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

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Abstract

We study the success and failure of 59 newly established ("nascent") stock markets since 1975 in their first 40 years of activity. Nascent markets differ markedly in their success, as measured by number of listings, market capitalization, and trading activity. 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 scale and success in fostering long-term stock market development.

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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.[1] 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, 1993; 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).

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

[1] 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.

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).

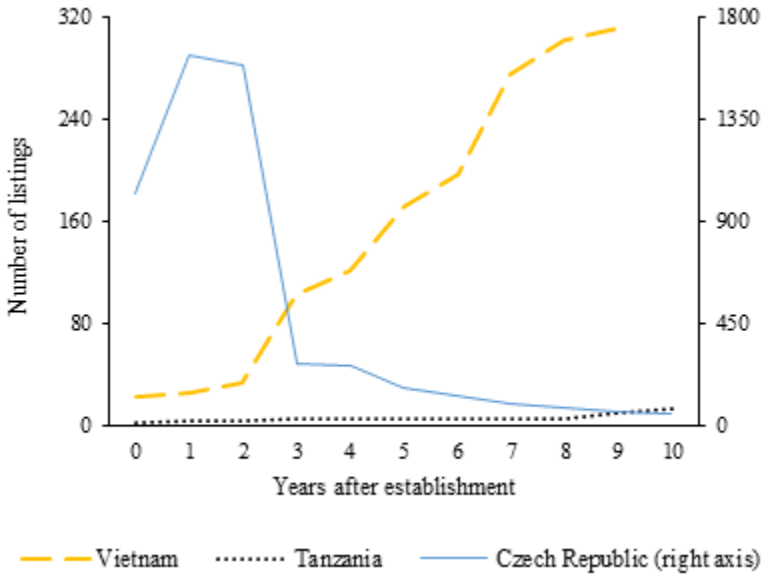

Figure 1. Number of listings in first ten years of select nascent markets

We find substantial variation in the success of different nascent markets, as illustrated in Figure 1 – which shows the development of the number of listings on three new stock markets (Czech Republic, established 1993; Tanzania, 1998; Vietnam, 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 seem 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. 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.

2.1. 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 (1993) 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. 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 possibly not sufficient, condition for long-term success.

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).[2] 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

[2] 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).

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.

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.

3. Data and methods

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

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 A1 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.[3] Table 1 presents an overview of the number and type (national or regional) of markets opened before and after 1975 and Figure 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[4] have at least one stock market, and some of these have more than one.[5] 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 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

[3] 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.
[4] The number of existing countries is based on the World Bank list of countries, retrieved in September 2014.
[5] 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.

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.

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 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.[6] 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.

3.1.2. Determinants of nascent market success

As shown in Table A1 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

[6] 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.

in Section 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.

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 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 new to the financial development literature, we briefly discuss these methods here.

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.

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.[7]

3.2.3. Regression analysis

In a final set of analyses, we use conventional regression methods to explore the factors that predict 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.

4. Empirical results

In this section, we first provide a general analysis of the development of nascent markets (Section 4.1). We then present a cluster analysis to distinguish between less and more successful markets (Section 4.2) and a necessary condition analysis of the question whether long-term success requires early success (Section 4.3). In Section 4.4, we run regressions to study the broader determinants of nascent markets success.

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 40 years of activity and of whether the different success measures develop in a similar way, Figure 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 in the sample for a specific 5-year interval if we have at least one annual observation for each success measure for that market

[7] 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.

in that interval. Panel A of Figure 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) 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 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 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 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.

4.2. Which nascent markets succeed and which ones fail?

The scatter plots in Figure 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 formed 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 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 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 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.

Figure 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 indicating the individual markets represents their 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.[8] 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 IA1 in the Appendix depicts the geographic distribution of the markets in the different clusters.[9]

The two vertical lines in the plot in Panel A of Figure 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 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).[10] 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 4, which shows histograms of the three success measures for the clusters of least and most successful markets separately, and by Table 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

[8] 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%.

[9] 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 IA2 of the Internet Appendix. As a further robustness check, we also use three instead of two clusters. Figure IA3 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.

[10] We note that, as discussed in Section 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.

dimensions of success than the cluster of least successful markets, especially for turnover. Table 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 5 presents a similar three-dimensional plot of the success measures of the 34 markets as Panel A of Figure 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 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 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 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 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.

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, market cap, and turnover after 1-5 years) on the x-axis in Panel A of Figures 6-8. 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 3.2.3), and for – comparison purposes – a simple OLS regression line. As described in Section 3.2.3, 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 6-8 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 6 shows that a high initial number of listings as well as high initial turnover seem 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 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 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 6, Figure 8 shows that a high initial number of listings as well as high initial turnover seem 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 seem 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.[11]

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 2.3, 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").

[11] 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.

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 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 IA1 through IA3 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 IA1 through IA3 do not survive more complex specifications.

Table 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[12]) 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 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 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

[12] 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 4.

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 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 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 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 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 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 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 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 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.

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 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.

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.

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Table 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 3 for a description of the data sources.

	Number of exchanges	**Number 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)

Table 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, Rep.	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
Trin. & 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
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 Fed.	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 Rep.	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 Rep.	1993	Bratislava Stock Exchange
Kyrgyz Rep.	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 Bucureşti
W. 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 N. 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

Table 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 A1 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*

Table 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 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 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 A1 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)

Table 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 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 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 A1 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)

Table 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 (t_0) as independent variables are measured as the averages over the period 1-5 years after establishment, also expressed in logs. Initial conditions (t_0) 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 R^2. We refer to Table A1 of the Appendix for variable definitions and data sources.

Table 6 – 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

Table 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 (t_0) as independent variables are measured as the averages over the period 1-5 years after establishment, also expressed in logs. Initial conditions (t_0) 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 A1 of the Appendix for variable definitions and data sources.

Table 7 – 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

Figure 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.

