth (averages over the 5-year period around the year of establishment) as controls. The table reports the coefficients and statistical significance of the independent variable as initial condition (t0) and as dynamic condition (Δ, t-1) based on standard errors clustered by country (***, **, and * indicate significance at the 1%, 5%, and 10% level), the number of countries (#C), and the number of observations (#O). We refer to Table A.1 of the Appendix for variable definitions and data sources.

(continued on next page)

Table I.2. Panel regressions to explain development of nascent market success (1-15 years after establishment), individual variables (continued)

	# of Listings				*Market cap*				*Turnover*			
	t_0	Δ, t-1	#C	#O	t_0	Δ, t-1	#C	#O	t_0	Δ, t-1	#C	#O
Panel B: Economic indicators												
GDP	0.43***	0.43	51	591	-0.0003	0.85***	51	591	0.44***	-0.16	51	591
GDP per capita	0.16	0.41	51	587	0.41***	0.89***	51	587	0.21	-0.30	51	542
Panel C: Openness indicators												
Globalization index	0.01	-2.55**	51	592	0.02	-3.40***	51	592	0.01	1.06	51	547
Trade openness	-0.55	-0.27	51	580	0.41	-0.03	51	580	-0.58	0.31	51	535
Panel D: Public finance indicators												
Government expenditure	-0.32	0.41	50	568	0.30	0.16	50	569	0.50	-0.05	50	525
Government debt	-0.21	-0.58	12	99	0.43	-0.03	12	99	-0.66	-0.67	12	90
Cash surplus/ deficit	-0.06	-0.02	13	125	0.05	0.0001	13	125	-0.16	0.01	13	116
Panel E: Political indicators												
Government effectiveness	-0.40	-0.11**	16	193	0.11	0.11	16	188	-0.44	-0.15***	16	176
Political stability	0.79	0.02	16	193	0.05	-0.001	16	188	0.15	0.01	16	176
Democracy	0.02	0.05	46	536	-0.002	-0.09	46	533	-0.04	-0.22***	46	497
Control of corruption	0.38*	-0.81**	31	252	0.18	-0.94**	31	248	0.49***	0.36	29	227
Freedom of the press	-0.02***	0.21	45	540	0.01	-0.11	45	535	-0.01*	0.27	45	493
Panel F: Legal indicators												
Regulatory quality	0.08	0.02	16	193	-0.05	0.02	16	188	-0.09	-0.01	16	176
Rule of law	-0.04	0.13	16	193	0.20	-0.29	16	188	0.69**	0.57***	16	176
Voice and accountability	0.46	-0.02**	16	193	0.25	-0.05***	16	188	-0.13	-0.04	16	176
Law and order	-0.08	-1.12	31	252	-0.09	-1.20***	31	248	0.18	0.99*	29	227

(continued on next page)

Table I.2. Panel regressions to explain development of nascent market success (1-15 years after establishment), individual variables (continued)

	# of Listings				*Market cap*				*Turnover*			
	t_0	Δ, t-1	#C	#O	t_0	Δ, t-1	#C	#O	t_0	Δ, t-1	#C	#O
Panel G: Financial indicators												
Private credit	0.41	0.20	42	471	0.22**	0.58*	42	474	0.68***	0.32	42	439
Bank concentration	-0.01	2.82*	6	69	0.02**	-1.79**	6	66	0.03***	0.40	6	61
Shadow economy	0.11***	-12.29	7	51	-0.08***	-21.99***	7	50	0.04***	-36.15***	7	45
Black market premium	0.07	0.17*	28	131	-0.33*	0.14	28	133	0.35	-0.04	28	121
Offshore deposits	-0.23	-0.15	16	194	-0.22	-0.18	16	189	-0.18	-0.03	16	174
Panel H: Demand and supply of capital indicators												
# of MSME's	-0.28	-0.01	10	78	0.04	-0.02	10	79	0.18	-0.37***	9	75
National savings	-0.002	-0.0002	40	437	0.03**	0.001	40	441	0.004	-0.001	40	408
Life insurance premium	-0.73	0.16	21	259	1.21***	0.27	21	254	0.24	0.92*	21	241
Panel I: Technology and innovation indicators												
High-technology exports	-0.27	0.13*	25	277	0.11	0.09	25	270	-0.10	-0.10	25	256
Scientific and technical articles	0.37***	0.03	44	528	-0.01	-0.17	44	521	0.38***	0.23	44	481
Secondary schooling	0.04*	0.13	10	60	-0.0003	0.002	9	57	0.01	-1.15	9	55
Panel J: Demographic indicators												
Population	0.03	-7.51	51	590	0.08	3.95	51	589	0.11	3.93	51	544
Population density	0.05	6.10	51	590	0.11**	2.24	51	590	0.09	13.74***	51	544
Life expectancy	0.11***	23.04***	51	594	-0.02	7.35	51	594	0.08***	0.48	51	547
Panel K: Socio-cultural indicators												
GINI index	-1.47	-0.25	18	125	0.37	0.31	18	124	-0.22	0.56	18	122
HIV prevalence	-0.73***	1.92	23	279	0.16	-0.02	23	275	-0.51*	2.33***	23	251
Health expenditure	-0.25	0.47	18	219	-0.51	1.25***	18	212	0.48	-1.84*	18	196

Table I.3. Panel models to explain development of nascent market success (1-15 years after establishment), fixed effects

This table presents the results of panel regressions similar to Table 7 of the paper of the three success measures (number of listings, market cap to GDP, and turnover, presented in the table columns) as the dependent variables on a large number of individual explanatory variables (presented in the table rows) as well as country and year fixed effects. Each panel presents the results of a different category of independent variables. The success measures as dependent variables are measured as the moving averages of 5-year windows in the first 15 years after establishment of the stock market and are expressed in logs. Independent variables are calculated as average of the 5-year period that is lagged one year relative to the period over which the dependent variables are measured. Independent variables as "initial conditions" (*to*) are used as controls, and are calculated as the average of the variable over the 5-year period around the year of establishment. All regressions further include lagged *log Population* and *log GDP per capita* as controls. The table reports the coefficients, economic significance (standardized coefficients), statistical significance of the independent variable based on standard errors clustered by country (***, **, and * indicate significance at the 1%, 5%, and 10% level), the number of countries (#C), and the number of observations (#O). We refer to Table A.1 of the Appendix for variable definitions and data sources.

(continued on next page)

Table I.3. Panel models to explain development of nascent market success (1-15 years after establishment), fixed effects (continued)

	# of listings				*Market cap*				*Turnover*			
	Coeff.	**Econ. Signif.**	**#C**	**#O**	**Coeff.**	**Econ. Signif.**	**#C**	**#O**	**Coeff.**	**Econ. Signif.**	**#C**	**#O**
Panel B: Economic indicators												
GDP	1.32**	1.34	56	624	-0.80	-1.02	56	620	2.58***	2.74	56	573
GDP per capita	-0.33	-0.30	56	624	0.20	0.23	56	620	-0.59	-0.56	56	573
GDP growth	-0.0002	-0.001	51	483	0.01	0.04	51	474	-0.01	-0.03	51	441
Inflation (st.dev.)	0.002	0.02	53	554	-0.001	-0.01	53	549	0.03**	0.27	53	512
Panel C: Openness indicators												
Globalization index	0.07***	0.64	56	624	0.04*	0.50	56	620	-0.03	-0.27	56	573
Equity market liberalization	0.42	0.18	19	190	0.77	0.33	19	194	0.26	0.10	19	178
Trade openness	0.29	0.08	56	615	0.37	0.14	56	611	0.23	0.07	56	565
Panel D: Public finance indicators												
Government expenditure	-1.01**	-0.25	55	602	-0.34	-0.11	55	599	-0.85	-0.22	55	554
Government debt	-0.39	-0.30	26	168	-0.68*	-0.65	26	169	-0.11	-0.08	26	156
Cash surplus/ deficit	0.10*	0.28	41	262	0.03	0.10	41	261	0.06	0.19	41	261
Panel E: Political indicators												
Government effectiveness	0.51	0.24	50	458	0.28	0.18	50	448	-0.75	-0.38	50	427
Political stability	0.50	0.27	49	457	0.03	0.02	50	447	0.19	0.11	50	426
Democracy	0.01	0.03	49	557	0.03	0.18	50	555	-0.01	-0.03	50	518
Transition period	0.04	0.002	48	545	-0.51*	-0.03	49	543	-0.49	-0.03	49	506
Control of corruption	-0.21*	-0.16	41	292	-0.05	-0.05	41	288	0.07	0.06	39	267
Freedom of the press	0.01	0.13	53	591	-0.004	-0.09	54	592	0.01	0.17	54	549
War	-0.49	-0.05	56	624	-0.04	-0.004	56	620	0.02	0.002	56	573

(continued on next page)

Table I.3. Panel models to explain development of nascent market success (1-15 years after establishment), fixed effects (continued)

	# of Listings				*Market cap*				*Turnover*			
	Coeff.	**Econ. Signif.**	**#C**	**#O**	**Coeff.**	**Econ. Signif.**	**#C**	**#O**	**Coeff.**	**Econ. Signif.**	**#C**	**#O**
Panel F: Legal indicators												
Regulatory quality	0.21	0.10	50	458	0.07	-0.04	50	448	-0.17	-0.09	50	427
Rule of law	-0.01	-0.01	50	460	-0.10	-0.06	50	450	-0.74	-0.37	50	428
Voice and accountability	0.58	0.32	50	461	0.40	0.30	50	450	-0.49	-0.29	50	428
Law and order	-0.01	-0.01	41	292	0.03	0.03	41	288	0.07	0.06	39	267
Panel G: Financial indicators												
Private credit	0.01	0.17	53	557	-0.003	-0.09	54	558	-0.002	-0.07	54	522
Bank concentration	-0.01	-0.17	48	349	-0.01	-0.16	48	339	-0.01	-0.17	48	324
Shadow economy	-0.08	-0.69	40	264	-0.12	-1.41	40	260	-0.12	-1.12	40	251
Black market premium	-0.13	-0.10	44	198	-0.07	-0.08	44	201	-0.04	-0.03	43	186
Offshore deposits	-0.21	-0.15	45	439	-0.16	-0.16	46	436	-0.02	-0.02	46	417
Panel H: Demand and supply of capital indicators												
# of MSME's	-0.11	-0.07	35	199	0.002	0.002	35	199	0.05	0.04	34	194
National savings	0.01	0.06	50	535	0.01	0.11	50	539	0.02*	0.16	50	503
Life insurance premium	-0.32	-0.10	43	430	-0.11	-0.04	43	422	0.30	0.10	43	400
Panel I: Technology and innovation												
High-technology exports	0.13	0.09	49	464	0.06	0.06	49	454	0.08	0.06	49	430
Scientific journal articles	0.41	0.55	53	575	0.18	0.31	53	567	0.26	0.37	53	528
Secondary schooling	0.001	0.01	38	223	-0.05**	-1.11	38	220	-0.02	-0.40	38	209
Panel J: Demographic indicators												
Population	-0.79	-1.00	56	624	-0.07	-0.11	56	620	-4.00***	-5.30	56	573
Population density	1.35**	1.41	56	624	-0.80	-1.08	56	620	2.59***	2.90	56	573
Life expectancy	0.08*	0.43	56	622	0.06	0.43	56	620	0.05*	0.27	56	573
Panel K: Socio-cultural indicators												
GINI index	1.98	0.29	43	237	0.81	0.16	43	235	-1.49	-0.23	43	228
HIV prevalence	-1.34***	-1.13	26	308	-0.51*	-0.52	26	304	-0.42	-0.34	26	276
Health expenditure	0.51	0.44	49	478	0.38	0.44	49	468	-0.60	-0.57	49	445
Panel N: Market design indicators												
Insider trading laws	0.33	0.11	45	502	0.61**	0.27	45	504	0.07	0.02	45	469
Insider trading enforcement	0.52	0.10	45	502	0.62***	0.17	45	504	0.26	0.06	45	469

Figure I.1. Geographic distribution of clusters of least/most successful nascent markets

This world map depicts stock markets included in the two clusters of "least successful and "most successful" markets from Panel A of Figure 2.4.

