Does the Stock Market Benefit the Economy?*

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Abstract

An effectively functioning stock market allocates capital efficiently and provides sufficient funds to emerging, productive firms, which in turn breeds competition and innovation, ultimately fueling economic growth. In this paper, we show that concentrated stock markets dominated by a small number of large firms are functionally inefficient. Using data from 47 countries during 1989–2013, we find that capital is allocated inefficiently in countries with concentrated stock markets, which results in sluggish IPO activity, innovation, and economic growth.

1. Introduction

In his presidential address "Does finance benefit society?" at the 2015 American Finance Association meeting, Zingales (2015) points to the lack of evidence that finance promotes economic growth. In particular, he argues that "there is remarkably little evidence that the existence or size of an equity market matters for growth" (Zingales, 2015, p.1,341). The lack of evidence that the stock market promotes growth is troubling, as "without vibrant, innovative financial markets, economies would invariably ossify and decline" (Rajan and Zingales, 2003, p.1). Arguably, the most important function of a stock market is to nurture entrepreneurship by facilitating funding for new, innovative firms. An effectively functioning stock market allocates capital efficiently and provides sufficient funds to emerging, productive firms, which in turn breeds competition and innovation and ultimately fuels economic growth. However, the literature has yet to establish a robust relationship between stock market development and economic growth.[1] Even if one believes that stock market development does promote economic development, much needs to be learned about the channels through which finance promotes economic growth (Zingales, 2003).

In this paper, we revisit the question of whether, and if so how, stock market development promotes economic growth. Theoretically, a good proxy for stock market development should capture the ease with which an entrepreneur or a firm with a good investment project can access required capital, that is, the functional efficiency of the stock market (Zingales, 2003). We propose a new measure of stock market functionality termed "stock market concentration" and examine its relationship with capital allocation efficiency, initial public offerings (IPOs), innovation, and

[1] For example, Levine and Zervos (1998) find that stock market size (stock market capitalization over GDP) is not robustly correlated with economic growth, capital accumulation, or productivity improvements. Although Levine and Zervos (1998) and Rousseau and Wachtel (2000) find that stock market turnover is correlated with economic growth, a priori trading volume would not be the most obvious measure of stock market development (Zingales, 2015).

economic growth, using data from 47 countries during 1989–2013. We measure the extent of stock market concentration as the sum of the stock market capitalizations of the largest five or ten firms divided by the total stock market capitalization of a country's domestic stock exchanges. The idea is that the structure of stock market, not just its size, can better capture the functional efficiency of stock market. In a concentrated stock market dominated by a few large firms, an entrepreneur with a good investment project may have more difficulty in obtaining required capital than in a stock market that is not. A more concentrated stock market then leads to less funding available to potential users of stock market financing. Consider a situation in which the five largest firms take up, say, 50% of the total stock market capitalization in a country's stock market.[2] Investors would then be likely to pay most attention to these five firms, the performance of which would mainly determine their portfolio returns. Under such circumstances, it would be hard for new, small firms to attract stock market investors, and they would be deprived of financing opportunities. In short, severe concentration is likely to keep many small firms from accessing the stock market.

The choice of five or ten firms in computing the extent of stock market concentration is arbitrary. One could use the share of all firms in the stock market and generate a measure similar to Herfindahl-Hirschman Index. We choose to focus on the share of largest firms, not of all firms, in the stock market because the effect of largest firms on the economy is fundamentally different from the rest of the firms. For instance, Gabaix (2011) shows that in modern economies dominated by largest firms, they disproportionately affect the economy. He finds that idiosyncratic shocks to the largest firms can translate into nontrivial aggregate shocks to the whole economy. Fogel, Morck, Yeung (2008) show that the stability of the businesses in a country negatively affects the country's economic growth and that it is the stability of the largest firms, not of all firms in an economy, that

[2] A stock market concentration ratio of 50% is not unrealistic. In our sample, the average concentration ratios computed using top 5 and 10 firms are 35% and 48%, respectively.

affects growth.

We begin our analysis by investigating the relationship between stock market concentration and capital allocation efficiency. This experiment is important, because we should see a negative correlation between the two, to the extent that the concentration measure is a good proxy for the inverse level of stock market functionality. Following Wurgler (2000), we construct a measure that captures the efficiency of capital allocation at the industry level of each country. By regressing the growth rate of gross fixed capital formation (investment) in an industry on the growth rate of value added in that industry, we estimate the degree of efficiency in allocating capital; that is, the extent to which a country increases investment in its growing industries and decreases investment in its declining industries. We then run cross-sectional regressions of the capital allocation efficiency measure on stock market concentration. We find that stock market concentration is indeed negatively correlated with the proxy for capital allocation efficiency, suggesting that a concentrated stock market is less likely to allocate necessary capital to firms that may make more efficient use of capital.