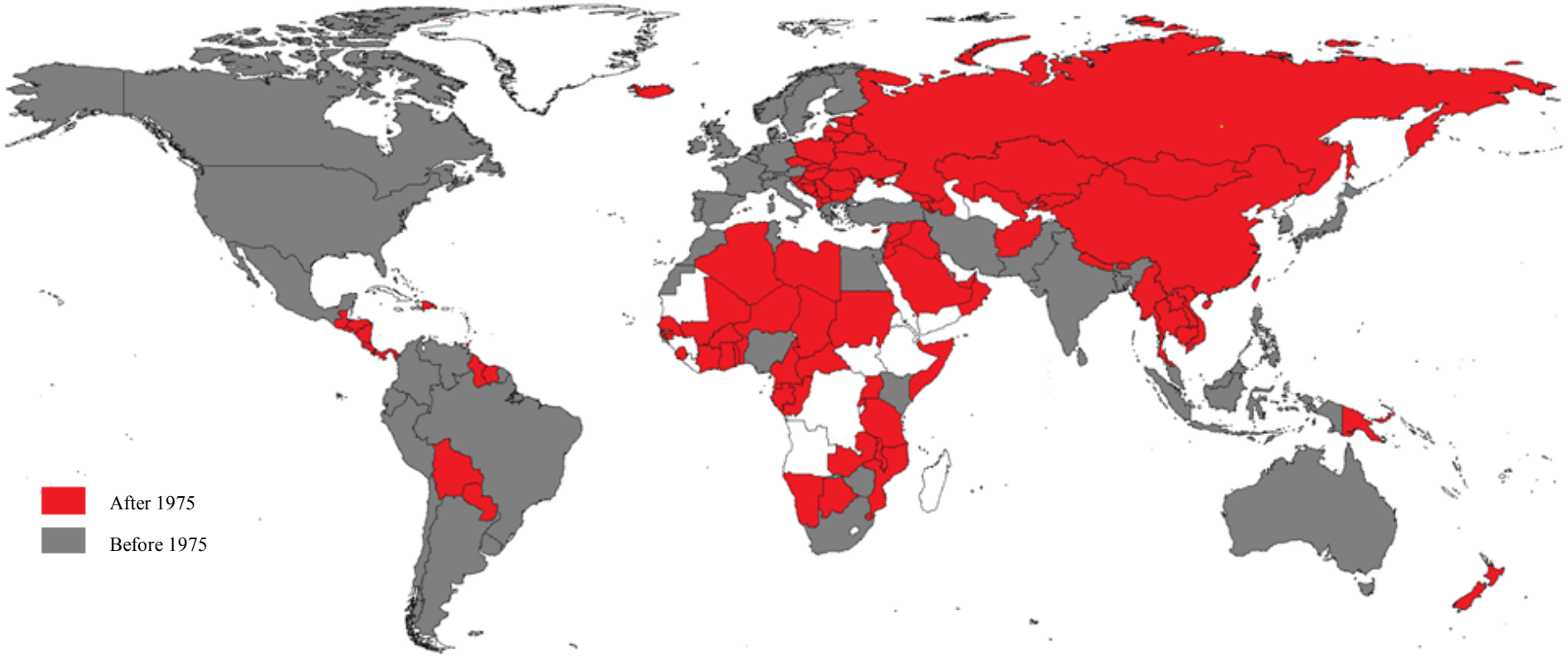
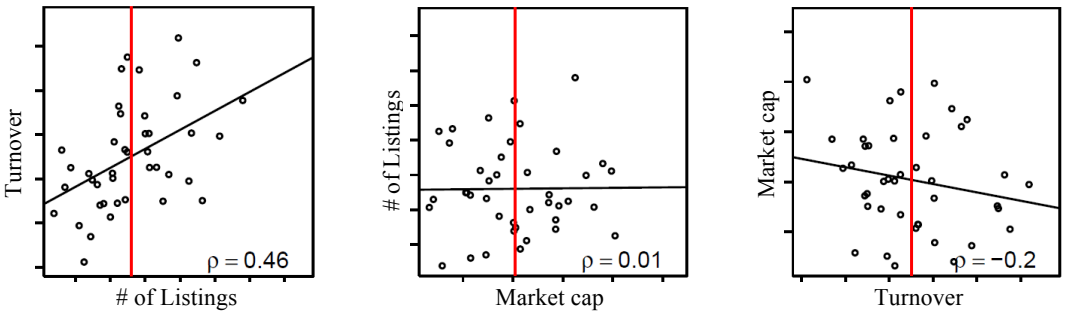


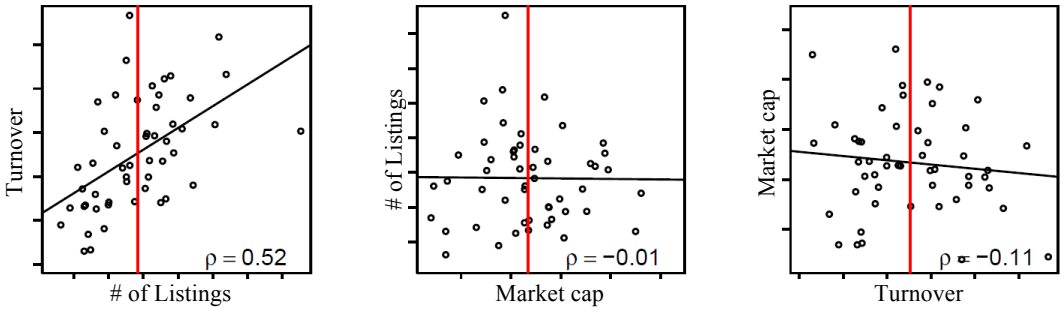
Figure 3. Scatter plots of nascent market success measures (5-year intervals after establishment)

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.