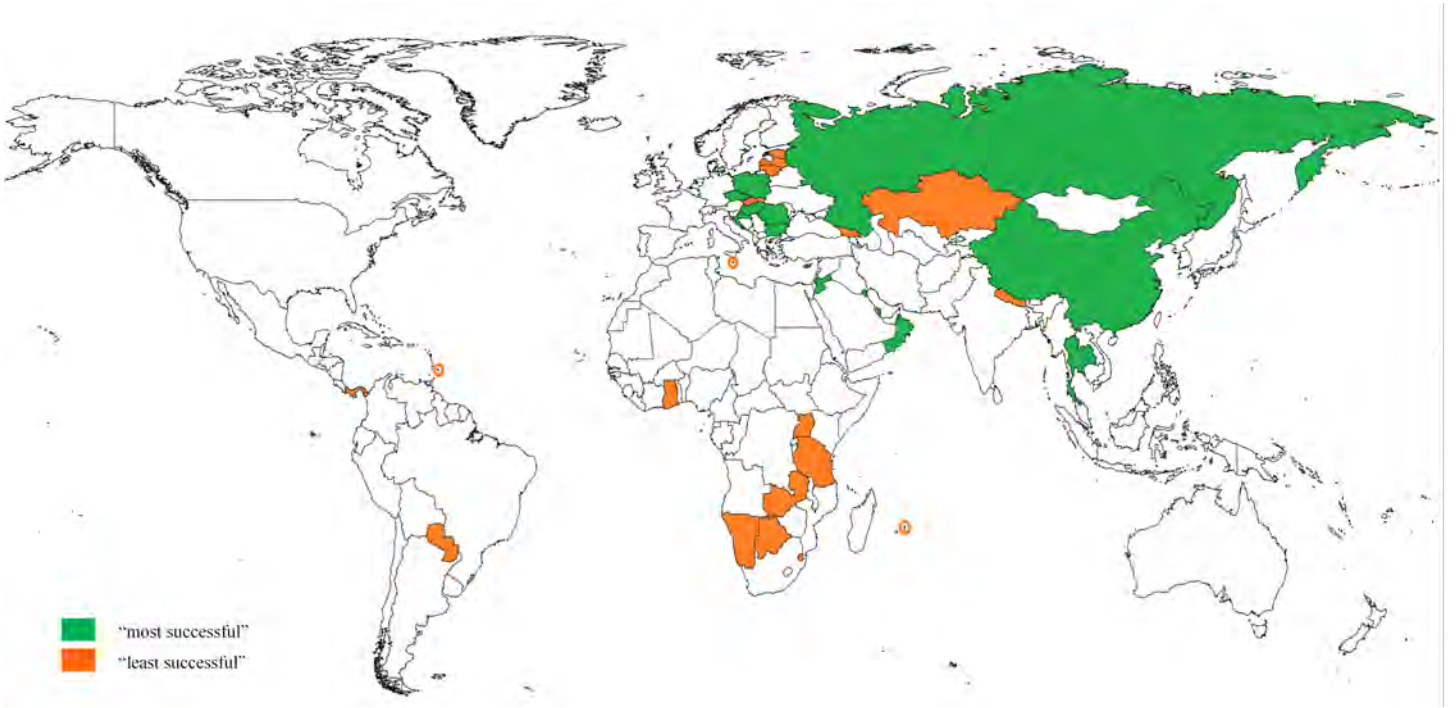


Figure I.2. Cluster analysis of nascent market success (16-20 years after establishment), number of listings scaled by population

This figure shows cluster analysis results similar to Panel A of Figure 2.4 based on the three measures of nascent market success (number of listings, market cap to GDP, and turnover) over the period 16-20 years after establishment, yielding a cluster of "least successful" markets and a cluster of "most successful" markets after 16-20 years. Difference with Panel A of Figure 2.4 is that the number of listings is scaled by population. The sample includes 34 markets. Success measures are expressed in logs and then standardized to the interval [0,1] across the whole period 1-20 years after establishment to facilitate comparison across measures and time periods. The plot presents depicts the position of each market along the three dimensions of success after 16-20 years: the x-axis represents number of listings, the y-axis represents turnover, and the diameter of the circle represents market cap. The horizontal lines indicate the average turnover of each cluster, the vertical lines represent the average number of listings of each cluster, and the circles in the bottom right corner represent the average market capitalization of each cluster. We refer to Table A.1 of the Appendix for variable definitions and data sources.

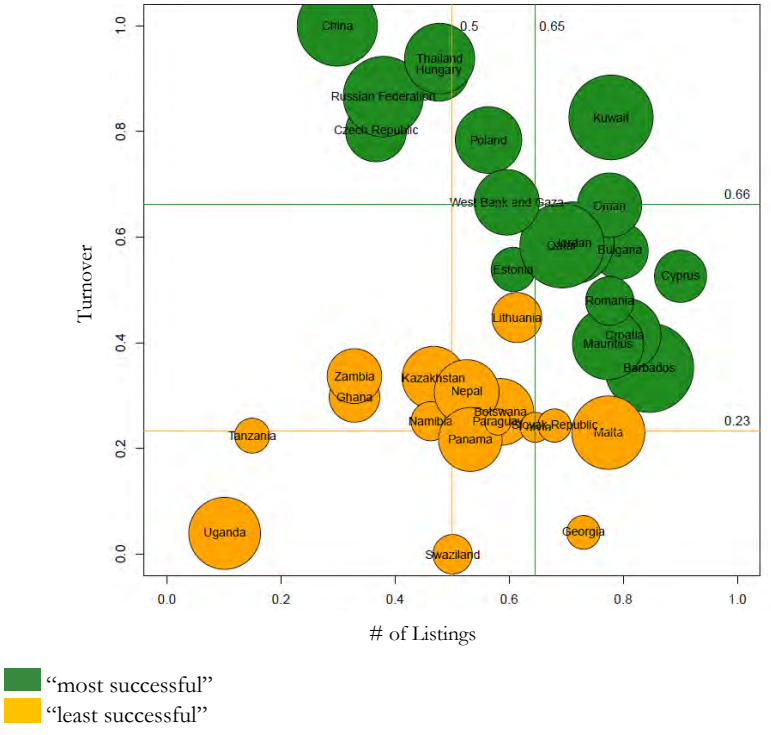
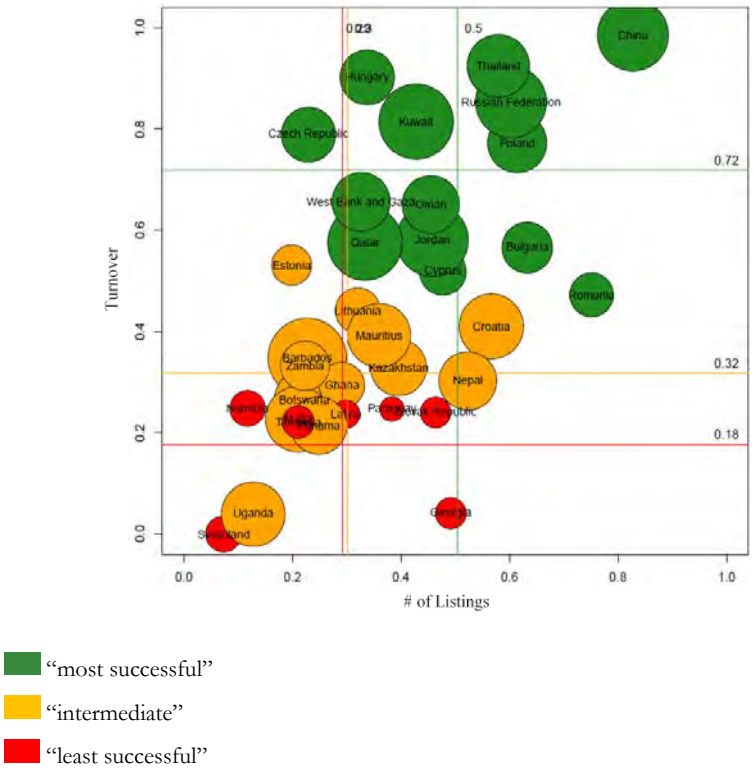


Figure I.3. Cluster analysis of nascent market success (16-20 years after establishment), three clusters

This figure shows cluster analysis results similar to Panel A of Figure 2.4 based on the three measures of nascent market success (number of listings, market cap to GDP, and turnover) over the period 16-20 years after establishment, yielding a cluster of "least successful" markets, a cluster of "most successful" markets, and an "intermediate" cluster after 16-20 years. Difference with Panel A of Figure 2.4 is that the number of clusters is three instead of two. The sample includes 34 markets. Success measures are expressed in logs and then standardized to the interval [0,1] across the whole period 1-20 years after establishment to facilitate comparison across measures and time periods. The plot presents depicts the position of each market along the three dimensions of success after 16-20 years: the x-axis represents number of listings, the y-axis represents turnover, and the diameter of the circle represents market cap. The horizontal lines indicate the average turnover of each cluster, the vertical lines represent the average number of listings of each cluster, and the circles in the bottom right corner represent the average market capitalization of each cluster. We refer to Table A.1 of the Appendix for variable definitions and data sources.



References

Acemoğlu, D., and S. Johnson, 2005, "Unbundling institutions," *Journal of Political Economy* 113, 949-995.

Acemoğlu, D., S. Johnson, and J.A. Robinson, 2001, "The colonial origins of comparative development: An empirical investigation," *American Economic Review* 91, 1369–1401.

Acemoğlu, D., S. Johnson, and J.A. Robinson, 2002, "Reversal of fortune: Geography and institutions in the making of the Modern World income distribution," *Quarterly Journal of Economics* 117, 1231-94.

Acemoğlu, D., S. Johnson, and J. Robinson, 2005, "Institutions as a fundamental cause of long-run growth," in Philippe Aghion, and Steven Durlauf, eds.: *Handbook of Economic Growth* (North-Holland, Amsterdam).

Acemoğlu, D., S. Johnson, J.A. Robinson, and Y. Thaicharoen, 2003, "Institutional causes, macroeconomic symptoms: Volatility, crises and growth," *Journal of Monetary Economics* 50, 49-123.