Next, we examine the relationship between stock market concentration and economic growth. Following King and Levine (1993), who rely on the "post hoc ergo propter hoc" (after this, therefore because of this) argument, we regress real per capita GDP growth rates in year *t* on stock market concentration in year *t*–5 or *t*–10. Using lagged values of stock market concentration allows us to investigate the long-term effects of concentration on economic growth. We find that stock market concentration today is significantly and negatively related to economic growth in five or even ten years. Interestingly, stock market concentration in year *t* is insignificantly correlated with contemporaneous (year *t*) economic growth. This finding may loosely imply a causal effect of stock market concentration on economic growth. The negative relationship between current stock market concentration and future economic growth rate is economically significant. For example, a one standard deviation decrease in stock market concentration by the top five firms in our basic regression predicts an increase of approximately 0.64 percentage point in the real per capita GDP growth rate in five years. This magnitude is nontrivial, representing 28% of the sample average real per capita GDP growth rate of 2.26%.

Although using lagged values of stock market concentration in the regressions partially addresses concerns over reverse causality bias, unknown country characteristic variables may be correlated with both stock market concentration and future economic growth, causing a spurious relationship between the two variables. We adopt two approaches to address the omitted variable problem. First, we run country fixed effect regressions to control for any time-invariant country characteristics. Second and more importantly, we use the identification method developed in a seminal paper by Rajan and Zingales (1998) and used in Cetorelli and Gambera (2001) and Hsu et al. (2014). The insight by Rajan and Zingales (1998) is that better-developed financial markets should lead to higher economic growth in industries that are heavily dependent on external finance, to the extent that financial market development helps the economy grow. We find the consistent evidence with the hypothesis. Less concentrated stock markets, i.e., more functionally efficient stock markets, promote the growth of industries that are more dependent on external finance. We also run a battery of robustness tests and find that the negative effect of stock market concentration on growth is robust.

Next, we examine the relationship of stock market concentration with IPOs and innovation. We hypothesize that stock market concentration adversely affects future economic growth through a negative effect on entrepreneurship by constricting the financing and innovative activities of new firms. Although many studies investigate the relationship between finance and economic growth, the specific channels through which finance affects growth remain relatively unknown. Identifying the channels also affirms—at least partially—the causal link between finance and growth. To the extent that the structure of a concentrated stock market hampers financing by new, innovative firms, we expect a country with high stock market concentration to have fewer IPOs and less innovation, slowing its economic growth. To test this hypothesis, we run panel regressions of the IPO and innovation variables in year *t* on stock market concentration in year *t–5*. We find that stock market concentration is indeed negatively associated with the IPO and innovation proxies.

Our study contributes to several strands of the literature. First, we add evidence to the finance and growth literature that stock market development is beneficial to economic growth. Whether finance leads to economic growth is a classic issue debated between two opposing views. One view is that financial markets promote the innovation that boosts a country's economic growth and are thus critical to that growth (Schumpeter, 1912; Goldsmith, 1969; McKinnon, 1973; Miller, 1998). The other view is that the financial system is a mere sideshow, responding passively to the demands created by economic development (Robinson, 1952; Lucas, 1988). Distinguishing between the two views has enormously important implications for policymakers, particularly in developing economies. Although the literature generally agrees that financial development promotes economic growth (King and Levine, 1993; Levine and Zervos, 1998; Beck, Levine, and Loayza, 2000; Rousseau and Wachtel, 2000; Beck and Levine, 2004),[3] it focuses mainly on the credit market. Furthermore, recent studies find that excessive credit can be problematic. In the wake of the global credit crisis of 2008, several studies question the benefits of credit market development, even suggesting that too much credit may not promote but even hurt growth (Arcand,

[3] These studies are based on country-level analysis. Jayaratne and Strahan (1996) add evidence on the positive finance-growth nexus using state-level data for the United States. Rajan and Zingales (1998) provide industry-level evidence. Demirgüç-Kunt and Maksimovic (1998) and Guiso, Sapienza, and Zingales (2004) suggest that firm-level growth is associated with financial development. Levine (2005) provides a good survey of the literature on finance and growth.