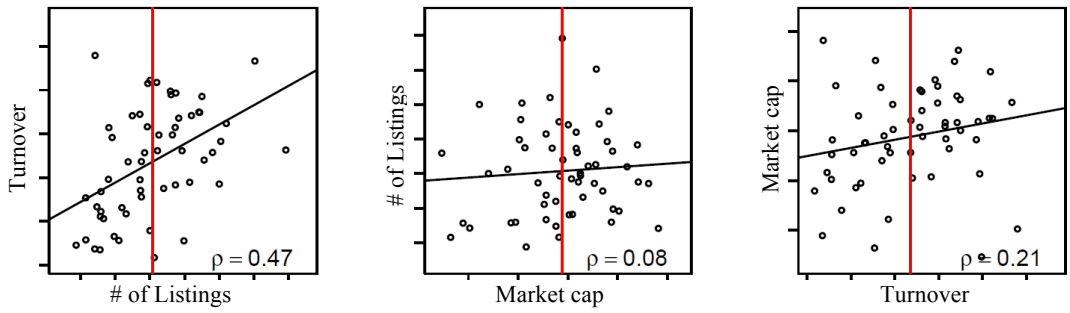
Panel A: 1-5 years after establishment (41 markets)



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



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



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

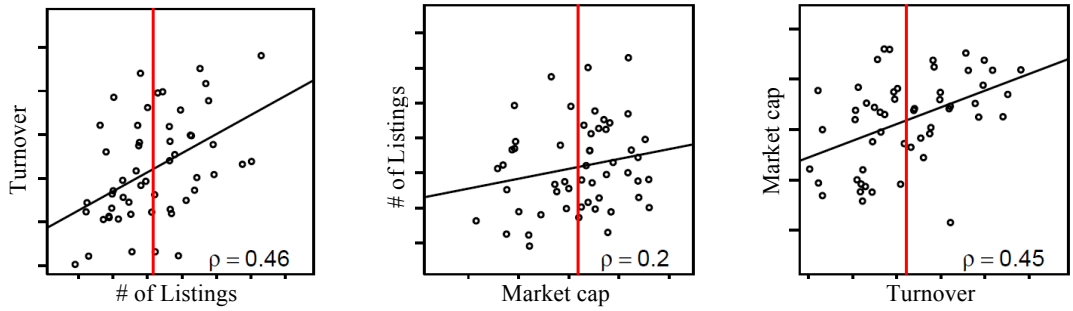
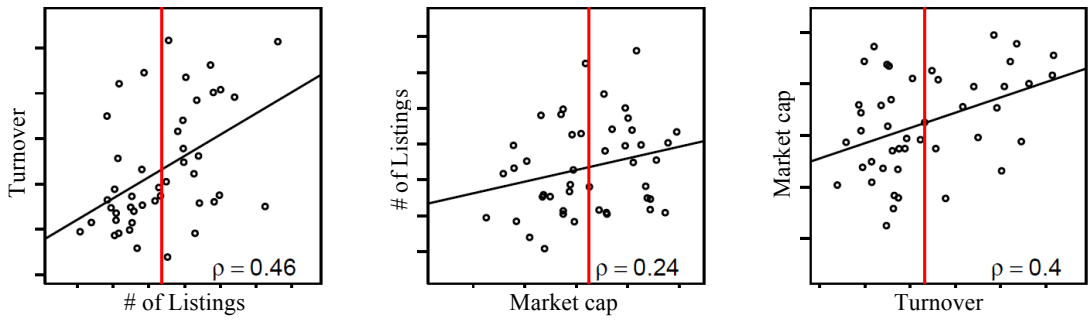
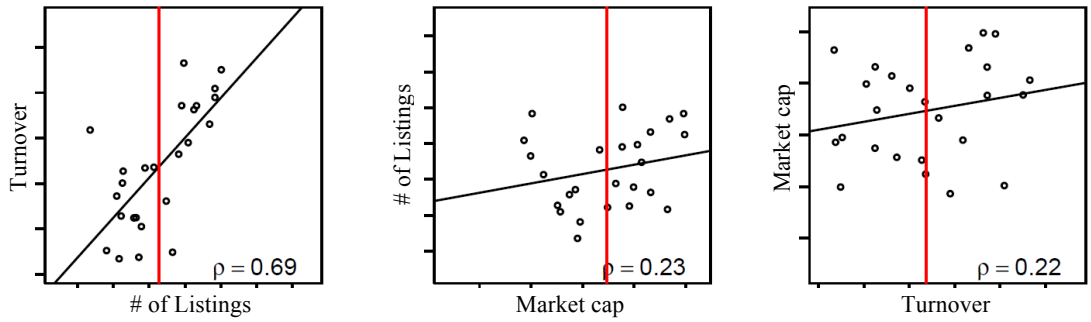


Figure 3 - continued

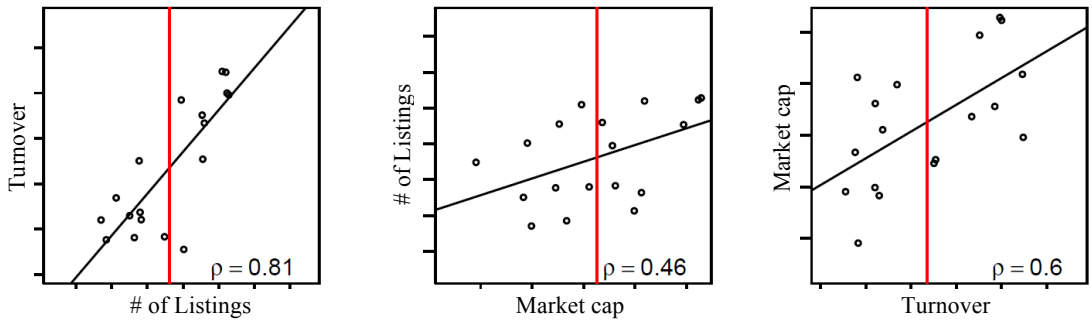
Panel E: 21-25 years after establishment (45 markets)



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)