Acemoğlu, D., and J.A. Robinson, 2001, "A theory of political transitions," *American Economic Review* 91, 938-963.

Acemoğlu, D., and J.A. Robinson, 2005, *Economic origins of dictatorship and democracy*. Cambridge University Press.

Admati, A. R., and P. Pfleiderer, 2009, "The "Wall Street Walk" and shareholder activism: Exit as a form of voice," *Review of Financial Studies*, 22, 2645-2685.

Agarwal, V., and H. Zhao, 2016, "Interfund lending in mutual fund families: Role in liquidity management," Working paper.

Aggarwal, R., I. Erel, M. Ferreira, and P. Matos, 2011, "Does governance travel around the world? Evidence from institutional investors," *Journal of Financial Economics*, 100, 154-181.

Aggarwal, R., P.A. Saffi, and J. Sturgess, 2015, "The role of institutional investors in voting: Evidence from the securities lending market," *The Journal of Finance*, 70, 2309-2346.

Aggarwal, R.K. and A.A. Samwick, 2006, "Empire-builders and shirkers: Investment, firm profitability, and managerial incentives," *Journal of Corporate Finance*, 12, 489-515.

Aghion, P., Y. Algan, P. Cahuc, and A. Shleifer, 2010, "Regulation and distrust," *Quarterly Journal of Economics* 125, 1015-1049.

Aghion, P., J. Van Reenen, and L. Zingales, 2013, "Innovation and institutional ownership," *The American Economic Review*, 103, 277-304.

Aidt, T., and R. Franck, 2015, "Democratization under the threat of revolution: Evidence from the Great Reform Act of 1832," *Econometrica* 83, 505–547.

Aidt, T., and P. Jensen, 2014, "Workers of the World, unite! Franchise extensions and the threat of revolution in Europe, 1820-1938," *European Economic Review* 72, 52–75.

Akerlof, G.A., 1970, "The market for 'lemons': Quality uncertainty and the market mechanism," *Quarterly Journal of Economics* 84, 488-500.

Albuquerque de Sousa, J., T. Beck, P.A.G. van Bergeijk, and M.A. van Dijk, 2017, "Nascent markets: Understanding the success and failure of new stock markets," Working paper.

Anton, J.J., and D.A. Yao, 2002, "The sale of intellectual property: strategic disclosure, property rights, and incomplete contracts," *Review of Economic Studies*, 69, 513-531.

Appel, I.R., T.A. Gormley, and D.B. Keim, 2016a, "Passive investors, not passive owners," *Journal of Financial Economics*, 121, 111-141.

Appel, I. R., T.A. Gormley, and D.B. Keim, 2016b, "Standing on the shoulders of giants: The effect of passive investors on activism," Working paper.

Arcand, J.L., E. Berkes, and U. Panizza, 2015, "Too much finance?," *Journal of Economic Growth* 20, 105-148.

Asker, J., J. Farre-Mensa, and A. Ljungqvist, 2014, "Corporate investment and stock market listing: a puzzle?," *Review of Financial Studies*, hhu077.

Attig, N., S. Cleary, S. El Ghoul, and O. Guedhami, 2012, "Institutional investment horizon and investment–cash flow sensitivity," *Journal of Banking & Finance*, 36, 1164-1180.

Baltagi, B., P. Demetriades, and S.H. Law, 2009, "Financial development and openness: Evidence from panel data," *Journal of Development Economics* 89, 285–296.

Barro, R. J., 1996, Determinants of economic growth: A cross-country empirical study (No. w5698), *National Bureau of Economic Research*.

Barro, R.J., 1999, "Determinants of democracy," *Journal of Political Economy* 107, S158-S183.

Bebchuk, L.A., A. Brav, and W. Jiang, 2015, "The long-term effects of hedge fund activism," *Columbia Law Review*, 115.

Bebchuk, L., and Z. Neeman, 2010, "Investor protection and interest group politics," Review of Financial Studies 23, 1089–1119.

Beck, T., 2013, "Finance, growth and fragility: The role of government," *International Journal of Banking, Accounting and Finance* 5, 49-77.

Beck, T., A. Demirgüç-Kunt, and R. Levine, 2003, "Law, endowments and finance," *Journal of Financial Economics* 70, 137-181.

Beck, T., and R. Levine, 2004, "Stock markets, banks, and growth: Panel evidence," Journal of Banking and Finance 28, 423-442.

Beck, T., and E. Feyen, 2013, "Benchmarking financial systems: Introducing the financial possibility frontier," *World Bank Policy Research Working Paper* 6615.

Beck, T., and R. Levine, 2005, "Legal institutions and financial development," in Claude Menard, and Mary Shirley, eds.: Handbook of New Institutional Economics, Kluwer, Dordrecht.Bekaert, G., C.R. Harvey, and C. Lundblad, 2005, "Does financial liberalization spur growth?," *Journal of Financial Economics* 77, 3-55.

Beck, T., R. Levine, and N. Loayza, 2000, "Finance and the sources of growth," *Journal of Financial Economics* 58, 261-300.

Bena, J., M.A. Ferreira, P.P. Matos, and P. Pires, 2015, "Are foreign investors locusts? The long-term effects of foreign institutional ownership," Journal of Financial Economics, 126, 122-146.

Bencivenga, V.R., and B.D. Smith, 1991, "Financial intermediation and endogenous growth," *Review of Economic Studies* 58, 195-209.

Bencivenga, V.R., B.D. Smith, and R.M. Starr, 1996, "Equity markets, transaction costs, and capital accumulation: An illustration," *World Bank Economic Review* 10, 241-265.

Berle, A.A., and G.G.C. Means, 1932, *The modern corporation and private property*, Transaction Publishers.

Bertrand, M., and S. Mullainathan, 2003, "Enjoying the quiet life? Corporate governance and managerial preferences," *Journal of Political Economy*, 111, 1043-1075.

Bhattacharya, U., and H. Daouk, 2002, "The world price of insider trading," *Journal of Finance* 57, 75-108.

Bhattacharya, S., and J.R. Ritter, 1983, "Innovation and communication: Signaling with partial disclosure," *Review of Economic Studies*, 50, 331-46.

Biais, B., and E. Perotti, 2002, "Machiavellian privatization," *American Economic Review* 92, 240–258.

Boone, A.L., and J.T. White, 2015, "The effect of institutional ownership on firm transparency and information production," *Journal of Financial Economics*, 117, 508-533.

Bortolotti, B., and M. Faccio, 2009, "Government control of privatized firms," *Review of Financial Studies* 22, 2907–2939.

Box-Steffensmeier, J. M., and B.S. Jones, 2004, *Event history modeling: A guide for social scientists*, Cambridge University Press.

Box-Steffensmeier, J.M., and C.J. Zorn, 2001, "Duration models and proportional hazards in political science," *American Journal of Political Science* 972-988.

Boyd, J., R. Levine, and B. Smith, 2001, "The impact of inflation on financial sector performance," *Journal of Monetary Economics* 47, 221-248.

Boyd, J., and B. Smith, 1996, "The coevolution of the real and financial sectors in the growth process," *World Bank Economic Review* 10, 371-396.

Braun, M., and C. Raddatz, 2008, "The politics of financial development: Evidence from trade liberalization," *Journal of Finance* 63, 1469–1508.

Bueno de Mesquita, B., and A. Smith, 2010, "Leader survival, revolutions, and the nature of government finance," *American Journal of Political Science* 54, 936-950.

Bueno de Mesquita, B., and A. Smith, 2017, "Political succession: A model of coups, revolution, purges, and everyday politics," *Journal of Conflict Resolution* 61, 707-743.

Bueno de Mesquita, B., A. Smith, R. Siverson, and J. Morrow, 2003, *The logic of political survival*, MIT press.

Bushee, B.J., 1998, "The influence of institutional investors on myopic R&D investment behavior," *Accounting Review*, 73, 305–353..

Busse, J. A., and Q. Tong, 2012, "Mutual fund industry selection and persistence," *Review of Asset Pricing Studies*, 2, 245-274.

Cella, C., 2009, "Institutional investors and corporate investment," Working paper.

Cella, C., A. Ellul, and M. Giannetti, 2013, "Investors' horizons and the amplification of market shocks," *Review of Financial Studies*, hht023.

Campbell, J.Y., Ramadorai, T., and B. Ranish, 2018, "Do the rich get richer in the stock market? Evidence from India," Working paper.

Charrad, M., N. Ghazzali, V. Boiteau, and A. Niknafs, 2014, "NbClust: An R package for determining the relevant number of clusters in a data set," *Journal of Statistical Software* 61, 1-36.

Chemmanur, T. J., and X. Tian, 2013, "Do anti-takeover provisions spur corporate innovation? A Regression Discontinuity Analysis," *Journal of Financial and Quantitative Analysis*, forthcoming.

Choi, S., J. Fisch, and M. Kahan, 2013, "Who calls the shots: How mutual funds vote on director elections," *Harvard Business Law Review*, 3, 35-81.

Claessens, S., S. Djankov, and D. Klingebiel, 2001, "Stock markets in transition economies," in Bokros, L., A. Fleming, and C. Votava, Eds, *Financial transition in*

Europe and Central Asia. Challenges of the new decade, The World Bank, Washington D.C.

Claessens, S., and E. Feyen, 2006, "Financial sector development and the millennium development goals," World Bank Working Paper No. 89, World Bank, Washington, D.C.

Claessens, S., and E. Perotti, 2007, "Finance and inequality: Channels and evidence," *Journal of Comparative Economics* 35, 748–773.

Crane, A. D., A. Koch, and S. Michenaud, S., 2016, "Institutional investor cliques and governance," Working paper.

Crane, A.D., S. Michenaud, and J.P. Weston, 2016, "The effect of institutional ownership on payout policy: evidence from index thresholds," *Review of Financial Studies*, hhw012.

Dasgupta, A., and G. Piacentino, 2015, "The wall street walk when blockholders compete for flows," *Journal of Finance*, 70, 2853-2896.

De La Torre, A., E. Feyen, and A. Ize, 2013, "Financial development: Structure and dynamics," *The World Bank Economic Review*.

Degryse, H., T. Lambert, and A. Schwienbacher, 2016, "The political economy of financial systems: Evidence from suffrage reforms in the last two centuries," Economic Journal 128, 1433-1475.

Demirgüç-Kunt, A., E. Feyen, and R. Levine, 2011, "Optimal financial structures and development: The evolving importance of banks and markets," Working Paper, World Bank, Washington, D.C.

Demirgüç-Kunt, A., E. Feyen, and R. Levine, 2013, "The evolving importance of banks and securities markets," *World Bank Economic Review* 27, 476-490.

Demirgüç-Kunt, A., and R. Levine, 1996, "Stock market development and financial intermediaries: Stylized facts," *World Bank Economic Review* 10, 291-321.

Demirgüç-Kunt, A., and R. Levine, 2001, "Financial structure and economic growth: Overview," in Demirgüç-Kunt, A. and R. Levine, Eds., *Financial structure and*

economic growth: a cross-country comparison of banks, markets, and development, MIT Press, Cambridge, MA.

Devereux, M.B., and G.W. Smith, 1994, "International risk sharing and economic growth," *International Economic Review* 35, 535-50.

Diamond, D.W., and R.E. Verrecchia, 1982, "Optimal managerial contracts and equilibrium security prices," *Journal of Finance* 37, 275-287.

Dinc, Serdar, and Nandini Gupta, 2011, "The decision to privatize: Finance and politics," *Journal of Finance* 66, 241–269.

Djankov, S., C. McLiesh and A. Shleifer, 2007, "Private credit in 129 countries," *Journal of Financial Economics* 84, 299-329.

Dul, J., 2016, "Necessary condition analysis (NCA): Logic and methodology of "necessary but not sufficient" causality," *Organizational Research Methods* 19, 10-52.

Edmans, A., 2009, "Blockholder trading, market efficiency, and managerial myopia," *Journal of Finance*, 64, 2481-2513.

Edmans, A., and C.G. Holderness, 2017, "Blockholders: A Survey of theory and evidence," Working paper.

Edmans, A., & Manso, G., 2010, "Governance through trading and intervention: A theory of multiple blockholders," *The Review of Financial Studies*, 24, 2395-2428.

Ekelund, R.B., Jr., and R.D. Tollison, 1980, "Mercantilist origins of the corporation," *Bell Journal of Economics* 11, 715-20.

Ertimur, Y., F. Ferri, and D. Oesch, 2013, "Shareholder votes and proxy advisors: Evidence from say on pay," *Journal of Accounting Research*, 51, 951-96.

Fang, V. W., X. Tian, and S. Tice, 2014, "Does stock liquidity enhance or impede firm innovation?," *Journal of Finance*, 69, 2085-2125.

Ferreira, M.A., and P. Matos, 2008, "The colors of investors' money: The role of institutional investors around the world," *Journal of Financial Economics*, 88, 499-533.

Feyen, E., 2010, "Finances of Egyptian listed firms and the performance of the Egyptian Stock Exchange," *World Bank Policy Research Working Paper* 5213.

Fich, E.M., J. Harford, and A.L. Tran, 2015, "Motivated monitors: The importance of institutional investors' portfolio weights," *Journal of Financial Economics*, 118, 21-48.

Fisman, R. and I. Love, 2004, "Financial development and intersectoral allocation: A new approach," *Journal of Finance* 59, 2785-2807.

Friedman, B.M., 2006, "The moral consequences of economic growth," *Society* 43, 15-22.

Garcia, F. V., and L. Liu, 1999, "Macroeconomic determinants of stock market development," *Journal of Applied Economics* 2, 29-59.

Garretsen, H., R. Lensink, and E. Sterken, 2004, "Growth, financial development, societal norms and legal institutions," *Journal of International Financial Markets, Institutions and Money* 14, 165-183.

Gaspar, J. M., M. Massa, and P. Matos, 2006, "Favoritism in mutual fund families? Evidence on strategic cross-fund subsidization," *Journal of Finance*, 61, 73-104.

Gelderblom, O., A. De Jong, and J. Jonker, J., 2013, "The formative years of the modern corporation: the Dutch East India Company VOC, 1602–1623," *The Journal of Economic History* 73, 1050-1076.

Giannetti, M., and X. Yu, 2016, "The corporate finance benefits of short horizon investors," Working paper.

Gillan, S., L. Starks, 2003, "Corporate governance, corporate ownership, and the role of institutional investors: a global perspective," *Journal of Applied Finance*, 13, 4–22.

Glaeser, E., S. Johnson, and A. Shleifer, 2001, "Coase versus the Coasians," *Quarterly Journal of Economics* 116, 853-899.

Glaeser, E., and A. Shleifer, 2002, "Legal origins," *Quarterly Journal of Economics* 117, 1193–1230.

Goemans, H., K.S. Gleditsch, and G. Chiozza, 2009, "Introducing Archigos. A data set of political leaders, 1875-2003," *Journal of Peace Research* 46, 269-283.

Goetzmann, W. and P. Jorion, 1999, "Re-emerging markets," *Journal of Financial and Quantitative Analysis* 34, 1-32.

Goncalves-Pinto, L., and J.M. Sotes-Paladino, 2016, "The invisible hand of internal markets in mutual fund families," Working paper.

Goncalves-Pinto, L., and B. Schmidt, 2013, "Co-insurance in mutual fund families," Working paper.

González, F., M. Prem, M., F. Urzúa, 2018, "Take the money and run? The consequences of controversial privatizations", Working paper.

Gower, L.C.B., 1969, *The principles of modern company law*, ed. K.W. Wedderburn, O. Weaver, and A.E.W. Park, London, Stevens and Sons.

Green, C.J., P. Maggioni, V. Murinde, 2000, "Regulatory lessons for emerging stock markets from a century of evidence on transactions costs and share price volatility in the London Stock Exchange," *Journal of Banking and Finance* 24, 577-601.

Greenwood, J., and B.D. Smith, 1997, "Financial markets in development, and the development of financial markets," *Journal of Economic Dynamics and Control* 21, 145-181.

Grossman, S.J., and J.E. Stiglitz, 1980, "On the impossibility of informationally efficient markets," *American Economic Review* 70, 393-408.

Guiso, L., P. Sapienza, and L. Zingales, 2004, "The role of social capital in financial development," *The American Economic Review* 94, 526-556.

Hall, B., A. Jaffe, and M. Trajtenberg, 2001, "The NBER patent citation data file: Lessons, insights and methodological tools," Working paper.

Hall, B., A. Jaffe, and M. Trajtenberg, 2005, "Market value and patent citations," *The RAND Journal of Economics*, 36, 16-38.

Hall, B.H., and J. Lerner, 2010, "The financing of R&D and innovation," in Hall, B.H., and N. Rosenberg (eds.), Handbook of the Economics of Innovation, North Holland, 609-639.

Hansmann, H., and R. Kraakman, 2004, "What is corporate law?" In Kraakman, R., P. Davies, H. Hansmann, G. Hertig, K.J. Hopt, H. Kanda, and E.B. Rock, *The anatomy of corporate law; A comparative and functional approach*, Oxford University Press.

Harford, J., A. Kecskes, and S. Mansi, 2015, "Do long-term investors improve corporate decision making?," *Finance Down Under 2015 Building on the Best from the Cellars of Finance Paper.*

Hart, O., 1983, "The market mechanism as an incentive scheme," *Bell Journal of Economics*, 14, 366-382.

Hartigan, J.A., and M.A. Wong, 1979, "Algorithm AS 136: A k-means clustering algorithm," *Journal of the Royal Statistical Society* 28, 100-108.

Hartzell, J.C., and L.T. Starks, 2003, "Institutional investors and executive compensation," *Journal of Finance*, 58, 2351-2374.

Hausmann, R., D. Rodrik, and A. Velasco, 2005, "Growth diagnostics," in Serra, N., and J.E. Stiglitz, Eds, *The Washington Consensus reconsidered: Towards a new global governance*, Oxford University Press, Oxford.

He, J.J., and X. Tian, 2013, "The dark side of analyst coverage: The case of innovation," *Journal of Financial Economics*, 109, 856-878.

Hofstede, G., G.J. Hofstede, and M. Minkov, 2010, *Cultures and organizations: Software of the mind*,. McGraw-Hill, New York.

Holmström, B., 1999, "Managerial incentive problems: a dynamic perspective," *Review of Economic Studies*, 66, 169-182

Iliev, P., and M. Lowry, 2015, "Are mutual funds active voters?," *Review of Financial Studies*, 28, 446-485.

Irving, J., 2005, "Regional integration of stock exchanges in Eastern and Southern Africa: Progress and prospects," Working paper, IMF.

Jappelli, T., and M. Pagano, 1993, "Savings, growth, and liquidity constraints," *Quarterly Journal of Economics* 108, 93-109.

Jensen, M.C., and W.H. Meckling, 1976, "Theory of the firm: Managerial behavior, agency costs and ownership structure," *Journal of Financial Economics* 3, 305-360.

Kairys Jr., J.P., R. Kruza, R. Kumpins, 2000, "Winners and losers from the introduction of continuous variable price trading: Evidence from the Riga Stock Exchange," *Journal of Banking and Finance* 24, 603-624.

Kaplan, S. N., and B. Minton, 2006, "How has CEO turnover changed? Increasingly performance sensitive boards and increasingly uneasy CEOs," Working paper.

Kempf, E., A. Manconi, A., and O. Spalt, 2016, "Distracted shareholders and corporate actions," *Review of Financial Studies*, hhw082.

Kempf, A., and S. Ruenzi, 2007, "Tournaments in mutual-fund families," *Review of Financial Studies*, 21, 1013-1036.

Kindleberger, C.P., 1984, *A financial history of Western Europe*, Sydney and London, Allen and Unwin.

King, R. G., and R. Levine, 1993, "Finance, entrepreneurship and growth," *Journal of Monetary Economics*, 32, 513-542.

Kogan, L., D. Papanikolaou, A. Seru, and N. Stoffman, 2017, "Technological innovation, resource allocation, and growth", *Quarterly Journal of Economics*, 132, 665-712.

Krueger, A., 2002, "Why crony capitalism is bad for economic growth," in *Crony capitalism and economic growth in Latin America: theory and evidence*, 1, 23.

Kyle, A.S., 1985, "Continuous auctions and insider trading," *Econometrica: Journal of the Econometric Society*, 1315-1335.

La Porta, R., F. Lopez-de-Silanes, A. Shleifer, and R.W. Vishny, 1997, "Legal determinants of external finance," *Journal of Finance* 52, 1131-1150.

La Porta, R., F. Lopez-de-Silanes, A. Shleifer, and R. Vishny, 1998, "Law and finance", *Journal of Political Economy* 106, 231–268.

La Porta, R., F. Lopez-de-Silanes, A. Shleifer, and R.W. Vishny. 1999. "The quality of government," *Journal of Law, Economics and Organization* 15, 222-279.

La Porta, R., F. Lopez-de-Silanes, A. Shleifer, and R.W. Vishny. 2006. "What works in securities laws," *Journal of Finance* 61, 1-32.

Laffont, J.-J., and J. Tirole, 1988, "Repeated auctions of incentive contracts, investment, and bidding parity with an application to takeovers," *RAND Journal of Economics* 19, 516-537.

Lambert, T., and P.F. Volpin, 2018, "Endogenous political institutions and financial development," in *Handbook of Finance and Development*, 477.

Larcker, D.F., A.L. McCall, and G. Ormazabal, 2015, "Outsourcing shareholder voting to proxy advisory firms," *Journal of Law and Economics*, 58, 173-204.

Law, S.H., H.B. Tan, and W.N.W. Azman-Saini, 2014, "Financial development and income inequality at different levels of institutional quality," *Emerging Markets Finance and Trade* 50, 21-33.

Leland, H.E., and D.H. Pyle, 1977, "Informational asymmetries, financial structure, and financial intermediation." *Journal of Finance*, 32, 371-87.

Levine, R., 1991, "Stock markets, growth and tax policy," *Journal of Finance*, 46, 1445-1465.

Levine, R., 1997, "Financial development and economic growth: Views and agenda," *Journal of Economic Literature* 35, 688-726.