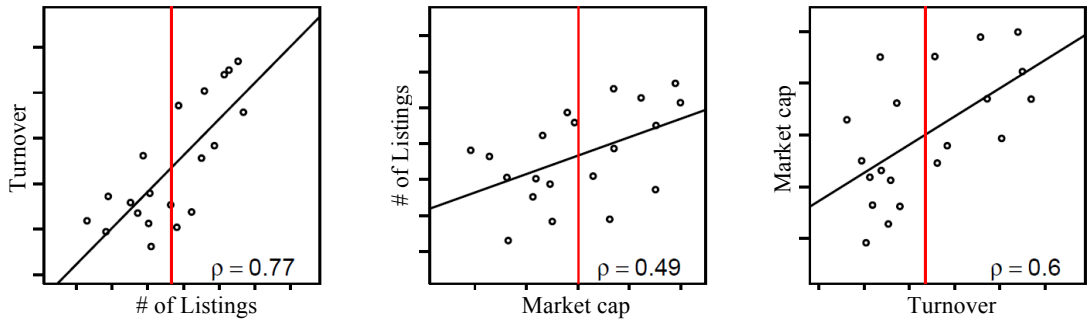
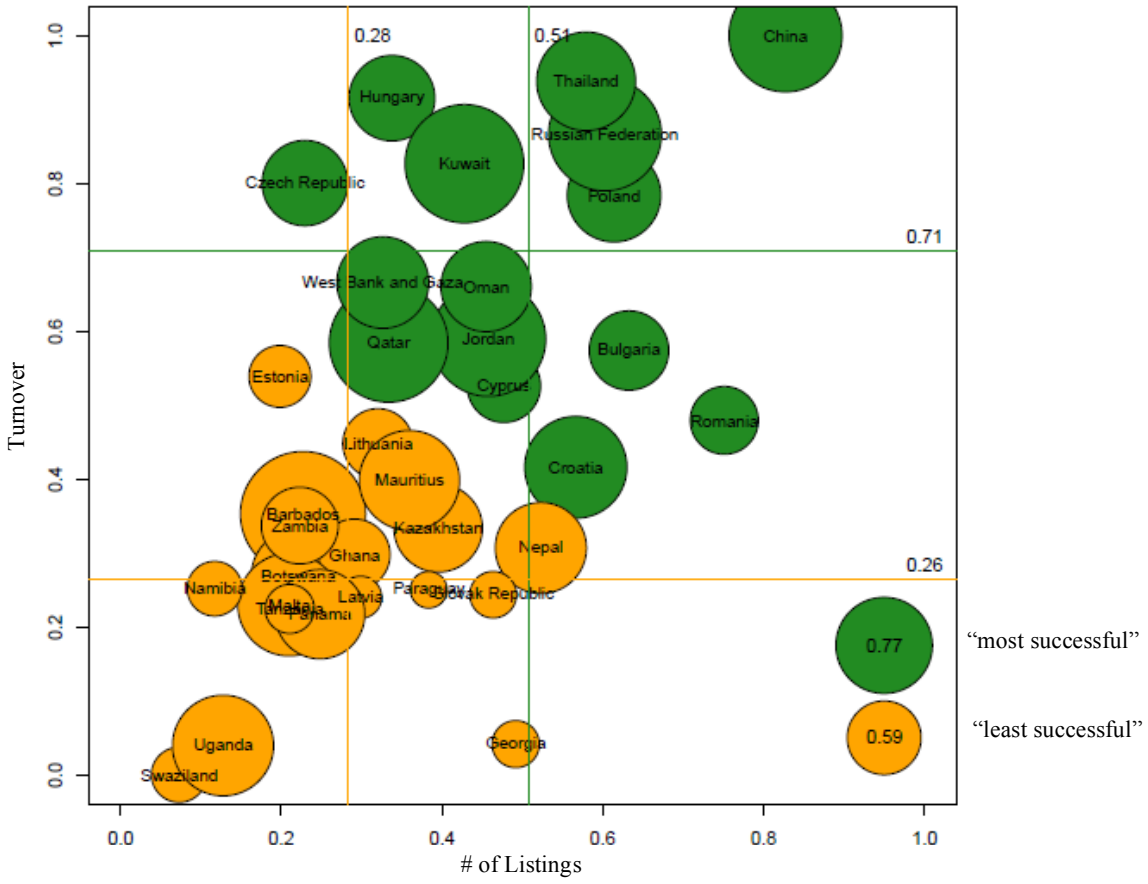


Figure 4. Cluster analysis of nascent market success (16-20 years after establishment)

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 A1 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