Levine, R., 2005, "Finance and growth: Theory and evidence," in Aghion, P., and S.N. Durlauf, Eds., *Handbook of Economic Growth*, Elsevier, Amsterdam.

Levine, R., and S. Zervos, 1998, "Stock markets, banks, and economic growth," *American Economic Review* 88, 537-558.

Lipset, S.M., 1959, "Some social requisites of democracy: Economic development and political legitimacy," *American Political Science Review* 53, 69–105.

Lipset, S.M., 1994, "The social requisites of democracy revisited: 1993 Presidential address," *American Sociological Review* 59, 1–22.

Malenko, N., and Y. Shen, 2016, "The role of proxy advisory firms: Evidence from a regression-discontinuity design," *Review of Financial Studies*, hhw070.

Malmendier, U., 2009, "Law and finance at the origin", *Journal of Economic Literature* 47, 1076-1108.

Manso, G., 2011, "Motivating innovation," *Journal of Finance*, 66, 1823-60.

Maug, E., 1998, "Large shareholders as monitors: is there a trade-off between liquidity and control?," *Journal of Finance*, 53, 65-98.

Miller, M., and K. Rock, 1985, "Dividend policy under asymmetric information," *Journal of Finance*, 40, 1031-51.

Minier, J., 2009, "Opening a stock exchange," *Journal of Development Economics* 90, 135-143.

Morck, R., D. Yavuz, and B. Yeung, 2011, "Banking system control, capital allocation and economy performance," *Journal of Financial Economics* 100, 264-283.

Morduch, J., 1995, "Income smoothing and consumption smoothing," Journal of Economic Perspectives 9, 103-114.

Morgan, A., A. Poulsen, J. Wolf, and T. Yang, 2011, "Mutual funds as monitors: Evidence from mutual fund voting," Journal of Corporate Finance, 17, 914-928.

Narayanan, M., 1985, "Managerial incentives for short-term results," *Journal of Finance*, 40, 1469-84.

Neal, L., 2005, "Venture shares of the Dutch East India Company," in *The origins of value: The financial innovations that created modern capital markets*, Goetzmann & Rouwenhorst (eds.), Oxford University Press.

Obstfeld, M., 1994, Risk-taking, global diversification and growth," *American Economic Review* 85, 1310-1329.

Odusola, A.F., G.A. Cornia, H. Bhorat, and P. Conceição, 2017, "Income inequality trends in sub-Saharan Africa: divergence, determinants and consequences," United Nations Development Programme, Regional Bureau for Africa.

O'Hara, M., 1995, *Market microstructure theory*, Blackwell, Malden, MA.

Pagano, M., 1993a, "Financial markets and growth: An overview," *European Economic Review*, 37, 613-622.

Pagano, M., 1993b, "The flotation of companies on the stock market: A coordination failure model," *European Economic Review* 37, 1101-1125.

Pagano, M., and P.F. Volpin, 2001, "The political economy of finance," *Oxford Review of Economic Policy* 17, 502–519.

Pagano, M., and P.F. Volpin, 2005, "The political economy of corporate governance," *American Economic Review* 95, 1005-1030.

Perotti, E.C., and P. van Oijen, 2001, "Privatization, political risk and stock market development in emerging economies," *Journal of International Money and Finance* 20, 43-69.

Perotti, E.C., and E.L. Von Thadden, 2006, "The political economy of corporate control and labor rents," *Journal of Political Economy* 114, 145-175.

Piesse, J., and B. Hearn, 2005, "Regional integration of equity markets in Sub-Saharan Africa," *South African Journal of Economics* 73, 36-53.

Porter, M.E., 1992, "Capital choices: Changing the way America invests in industry," *Journal of Applied Corporate Finance*, 5, 4-16.

Rajan, R., and L. Zingales, 1998, "Financial dependence and growth," *American Economic Review* 88, 559-586.

Rajan, R., and L. Zingales, 2003, "The great reversals: The politics of financial development in the 20th century," *Journal of Financial Economics* 69, 5-50.

Rioja, F., and N. Valev, 2014, "Stock markets, banks and the sources of economic growth in low and high income countries," *Journal of Economics and Finance* 38, 302-320.

Rothman K.J., and S. Greenland, 1998, *Modern epidemiology*, 2nd ed. Philadelphia, P.A. Lippincott-Raven

Scartascini, C., C. Cruz, P. Keefer, 2017, "The database of political institutions 2017 (DPI2017)," Inter-American Development Bank Publications.

Scharfstein, D., 1988, "The disciplinary role of takeovers," *Review of Economic Studies* 55, 185-99.

Schmidt, C., and R. Fahlenbrach, 2017, "Do exogenous changes in passive institutional ownership affect corporate governance and firm value?," *Journal of Financial Economics*, forthcoming.

Schumpeter, J., 1934, *The theory of economic development*, Harvard University Press, Cambridge, MA.

Shleifer, A., and R.W. Vishny, 1986, "Large shareholders and corporate control," *Journal of Political Economy*, 94, 461-488.

Shleifer, A., and R.W. Vishny, 1990, "Equilibrium short horizons of investors and firms," *American Economic Review*, 80, 148–53.

Shleifer, A., and R.W. Vishny, 1997, "A survey of corporate governance," *Journal of Finance* 52, 737-783.

Singh, A., 1997, "Financial liberalization, stock markets, and economic development," *The Economic Journal* 107, 771-782.

Sneath, P., and R. Sokal, 1973, *Principles of numerical taxonomy*, Freeman, San Francisco.

Stein, J., 1988, "Takeover threats and managerial myopia," *Journal of Political Economy*, 96, 61-80.

Stein, J.C., 1989, "Efficient capital markets, inefficient firms: A model of myopic corporate behavior," *Quarterly Journal of Economics*, 655-669.

Von Thadden, E.L., 1995, "Long-term contracts, short-term investment, and monitoring," *Review of Economic Studies*, 62, 557-75.

Wang, Y., and J. Zhao, 2015, "Hedge funds and corporate innovation," *Financial Management*, 44, 353-385.

Walker, A.M., 1991, *Observation and inference: an introduction to the methods of epidemiology,* Newton Lower Falls, M.A. Epidemiology Resources Inc.

Weber, K., G.F. Davis, and M. Lounsbury, 2009, "Policy as myth and ceremony? The global spread of stock exchanges, 1980-2005," *Academy of Management Journal* 52, 1319-1347.

Wurgler, J., 2000, "Financial markets and the allocation of capital," *Journal of Financial Economics* 58, 187-214.

Wurgler, J., 2011, "On the economic consequences of index-linked investing," in: Rosenfeld, G., Lorsch, J., Khurana, R. (Eds.), *Challenges to Business in the 21st Century: The Way Forward*, American Academy of Arts and Sciences, Cambridge, MA.

Zingales, L., 2000, "In search of new foundations," *Journal of Finance*, 55, 1623–1653.

About the author

José Albuquerque de Sousa was born on April 14, 1978 in Porto, Portugal. After obtaining a degree in Architecture at the University of Porto, Portugal, and the Technical University in Berlin, Germany, he worked for 10 years as an architect in The Netherlands. In 2012, he obtained his pre-Master degree in General Management at the Rotterdam School of Management, Erasmus University, and one year later the Master degree in Finance and Investments from the same school. He received the "Best student award" and the Honours Class "Best essay award". During his Master studies, he worked as a research assistant for Professor Mathijs van Dijk. After an internship in the Real Estate department of ABN-AMRO bank, he started his doctoral studies under the supervision of Professors Mathijs van Dijk and Peter van Bergeijk in 2014, on the PhD project "Nascent markets: Understanding the success and failure of new stock markets."

During his PhD studies, José went on a research visit to Haas School of Business, University of California at Berkeley, hosted by Professor Gustavo Manso. He presented his work, among others, at the Annual Meeting of the European Finance Association (Oslo, 2016), the Annual Meeting of the American Economics Association (Chicago, 2017), and the Annual Meeting of the Financial Markets Association (Boston, 2017). His research focuses on Financial Markets and Institutional Investors.

As of September 1, 2018, José joined the Norwegian School of Economics (NHH), in Bergen, Norway, where he will be working as an Assistant Professor.

Portfolio

Working Papers

Albuquerque de Sousa, J.A., T. Beck, P.A.G. van Bergeijk, and M.A. van Dijk, 2016, "Nascent markets: Understanding the success and failure of new stock markets," CEPR Working Paper no. DP11604[1].

Albuquerque de Sousa, J.A., and M. van Dijk, 2018, "The political consequences of financial market development: Evidence from the opening of African stock exchanges."

Albuquerque de Sousa, J.A., 2017, "Do index funds' family ties benefit the firms they own?, SSRN Working paper No. 3059128.[2]

Conferences and Seminars (* presented by a co-author)

2018

Dynamics of Inclusive Prosperity - Erasmus University, Rotterdam

Erasmus Finance Day - Erasmus Research Institute of Management, Rotterdam

Job market seminar - Norwegian School of Economics (NHH), Bergen

2017

Brown Bag Seminar - Haas School of Business, University of California, Berkeley

Doctoral Student Special Presentations - Annual Meeting Financial Management Association (FMA), Boston.

Doctoral Student Consortium - Annual Meeting Financial Management Association (FMA), Boston.

2nd Workshop on Finance and Development - German Institute for Economic Research (DIW), Berlin*

Erasmus Finance Day - Erasmus Research Institute of Management, Rotterdam

[1] available at https://cepr.org/active/publications/discussion_papers/dp.php?dpno=11604.
[2] available at https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3059128.

PhD seminar - Rotterdam School of Management, Rotterdam

Financial Structure, Financial Stability, and the Economy - Banque de France, Paris*

34th Symposium on Money, Banking and Finance, Paris Nanterre

International Organization of Securities Commissions (IOSCO), Madrid

Annual Meeting American Economics Association (AEA), Chicago

2016

Annual Meeting European Finance Association (EFA), Oslo

Netherlands Institute for Advanced Study (NIAS), Wassenaar*

PhD seminar - Rotterdam School of Management, Rotterdam

Media coverage

2017

World Bank blog: "Nascent stock exchanges - tales of success and failure."

RSM Discovery: "What makes new stock markets successful?"

MeJudice blog: "Wat verklaart het succes en falen van prille aandelenbeurzen?"

Oxford Business Law blog: "Understanding the Success and Failure of Nascent Stock Exchanges."

2016

The Economist: "Africa's stock exchanges meet but size holds them back."

VOXEU column: "Nascent stock exchanges: Explaining success and failure."

Teaching Experience

2017 – Lecture MSc. Elective "Institutional investors"

2017 - BSc. thesis supervision (15 students)

2017, 2018 - BSc. course "Financiële Processen", workshops

2013-18 - MSc. thesis supervision (28 students)

2013-18 - MSc. co-readership (40 students)

2015 - Lecture "Nascent Markets" at the International Institute of Social Studies, Erasmus University.

Prizes, Awards, and Scholarships

Student Travel Grant for the Annual Meeting

2017 - American Finance Association (AFA)

MSc. Finance and Investments Best Student Award

2014 - Erasmus University, Rotterdam School of Management

MSc. Finance and Investments Honors Class Best Essay Award

2014 - Erasmus University, Rotterdam School of Management

Chartered Financial Analyst (CFA) Level I Grant

2013 - Erasmus University, Rotterdam School of Management

ERASMUS RESEARCH INSTITUTE OF MANAGEMENT

ERIM PH.D. SERIES RESEARCH IN MANAGEMENT

The ERIM PhD Series

The ERIM PhD Series contains PhD dissertations in the field of Research in Management defended at Erasmus University Rotterdam and supervised by senior researchers affiliated to the Erasmus Research Institute of Management (ERIM). All dissertations in the ERIM PhD Series are available in full text through the ERIM Electronic Series Portal: http://repub.eur.nl/pub. ERIM is the joint research institute of the Rotterdam School of Management (RSM) and the Erasmus School of Economics (ESE) at the Erasmus University Rotterdam (EUR).

Dissertations in the last four years

Akemu, O., Corporate Responses to Social Issues: Essays in Social Entrepreneurship and Corporate Social Responsibility, Promotors: Prof. G.M. Whiteman & Dr S.P. Kennedy, EPS-2017-392-ORG, https://repub.eur.nl/pub/95768

Alexiou, A. Management of Emerging Technologies and the Learning Organization: Lessons from the Cloud and Serious Games Technology, Promotors: Prof. S.J. Magala, Prof. M.C. Schippers and Dr I. Oshri, EPS-2016-404-ORG, http://repub.eur.nl/pub/93818

Alserda, G.A.G., Choices in Pension Management, Promotors: Prof. S.G. van der Lecq & Dr O.W. Steenbeek, EPS-2017-432-F&A, https://repub.eur.nl/pub/103496

Arampatzi, E., Subjective Well-Being in Times of Crises: Evidence on the Wider Impact of Economic Crises and Turmoil on Subjective Well-Being, Promotors: Prof. H.R. Commandeur, Prof. F. van Oort & Dr. M.J. Burger, EPS-2018-459-S&E, https://repub.eur.nl/pub/111830

Avci, E., Surveillance of Complex Auction Markets: a Market Policy Analytics Approach, Promotors: Prof. W. Ketter, Prof. H.W.G.M. van Heck & Prof. D.W. Bunn, EPS-2018-426-LIS, https://repub.eur.nl/pub/106286

Benschop, N, Biases in Project Escalation: Names, frames & construal levels, Promotors: Prof. K.I.M. Rhode, Prof. H.R. Commandeur, Prof. M. Keil & Dr A.L.P. Nuijten, EPS-2015-375-S&E, http://repub.eur.nl/pub/79408

Bernoster, I., Essays at the Intersection of Psychology, Biology, and Entrepreneurship, Promotors: Prof. A.R. Thurik, Prof. I.H.A. Franken & Prof. P.J.F Groenen, EPS-2018-463-S&E, https://repub.eur.nl/pub/113907

Beusichem, H.C. van, Firms and Financial Markets: Empirical Studies on the Informational Value of Dividends, Governance and Financial Reporting, Promotors: Prof. A. de Jong & Dr G. Westerhuis, EPS-2016-378-F&A, http://repub.eur.nl/pub/93079

Bliek, R. de, Empirical Studies on the Economic Impact of Trust, Promotor: Prof. J. Veenman & Prof. Ph.H.B.F. Franses, EPS-2015-324-ORG, http://repub.eur.nl/pub/78159

Bouman, P., Passengers, Crowding and Complexity: Models for Passenger Oriented Public Transport, Prof. L.G. Kroon, Prof. A. Schöbel & Prof. P.H.M. Vervest, EPS-2017-420-LIS, https://repub.eur.nl/

Brazys, J., Aggregated Marcoeconomic News and Price Discovery, Promotor: Prof. W.F.C. Verschoor, EPS-2015-351-F&A, http://repub.eur.nl/pub/78243

Bunderen, L. van, Tug-of-War: Why and when teams get embroiled in power struggles, Promotors: Prof. D.L. van Knippenberg & Dr. L. Greer, EPS-2018-446-ORG, https://repub.eur.nl/pub/105346

Burg, G.J.J. van den, Algorithms for Multiclass Classification and Regularized Regression, Promotors: Prof. P.J.F. Groenen & Dr. A. Alfons, EPS-2018-442-MKT, https://repub.eur.nl/pub/103929

Chammas, G., Portfolio concentration, Promotor: Prof. J. Spronk, EPS-2017-410-F&E, https://repub.eur.nl/pub/94975

Cranenburgh, K.C. van, Money or Ethics: Multinational corporations and religious organisations operating in an era of corporate responsibility, Prof. L.C.P.M. Meijs, Prof. R.J.M. van Tulder & Dr D. Arenas, EPS-2016-385-ORG, http://repub.eur.nl/pub/93104

Consiglio, I., Others: Essays on Interpersonal and Consumer Behavior, Promotor: Prof. S.M.J. van Osselaer, EPS-2016-366-MKT, http://repub.eur.nl/pub/79820

Darnihamedani, P. Individual Characteristics, Contextual Factors and Entrepreneurial Behavior, Promotors: Prof. A.R. Thurik & S.J.A. Hessels, EPS-2016-360-S&E, http://repub.eur.nl/pub/93280

Dennerlein, T. Empowering Leadership and Employees' Achievement Motivations: the Role of Self-Efficacy and Goal Orientations in the Empowering Leadership Process, Promotors: Prof. D.L. van Knippenberg & Dr J. Dietz, EPS-2017-414-ORG, https://repub.eur.nl/pub/98438

Deng, W., Social Capital and Diversification of Cooperatives, Promotor: Prof. G.W.J. Hendrikse, EPS-2015-341-ORG, http://repub.eur.nl/pub/77449

Depecik, B.E., Revitalizing brands and brand: Essays on Brand and Brand Portfolio Management Strategies, Promotors: Prof. G.H. van Bruggen, Dr Y.M. van Everdingen and Dr M.B. Ataman, EPS-2016-406-MKT, http://repub.eur.nl/pub/93507

Duijzer, L.E., Mathematical Optimization in Vaccine Allocation, Promotors: Prof. R. Dekker & Dr W.L. van Jaarsveld, EPS-2017-430-LIS, https://repub.eur.nl/pub/101487

Duyvesteyn, J.G. Empirical Studies on Sovereign Fixed Income Markets, Promotors: Prof. P. Verwijmeren & Prof. M.P.E. Martens, EPS-2015-361-F&A, https://repub.eur.nl/pub/79033

Elemes, A., Studies on Determinants and Consequences of Financial Reporting Quality, Promotor: Prof. E. Peek, EPS-2015-354-F&A, https://repub.eur.nl/pub/79037

Ellen, S. ter, Measurement, Dynamics, and Implications of Heterogeneous Beliefs in Financial Markets, Promotor: Prof. W.F.C. Verschoor, EPS-2015-343-F&A, http://repub.eur.nl/pub/78191

El Nayal, O.S.A.N., Firms and the State: An Examination of Corporate Political Activity and the Business-Government Interface, Promotor: Prof. J. van Oosterhout & Dr. M. van Essen, EPS-2018-469-S&E, https://repub.eur.nl/pub/114683

Erlemann, C., Gender and Leadership Aspiration: The Impact of the Organizational Environment, Promotor: Prof. D.L. van Knippenberg, EPS-2016-376-ORG, http://repub.eur.nl/pub/79409

Eskenazi, P.I., The Accountable Animal, Promotor: Prof. F.G.H. Hartmann, EPS-2015-355-F&A, http://repub.eur.nl/pub/78300

Evangelidis, I., Preference Construction under Prominence, Promotor: Prof. S.M.J. van Osselaer, EPS-2015-340-MKT, http://repub.eur.nl/pub/78202

Faber, N., Structuring Warehouse Management, Promotors: Prof. M.B.M. de Koster & Prof. A. Smidts, EPS-2015-336-LIS, http://repub.eur.nl/pub/78603

Feng, Y., The Effectiveness of Corporate Governance Mechanisms and Leadership Structure: Impacts on strategic change and firm performance, Promotors: Prof. F.A.J. van den Bosch, Prof. H.W. Volberda & Dr J.S. Sidhu, EPS-2017-389-S&E, https://repub.eur.nl/pub/98470

Fernald, K., The Waves of Biotechnological Innovation in Medicine: Interfirm Cooperation Effects and a Venture Capital Perspective, Promotors: Prof. E. Claassen, Prof. H.P.G. Pennings & Prof. H.R. Commandeur, EPS-2015-371-S&E, http://hdl.handle.net/1765/79120

Fisch, C.O., Patents and trademarks: Motivations, antecedents, and value in industrialized and emerging markets, Promotors: Prof. J.H. Block, Prof. H.P.G. Pennings & Prof. A.R. Thurik, EPS-2016-397-S&E, http://repub.eur.nl/pub/94036

Fliers, P.T., Essays on Financing and Performance: The role of firms, banks and board, Promotors: Prof. A. de Jong & Prof. P.G.J. Roosenboom, EPS-2016-388-F&A, http://repub.eur.nl/pub/93019

Frick, T.W., The Implications of Advertising Personalization for Firms, Consumer, and Ad Platfroms, Promotors: Prof. T. Li & Prof. H.W.G.M. van Heck, EPS-2018-452-LIS, https://repub.eur.nl/pub/110314

Fytraki, A.T., Behavioral Effects in Consumer Evaluations of Recommendation Systems, Promotors: Prof. B.G.C. Dellaert & Prof. T. Li, EPS-2018-427-MKT, https://repub.eur.nl/pub/110457

Gaast, J.P. van der, Stochastic Models for Order Picking Systems, Promotors: Prof. M.B.M de Koster & Prof. I.J.B.F. Adan, EPS-2016-398-LIS, http://repub.eur.nl/pub/93222

Ghazizadeh, P. Empirical Studies on the Role of Financial Information in Asset and Capital Markets, Promotors: Prof. A. de Jong & Prof. E. Peek. EPS-2019-470-F&A https://repub.eur.nl/pub/114023

Giurge, L., A Test of Time; A temporal and dynamic approach to power and ethics, Promotors: Prof. M.H. van Dijke & Prof. D. De Cremer, EPS-2017-412-ORG, https://repub.eur.nl/

Gobena, L., Towards Integrating Antecedents of Voluntary Tax Compliance, Promotors: Prof. M.H. van Dijke & Dr P. Verboon, EPS-2017-436-ORG, https://repub.eur.nl/pub/103276

Groot, W.A., Assessing Asset Pricing Anomalies, Promotors: Prof. M.J.C.M. Verbeek & Prof. J.H. van Binsbergen, EPS-2017-437-F&A, https://repub.eur.nl/pub/103490

Hanselaar, R.M., Raising Capital: On pricing, liquidity and incentives, Promotors: Prof. M.A. van Dijk & Prof. P.G.J. Roosenboom, EPS-2018-429-F&A-9789058925404, https://repub.eur.nl/pub/113274

Harms, J. A., Essays on the Behavioral Economics of Social Preferences and Bounded Rationality, Prof. H.R. Commandeur & Dr K.E.H. Maas, EPS-2018-457-S&E, https://repub.eur.nl/pub/108831