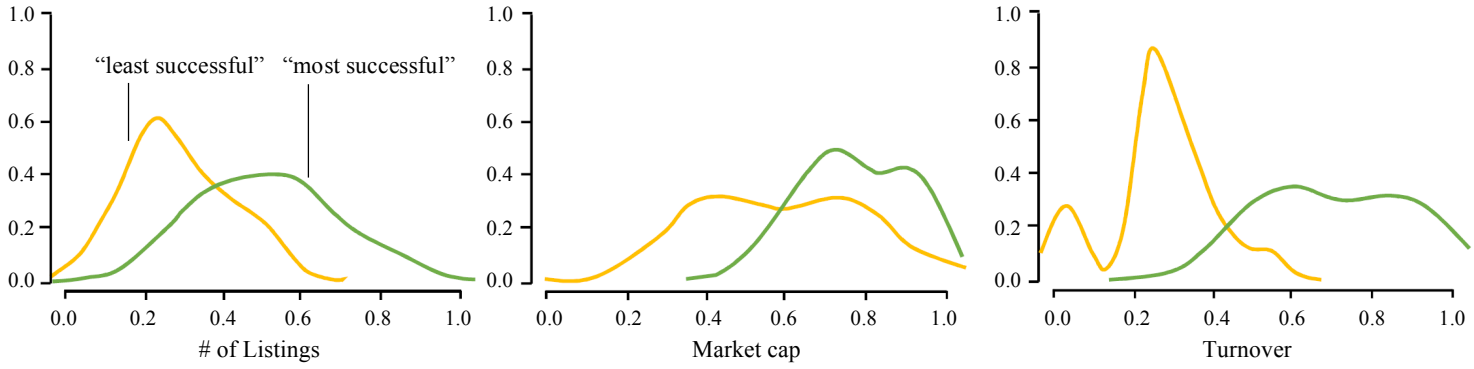
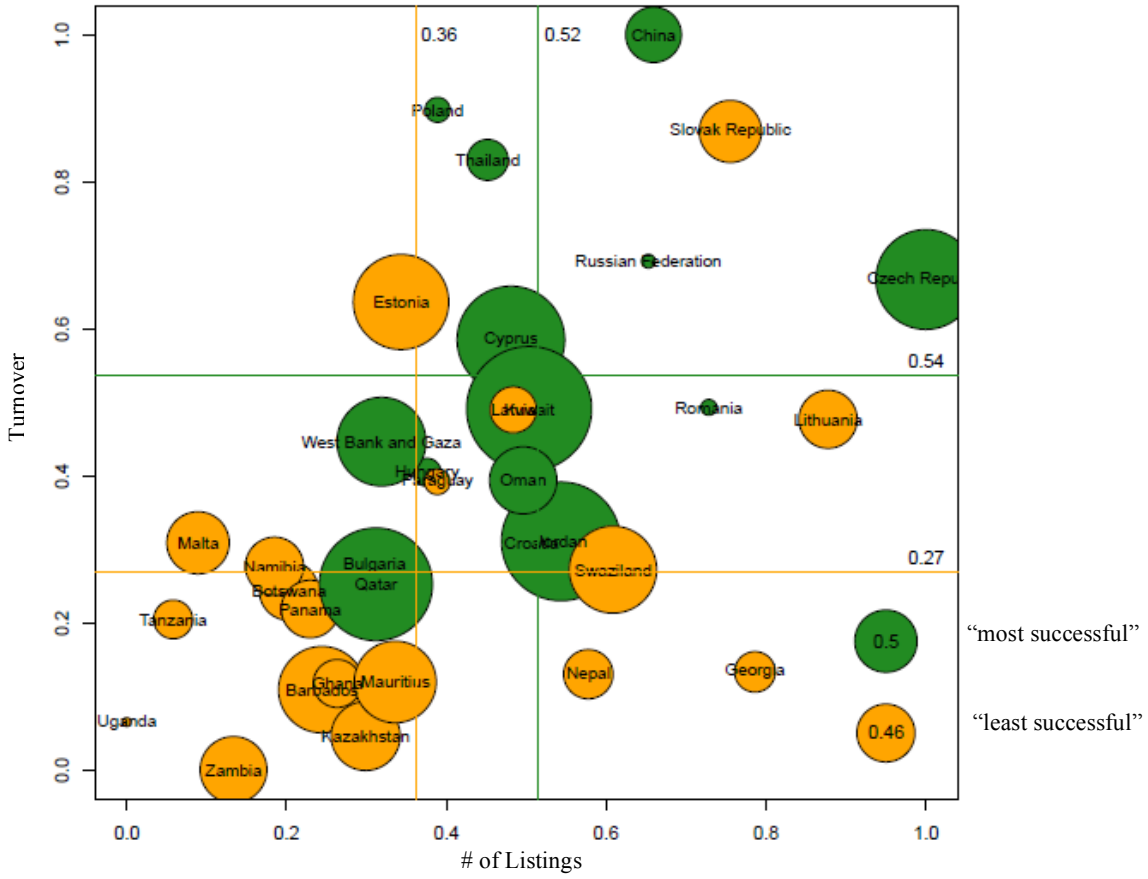


Figure 5. Success measures of least/most successful clusters (1-5 years after establishment)

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 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 A1 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

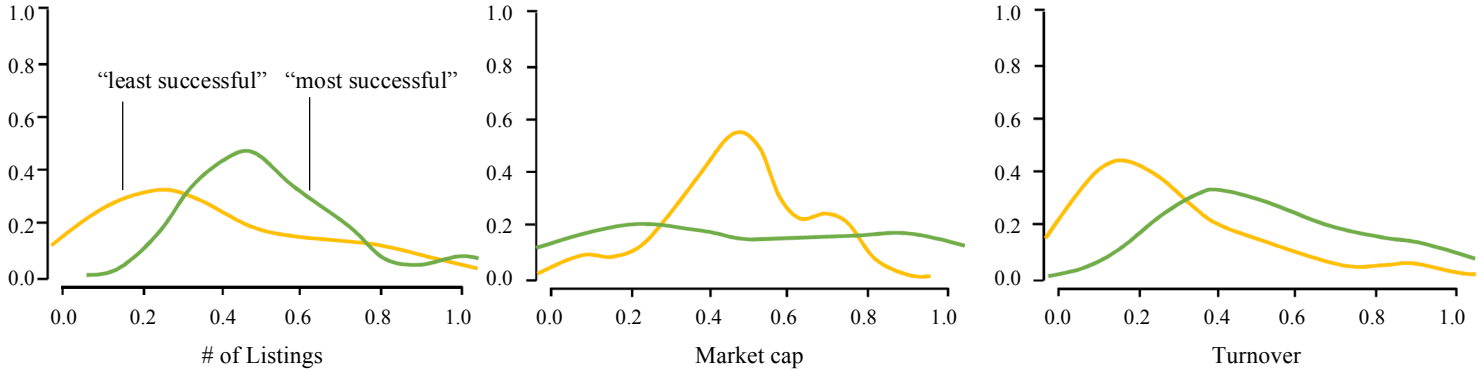
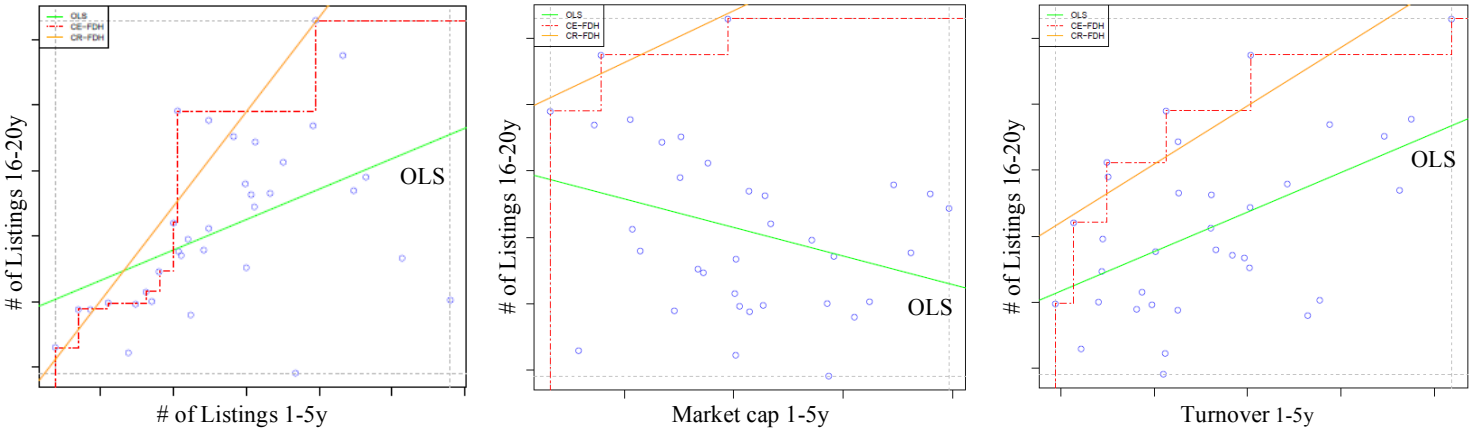