Hekimoglu, M., Spare Parts Management of Aging Capital Products, Promotor: Prof. R. Dekker, EPS-2015-368-LIS, http://repub.eur.nl/pub/79092

Hendriks, G., Multinational Enterprises and Limits to International Growth: Links between Domestic and Foreign Activities in a Firm's Portfolio, Promotors: Prof. P.P.M.A.R. Heugens & Dr. A.H.L Slangen, EPS-2019-464-S&E, https://repub.eur.nl/pub/114981

Hengelaar, G.A., The Proactive Incumbent: Holy grail or hidden gem? Investigating whether the Dutch electricity sector can overcome the incumbent's curse and lead the sustainability transition, Promotors: Prof. R.J. M. van Tulder & Dr K. Dittrich, EPS-2018-438-ORG, https://repub.eur.nl/pub/102953

Hogenboom, A.C., Sentiment Analysis of Text Guided by Semantics and Structure, Promotors: Prof. U. Kaymak & Prof. F.M.G. de Jong, EPS-2015-369-LIS, http://repub.eur.nl/pub/79034

Hollen, R.M.A., Exploratory Studies into Strategies to Enhance Innovation-Driven International Competitiveness in a Port Context: Toward Ambidextrous Ports,Promotors: Prof. F.A.J. Van Den Bosch & Prof. H.W. Volberda, EPS-2015-372-S&E, http://repub.eur.nl/pub/78881

Hurk, E. van der, Passengers, Information, and Disruptions, Promotors: Prof. L.G. Kroon & Prof. P.H.M. Vervest, EPS-2015-345-LIS, http://repub.eur.nl/pub/78275

Jacobs, B.J.D., Marketing Analytics for High-Dimensional Assortments, Promotors: Prof. A.C.D. Donkers & Prof. D. Fok, EPS-2017-445-MKT, https://repub.eur.nl/pub/103497

Kahlen, M. T., Virtual Power Plants of Electric Vehicles in Sustainable Smart Electricity Markets, Promotors: Prof. W. Ketter & Prof. A. Gupta, EPS-2017-431-LIS, https://repub.eur.nl/pub/100844

Kampen, S. van, The Cross-sectional and Time-series Dynamics of Corporate Finance: Empirical evidence from financially constrained firms, Promotors: Prof. L. Norden &Prof. P.G.J. Roosenboom, EPS-2018-440-F&A, https://repub.eur.nl/pub/105245

Karali, E., Investigating Routines and Dynamic Capabilities for Change and Innovation, Promotors: Prof. H.W. Volberda, Prof. H.R. Commandeur and Dr J.S. Sidhu, EPS-2018-454-S&E, https://repub.eur.nl/pub/106274

Keko. E, Essays on Innovation Generation in Incumbent Firms, Promotors: Prof. S. Stremersch & Dr N.M.A. Camacho, EPS-2017-419-MKT, https://repub.eur.nl/pub/100841

Kerkkamp, R.B.O., Optimisation Models for Supply Chain Coordination under Information Asymmetry, Promotors: Prof. A.P.M. Wagelmans & Dr. W. van den Heuvel, EPS-2018-462-LIS

Khattab, J., Make Minorities Great Again: a contribution to workplace equity by identifying and addressing constraints and privileges, Promotors: Prof. D.L. van

Knippenberg & Dr A. Nederveen Pieterse, EPS-2017-421-ORG, https://repub.eur.nl/pub/99311

Kim, T. Y., Data-driven Warehouse Management in Global Supply Chains, Promotors: Prof. R. Dekker & Dr C. Heij, EPS-2018-449-LIS, https://repub.eur.nl/pub/109103

Klitsie, E.J., Strategic Renewal in Institutional Contexts: The paradox of embedded agency, Promotors: Prof. H.W. Volberda & Dr. S. Ansari, EPS-2018-444-S&E, https://repub.eur.nl/pub/106275

Kong, L. Essays on Financial Coordination, Promotors: Prof. M.J.C.M. Verbeek, Dr. D.G.J. Bongaerts & Dr. M.A. van Achter. EPS-2019-433-F&A, https://repub.eur.nl/pub/114516

Krämer, R., A license to mine? Community organizing against multinational corporations, Promotors: Prof. R.J.M. van Tulder & Prof. G.M. Whiteman, EPS-2016-383-ORG, http://repub.eur.nl/pub/94072

Kysucky, V., Access to Finance in a Cros-Country Context, Promotor: Prof. L. Norden, EPS-2015-350-F&A, http://repub.eur.nl/pub/78225

Lee, C.I.S.G., Big Data in Management Research: Exploring New Avenues, Promotors: Prof. S.J. Magala & Dr W.A. Felps, EPS-2016-365-ORG, http://repub.eur.nl/pub/79818

Legault-Tremblay, P.O., Corporate Governance During Market Transition: Heterogeneous responses to Institution Tensions in China, Promotor: Prof. B. Krug, EPS-2015-362-ORG, http://repub.eur.nl/pub/78649

Lenoir, A.S. Are You Talking to Me? Addressing Consumers in a Globalised World, Promotors: Prof. S. Puntoni & Prof. S.M.J. van Osselaer, EPS-2015-363-MKT, http://repub.eur.nl/pub/79036

Li, D., Supply Chain Contracting for After-sales Service and Product Support, Promotor: Prof. M.B.M. de Koster, EPS-2015-347-LIS, http://repub.eur.nl/pub/78526

Li, X. Dynamic Decision Making under Supply Chain Competition, Promotors: Prof. M.B.M de Koster, Prof. R. Dekker & Prof. R. Zuidwijk. EPS-2018-466-LIS, https://repub.eur.nl/pub/114028

Liu, N., Behavioral Biases in Interpersonal Contexts, Supervisors: Prof. A. Baillon & Prof. H. Bleichrodt, EPS-2017-408-MKT, https://repub.eur.nl/pub/95487

Ma, Y., The Use of Advanced Transportation Monitoring Data for Official Statistics, Promotors: Prof. L.G. Kroon & Dr J. van Dalen, EPS-2016-391-LIS, http://repub.eur.nl/pub/80174

Maira, E., Consumers and Producers, Promotors: Prof. S. Puntoni & Prof. C. Fuchs, EPS-2018-439-MKT, https://repub.eur.nl/pub/104387

Mell, J.N., Connecting Minds: On The Role of Metaknowledge in Knowledge Coordination, Promotor: Prof. D.L. van Knippenberg, EPS-2015-359-ORG, http://hdl.handle.net/1765/78951

Meulen,van der, D., The Distance Dilemma: the effect of flexible working practices on performance in the digital workplace, Promotors: Prof. H.W.G.M. van Heck & Prof. P.J. van Baalen, EPS-2016-403-LIS, http://repub.eur.nl/pub/94033

Micheli, M.R., Business Model Innovation: A Journey across Managers' Attention and Inter-Organizational Networks, Promotor: Prof. J.J.P. Jansen, EPS-2015-344-S&E, http://repub.eur.nl/pub/78241

Moniz, A, Textual Analysis of Intangible Information, Promotors: Prof. C.B.M. van Riel, Prof. F.M.G de Jong & Dr G.A.J.M. Berens, EPS-2016-393-ORG, http://repub.eur.nl/pub/93001

Mulder, J. Network design and robust scheduling in liner shipping, Promotors: Prof. R. Dekker & Dr W.L. van Jaarsveld, EPS-2016-384-LIS, http://repub.eur.nl/pub/80258

Neerijnen, P., The Adaptive Organization: the socio-cognitive antecedents of ambidexterity and individual exploration, Promotors: Prof. J.J.P. Jansen, P.P.M.A.R. Heugens & Dr T.J.M. Mom, EPS-2016-358-S&E, http://repub.eur.nl/pub/93274

Okbay, A., Essays on Genetics and the Social Sciences, Promotors: Prof. A.R. Thurik, Prof. Ph.D. Koellinger & Prof. P.J.F. Groenen, EPS-2017-413-S&E, https://repub.eur.nl/pub/95489

Oord, J.A. van, Essays on Momentum Strategies in Finance, Promotor: Prof. H.K. van Dijk, EPS-2016-380-F&A, http://repub.eur.nl/pub/80036

Peng, X., Innovation, Member Sorting, and Evaluation of Agricultural Cooperatives, Promotor: Prof. G.W.J. Hendriks, EPS-2017-409-ORG, https://repub.eur.nl/pub/94976

Pennings, C.L.P., Advancements in Demand Forecasting: Methods and Behavior, Promotors: Prof. L.G. Kroon, Prof. H.W.G.M. van Heck & Dr J. van Dalen, EPS-2016-400-LIS, http://repub.eur.nl/pub/94039

Petruchenya, A., Essays on Cooperatives: Emergence, Retained Earnings, and Market Shares, Promotors: Prof. G.W.J. Hendriks & Dr Y. Zhang, EPS-2018-447-ORG, https://repub.eur.nl/pub/105243

Plessis, C. du, Influencers: The Role of Social Influence in Marketing, Promotors: Prof. S. Puntoni & Prof. S.T.L.R. Sweldens, EPS-2017-425-MKT, https://repub.eur.nl/pub/103265

Pocock, M., Status Inequalities in Business Exchange Relations in Luxury Markets, Promotors: Prof. C.B.M. van Riel & Dr G.A.J.M. Berens, EPS-2017-346-ORG, https://repub.eur.nl/pub/98647

Pozharliev, R., Social Neuromarketing: The role of social context in measuring advertising effectiveness, Promotors: Prof. W.J.M.I. Verbeke & Prof. J.W. van Strien, EPS-2017-402-MKT, https://repub.eur.nl/pub/95528

Protzner, S. Mind the gap between demand and supply: A behavioral perspective on demand forecasting, Promotors: Prof. S.L. van de Velde & Dr L. Rook, EPS-2015-364-LIS, http://repub.eur.nl/pub/79355

Pruijssers, J.K., An Organizational Perspective on Auditor Conduct, Promotors:Prof. J. van Oosterhout & Prof. P.P.M.A.R. Heugens, EPS-2015-342-S&E, http://repub.eur.nl/pub/78192

Reh, S.G., A Temporal Perspective on Social Comparisons in Organizations, Promotors: Prof. S.R. Giessner, Prof. N. van Quaquebeke & Dr. C. Troster, EPS-2018-471-ORG, https://repub.eur.nl/pub/114522

Riessen, B. van, Optimal Transportation Plans and Portfolios for Synchromodal Container Networks, Promotors: Prof. R. Dekker & Prof. R.R. Negenborn, EPS-2018-448-LIS, https://repub.eur.nl/pub/105248

Rietdijk, W.J.R. The Use of Cognitive Factors for Explaining Entrepreneurship, Promotors: Prof. A.R. Thurik & Prof. I.H.A. Franken, EPS-2015-356-S&E, http://repub.eur.nl/pub/79817

Rösch, D. Market Efficiency and Liquidity, Promotor: Prof. M.A. van Dijk, EPS-2015-353-F&A, http://repub.eur.nl/pub/79121