Figure 6. Necessary condition analysis of number of listings (16-20 years) as dependent variable

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. 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 3.2.3 for a discussion of NCA and to Table A1 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)



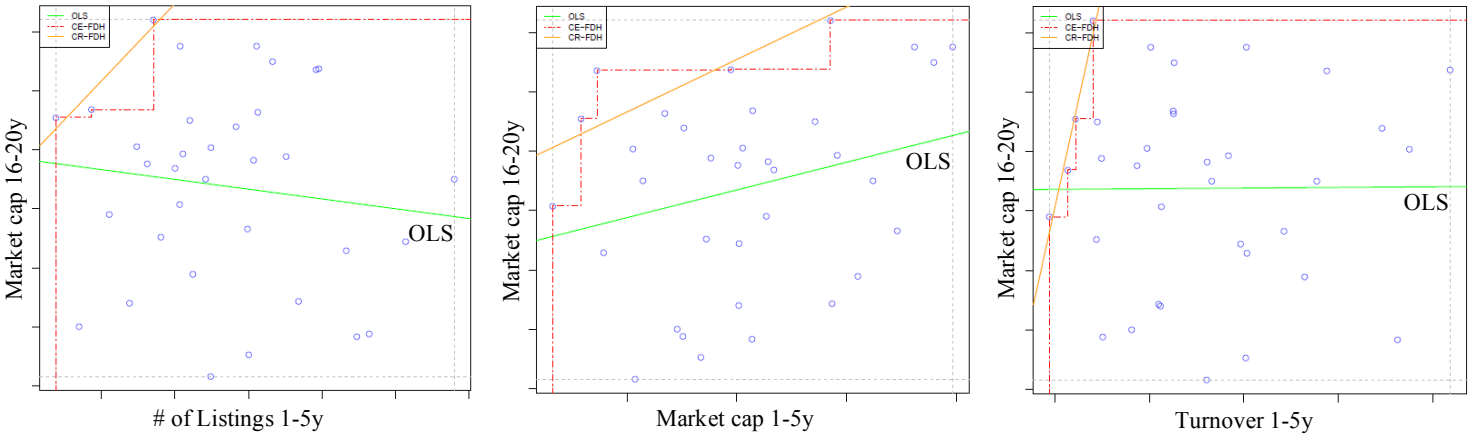
Panel B. Bottleneck table of necessary conditions for number of listings (16-20 years)

# 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 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. 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 3.2.3 for a discussion of NCA and to Table A1 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)



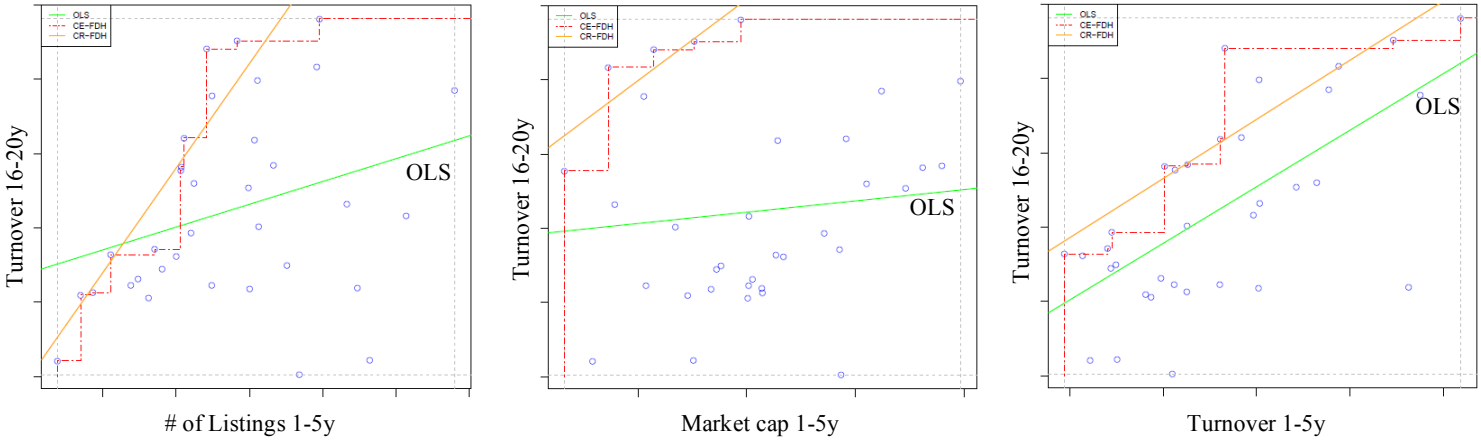
Panel B. Bottleneck table of necessary conditions for market cap (16-20 years)

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 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. 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 3.2.3 for a discussion of NCA and to Table A1 of the Appendix for variable definitions and data sources.

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



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+

APPENDIX

Table A1. 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.
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 %).

Table A1 - continued

Variable	Source	Definition
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.
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.
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.

Table A1 - continued

Variable	Source	Definition
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.
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).
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.

Table A1 - continued

Variable	Source	Definition
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.
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.
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.

Table A1 - continued

Variable	Source	Definition
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.
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.
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

Table A1 - continued

Variable	Source	Definition
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?".

INTERNET APPENDIX

Table IA1. 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 A1 of the Appendix for variable definitions and data sources.

	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

Table IA1 - 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

Table IA1 - 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

Table IA1 - 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 IA2. 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" ($\Delta, t\text{-}1$) 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" (t_0) 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 (t_0) and as dynamic condition ($\Delta, t\text{-}1$) 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 A1 of the Appendix for variable definitions and data sources.

	# of Listings				***Market cap***				***Turnover***			
	t_0	$\Delta, t\text{-}1$	#C	#O	t_0	$\Delta, t\text{-}1$	#C	#O	t_0	$\Delta, t\text{-}1$	#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

Table IA2 - 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 IA3. 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" (t_0) 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 A1 of the Appendix for variable definitions and data sources.

	# 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

Table IA3 - 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 IA1. 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 4.

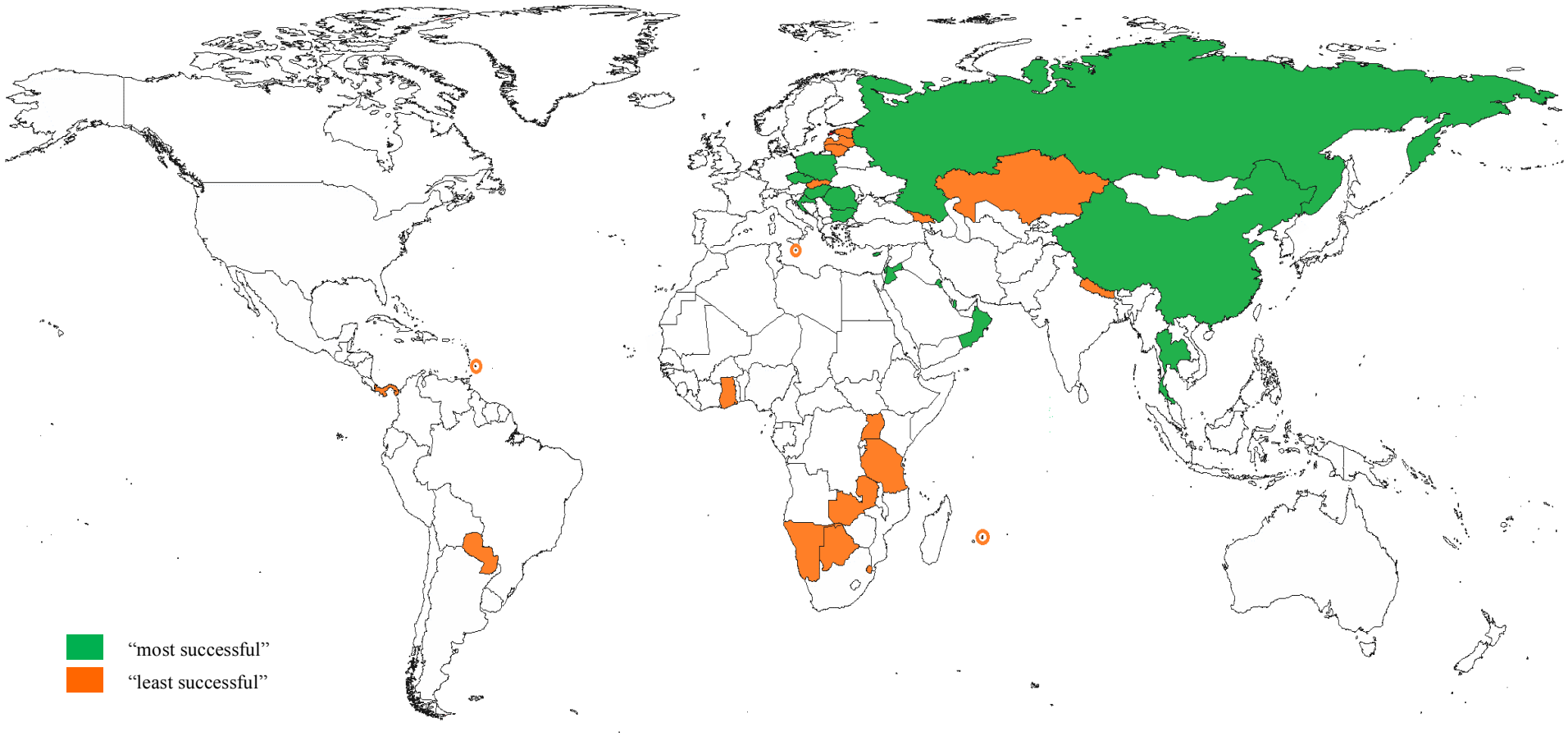
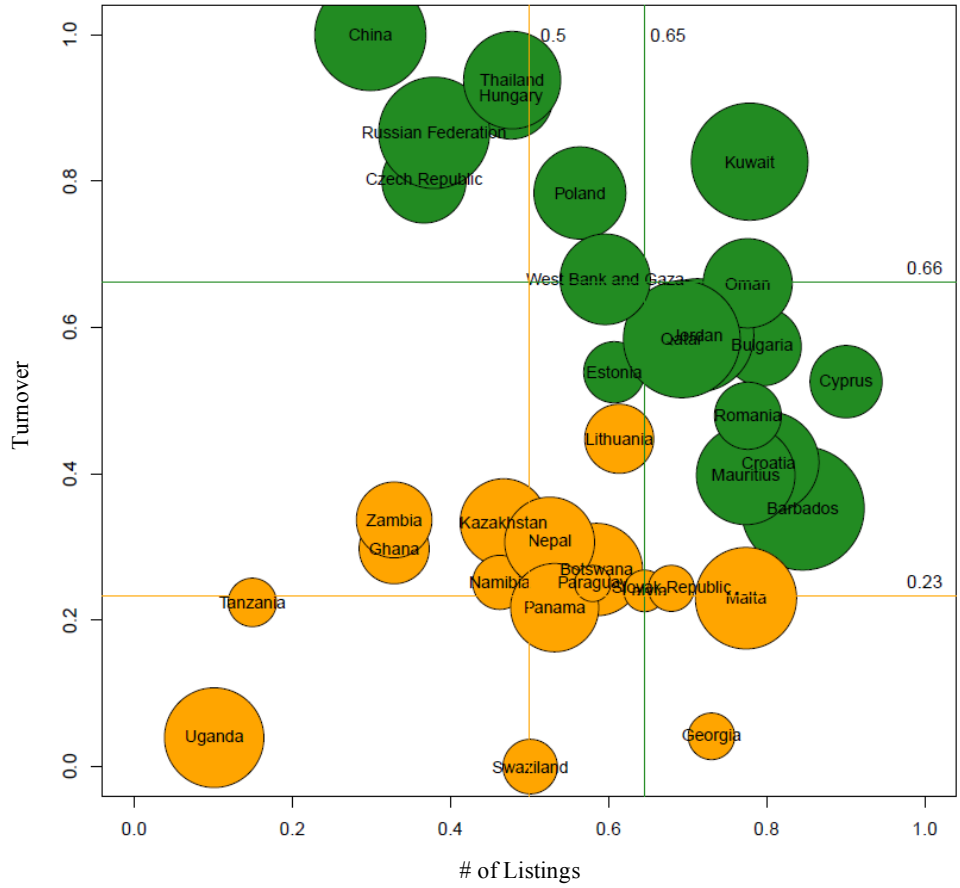