Roza, L., Employee Engagement in Corporate Social Responsibility: A collection of essays, Promotor: Prof. L.C.P.M. Meijs, EPS-2016-396-ORG, http://repub.eur.nl/pub/93254

Schie, R. J. G. van, Planning for Retirement: Save More or Retire Later? Promotors: Prof. B. G. C. Dellaert & Prof. A.C.D. Donkers, EOS-2017-415-MKT, https://repub.eur.nl/pub/100846

Schoonees, P. Methods for Modelling Response Styles, Promotor: Prof. P.J.F. Groenen, EPS-2015-348-MKT, http://repub.eur.nl/pub/79327

Schouten, K.I.M. Semantics-driven Aspect-based Sentiment Analysis, Promotors: Prof. F.M.G. de Jong, Prof. R. Dekker & Dr. F. Frasincar, EPS-2018-453-LIS, https://repub.eur.nl/pub/112161

Schouten, M.E., The Ups and Downs of Hierarchy: the causes and consequences of hierarchy struggles and positional loss, Promotors; Prof. D.L. van Knippenberg & Dr L.L. Greer, EPS-2016-386-ORG, http://repub.eur.nl/pub/80059

Smit, J. Unlocking Business Model Innovation: A look through the keyhole at the inner workings of Business Model Innovation, Promotor: Prof. H.G. Barkema, EPS-2016-399-S&E, http://repub.eur.nl/pub/93211

Straeter, L.M., Interpersonal Consumer Decision Making, Promotors: Prof. S.M.J. van Osselaer & Dr I.E. de Hooge, EPS-2017-423-MKT, https://repub.eur.nl/pub/100819

Stuppy, A., Essays on Product Quality, Promotors: Prof. S.M.J. van Osselaer & Dr. N.L. Mead. EPS-2018-461-MKT, https://repub.eur.nl/pub/111375

Subaşi, B., Demographic Dissimilarity, Information Access and Individual Performance, Promotors: Prof. D.L. van Knippenberg & Dr W.P. van Ginkel, EPS-2017-422-ORG, https://repub.eur.nl/pub/103495

Suurmond, R., In Pursuit of Supplier Knowledge: Leveraging capabilities and dividing responsibilities in product and service contexts, Promotors: Prof. J.Y.F Wynstra & Prof. J. Dul. EPS-2018-475-LIS, https://repub.eur.nl/pub/115138

Szatmari, B., We are (all) the champions: The effect of status in the implementation of innovations, Promotors: Prof. J.C.M van den Ende & Dr D. Deichmann, EPS-2016-401-LIS, http://repub.eur.nl/pub/94633

Toxopeus, H.S. Financing sustainable innovation: From a principal-agent to a collective action perspective, Promotors: Prof. H.R. Commandeur & Dr. K.E.H. Maas. EPS-2019-458-S&E, https://repub.eur.nl/pub/114018

Tuijl, E. van, Upgrading across Organisational and Geographical Configurations, Promotor: Prof. L. van den Berg, EPS-2015-349-S&E, http://repub.eur.nl/pub/78224

Turturea, R., Overcoming Resource Constraints: The Role of Creative Resourcing and Equity Crowdfunding in Financing Entrepreneurial Ventures, Promotors: Prof. P.P.M.A.R Heugens, Prof. J.J.P. Jansen & Dr. I. Verheuil, EPS-2019-472-S&E, https://repub.eur.nl/pub/112859

Valogianni, K. Sustainable Electric Vehicle Management using Coordinated Machine Learning, Promotors: Prof. H.W.G.M. van Heck & Prof. W. Ketter, EPS-2016-387-LIS, http://repub.eur.nl/pub/93018

Vandic, D., Intelligent Information Systems for Web Product Search, Promotors: Prof. U. Kaymak & Dr Frasincar, EPS-2017-405-LIS, https://repub.eur.nl/pub/95490

Verbeek, R.W.M., Essays on Empirical Asset Pricing, Promotors: Prof. M.A. van Dijk

& Dr M. Szymanowska, EPS-2017-441-F&A, https://repub.eur.nl/pub/102977

Vermeer, W., Propagation in Networks:The impact of information processing at the actor level on system-wide propagation dynamics, Promotor: Prof. P.H.M.Vervest, EPS-2015-373-LIS, http://repub.eur.nl/pub/79325

Versluis, I., Prevention of the Portion Size Effect, Promotors: Prof. Ph.H.B.F. Franses & Dr E.K. Papies, EPS-2016-382-MKT, http://repub.eur.nl/pub/79880

Vishwanathan, P., Governing for Stakeholders: How Organizations May Create or Destroy Value for their Stakeholders, Promotors: Prof. J. van Oosterhout & Prof. L.C.P.M. Meijs, EPS-2016-377-ORG, http://repub.eur.nl/pub/93016

Vlaming, R. de.,Linear Mixed Models in Statistical Genetics, Prof. A.R. Thurik, Prof. P.J.F. Groenen & Prof. Ph.D. Koellinger, EPS-2017-416-S&E, https://repub.eur.nl/pub/100428

Vries, H. de, Evidence-Based Optimization in Humanitarian Logistics, Promotors: Prof. A.P.M. Wagelmans & Prof. J.J. van de Klundert, EPS-2017-435-LIS, https://repub.eur.nl/pub/102771

Vries, J. de, Behavioral Operations in Logistics, Promotors: Prof. M.B.M de Koster & Prof. D.A. Stam, EPS-2015-374-LIS, http://repub.eur.nl/pub/79705

Wagenaar, J.C., Practice Oriented Algorithmic Disruption Management in Passenger Railways, Prof. L.G. Kroon & Prof. A.P.M. Wagelmans, EPS-2016-390-LIS, http://repub.eur.nl/pub/93177

Wang, P., Innovations, status, and networks, Promotors: Prof. J.J.P. Jansen & Dr V.J.A. van de Vrande, EPS-2016-381-S&E, http://repub.eur.nl/pub/93176

Wang, R., Corporate Environmentalism in China, Promotors: Prof. P.P.M.A.R Heugens & Dr F. Wijen, EPS-2017-417-S&E, https://repub.eur.nl/pub/99987

Wang, T., Essays in Banking and Corporate Finance, Promotors: Prof. L. Norden & Prof. P.G.J. Roosenboom, EPS-2015-352-F&A, http://repub.eur.nl/pub/78301

Wasesa, M., Agent-based inter-organizational systems in advanced logistics operations, Promotors: Prof. H.W.G.M van Heck, Prof. R.A. Zuidwijk & Dr A. W. Stam, EPS-2017-LIS-424, https://repub.eur.nl/pub/100527

Wessels, C., Flexible Working Practices: How Employees Can Reap the Benefits forEngagement and Performance, Promotors: Prof. H.W.G.M. van Heck, Prof. P.J. van Baalen & Prof. M.C. Schippers, EPS-2017-418-LIS, https://repub.eur.nl/

Wiegmann, P.M., Setting the Stage for Innovation: Balancing Diverse Interests through Standardisation, Promotors: Prof. H.J. de Vries & Dr. K. Blind, EPS-2019-473-LIS, https://repub.eur.nl/pub/114519

Williams, A.N., Make Our Planet Great Again: A Systems Perspective of Corporate Sustainability, Promotors: Prof. G.M. Whiteman & Dr. S. Kennedy, EPS-2018-456-ORG, https://repub.eur.nl/pub/111032

Witte, C.T., Bloody Business: Multinational investment in an increasingly conflict-afflicted world, Promotors: Prof. H.P.G. Pennings, Prof. H.R. Commandeur & Dr M.J. Burger, EPS-2018-443-S&E, https://repub.eur.nl/pub/104027

Yuan, Y., The Emergence of Team Creativity: a social network perspective, Promotors: Prof. D. L. van Knippenberg & Dr D. A. Stam, EPS-2017-434-ORG, https://repub.eur.nl/pub/100847

Ypsilantis, P., The Design, Planning and Execution of Sustainable Intermodal Port-hinterland Transport Networks, Promotors: Prof. R.A. Zuidwijk & Prof. L.G. Kroon, EPS-2016-395-LIS, http://repub.eur.nl/pub/94375

Yuferova, D. Price Discovery, Liquidity Provision, and Low-Latency Trading, Promotors: Prof. M.A. van Dijk & Dr D.G.J. Bongaerts, EPS-2016-379-F&A, http://repub.eur.nl/pub/93017

Zhang, Q., Financing and Regulatory Frictions in Mergers and Acquisitions, Promotors: Prof. P.G.J. Roosenboom & Prof. A. de Jong, EPS-2018-428-F&A, https://repub.eur.nl/pub/103871

Zuber, F.B., Looking at the Others: Studies on (un)ethical behavior and social relationships in organizations, Promotor: Prof. S.P. Kaptein, EPS-2016-394-ORG, http://repub.eur.nl/pub/94388

This dissertation consists of three empirical papers about the determinants and consequences of financial market development in an international context. It aims to contribute to our understanding of the functioning of global financial markets. Each chapter provides evidence of a different issue related to a specific stage of financial market development.

Chapter 2 provides an evaluation of the relative importance of structural and policy determinants of financial sector development by analyzing the success and failure of 59 newly established ("nascent") stock markets since 1975. The results point to a more important role of banks, demand factors, and early success in fostering long-term stock market development, rather than structural factors such as legal and political institutions.

Chapter 3 examines the political consequences of opening a stock exchange in 34 African countries over 1960-2016. This chapter shows that political leaders stay longer in office when they open a stock exchange if local political institutions are autocratic. Moreover, opening a stock exchange in autocracies is associated with slower subsequent democratization of political institutions. This result is surprising, because it suggests that incumbent elites may actually have incentives to support financial development, rather than opposing it.

Chapter 4 investigates the role of institutional investors on the governance of listed US firms, by analyzing the impact of ties between index and non-index funds within the same mutual fund family on the value of firms in which both funds invest. This chapter shows that family ties are associated with higher non-index fund ownership. Furthermore, firms held by funds with family ties are more profitable and have higher valuations. .

ERiM

The Erasmus Research Institute of Management (ERIM) is the Research School (Onderzoekschool) in the field of management of the Erasmus University Rotterdam. The founding participants of ERIM are the Rotterdam School of Management (RSM), and the Erasmus School of Economics (ESE). ERIM was founded in 1999 and is officially accredited by the Royal Netherlands Academy of Arts and Sciences (KNAW). The research undertaken by ERIM is focused on the management of the firm in its environment, its intra- and interfirm relations, and its business processes in their interdependent connections.

The objective of ERIM is to carry out first rate research in management, and to offer an advanced doctoral programme in Research in Management. Within ERIM, over three hundred senior researchers and PhD candidates are active in the different research programmes. From a variety of academic backgrounds and expertises, the ERIM community is united in striving for excellence and working at the forefront of creating new business knowledge.

ERiM

ERIM PhD Series
Research in Management

Erasmus University Rotterdam (EUR)
Erasmus Research Institute of Management
Mandeville (T) Building
Burgemeester Oudlaan 50
3062 PA Rotterdam, The Netherlands

P.O. Box 1738
3000 DR Rotterdam, The Netherlands
T +31 10 408 1182
E info@erim.eur.nl
W www.erim.eur.nl