Figure IA2. Cluster analysis of nascent market success (16-20 years after establishment), number of listings scaled by population

This figure shows cluster analysis results similar to Panel A of Figure 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 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 A1 of the Appendix for variable definitions and data sources.

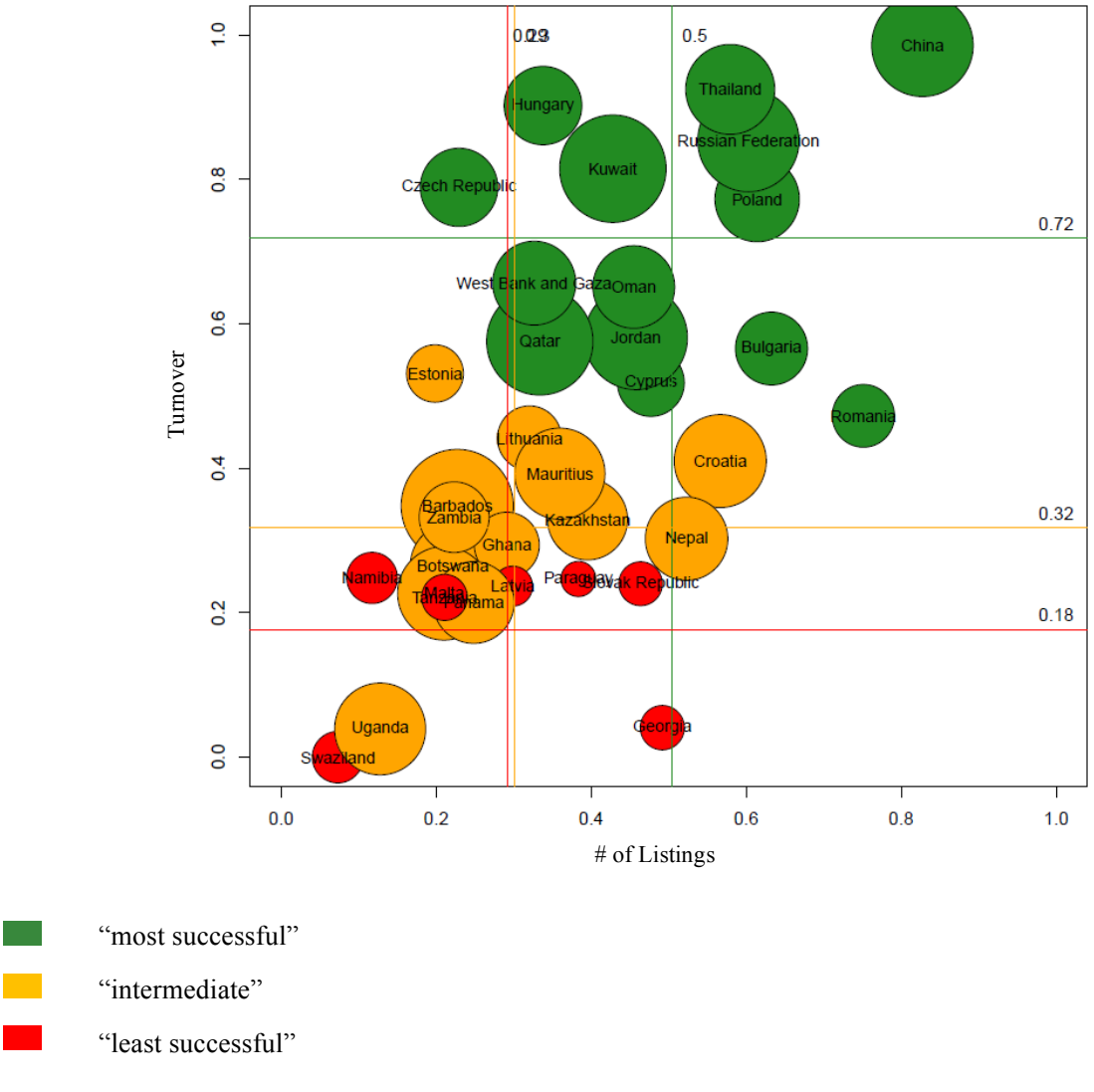


"most successful"

"least successful"

Figure IA3. 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 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 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 A1 of the Appendix for variable definitions and data sources.



"most successful"

"intermediate"

"least successful"