Berkes, and Panizza, 2012; Cecchetti and Kharroubi, 2012; Schularick and Taylor, 2012; Beck, Degryse, and Kneer, 2014; Mian and Sufi, 2014). In addition, there is little evidence that stock market development contributes to economic growth (Zingales, 2015). We fill this gap in the literature and provide evidence that a well-functioning stock market plays a positive role in the real economy. Our innovation is that we introduce a new measure of stock market development that better captures the functional efficiency of the stock market and investigate possible channels through which finance promotes growth.

Second, our study is related to the literature on creative destruction. Schumpeter (1912) asserts that economic growth is critically attributed to creative destruction, the process in which technological innovation and growth opportunities evolve by disavowing a battered, established regime and building a novel, new system. Nelson and Winter (1982) and Aghion and Howitt (1992, 1997, 1998) develop theoretical models based on this argument. Our finding that stock market concentration by the largest firms is negatively associated with new IPO and innovation activities is consistent with the Schumpeterian view of the role of creative destruction in economic growth. Supporting this idea, Fogel, Morck and Yeung (2008) find that big business stability is negatively associated with future economic growth. Their finding suggests that the long-lasting prosperity of the largest firms implies that old, large firms in a country are not challenged and replaced by small new firms, resulting in a slow creative destruction process and economic growth. Although closely related, our measure of stock market concentration is distinct from the measure of big business stability considered by Fogel et al. (2008). Our measure is intended to capture the functional efficiency of stock markets, whereas big business stability captures the extent of creative destruction (or lack of it) in the economy.

Finally, our study is related to the recent studies documenting evidence that the number of publicly traded firms has significantly decreased over time in the U.S. (Grullon, Larkin, and Michaely, 2015; Doidge, Karolyi, and Stulz, 2016). Furthermore, Grullon et al. (2015) argue that U.S. industries have become more concentrated due to the greater barriers to entry for new firms. Interestingly, global stock markets have also become increasingly concentrated. The degree of stock market concentration by top five firms around the world increased from 0.25 in 1989 to 0.39 in 2008, representing an increase of 56% (see Figure 1). To the extent that the stock market concentration measure captures barriers to entry for new firms, global stock markets appear to have become increasingly difficult for new firms to access.

We proceed as follows. Section 2 describes the data, variable constructions, and summary statistics. Sections 3 and 4 examine the relationships of stock market concentration with capital allocation efficiency and economic growth, respectively. Section 5 explores the impact of stock market concentration on IPOs and innovation, and Section 6 concludes the paper.

2. Data and Summary Characteristics

2.1. Data and variables

Appendix A describes the data sources and variable definitions used in this paper. We start with the list of countries available in the Datastream. In each country at the end of each year, we collect stock market capitalization (the stock price times the number of shares outstanding) data for all firms listed on domestic stock exchanges. We sort the firms by market capitalization to identify the largest five or ten in each country in each year and then compute the stock market concentration variables by dividing the sum of the market capitalization of the largest five or ten firms by the total market capitalization of the country's domestic stock exchanges. We call the stock market concentration variables *Mkt. Con. (top 5 (10) firms)*.

We compute stock market concentration from 1989, the year reliable market capitalization data became available for both developed and developing economies. The computation ends in 2008 because we use five-year preceding values of stock market concentration in the regressions of real per capita GDP growth rates, for which we have data up to 2013. Countries must have at least 40 listed firms in each year throughout the sample period to be included in the final sample. The lack of such a restriction would cause bias, giving small countries with few firms high stock market concentrations. This restriction results in the sample of 47 countries from 1989 to 2008, which is the base dataset for our analyses. We collect data on other financial development measures commonly used in the literature from the World Development Indicators (WDI) of the World Bank. These include the total market capitalization for firms listed on domestic stock exchanges over GDP (*Mkt. Cap./GDP*), the value of shares traded on domestic stock exchanges over market capitalization (*Turnover/Cap.*), and the domestic credit provided to the private sector over GDP (*Credit/GDP*).

We create dependent variables for four different categories: economic growth, capital allocation efficiency, IPOs, and innovation. The data for these variables are obtained from different sources and are available for different sets of countries and periods. The proxy for economic growth is the annual per capita GDP growth rate ($\Delta\, ln(y_{ct}), \%$) in real terms, which is computed as:

$$\Delta\, ln(y_{ct}) = (ln(per\ capita\ GDP_{ct}) - ln(per\ capita\ GDP_{ct-1}))\ \times 100, \qquad (1)$$

where c and t denote country and year, respectively, and *per capita GDP* is in constant 2005 U.S. dollars and collected from the WDI of the World Bank. We obtain the variable for the period 1994–2013.

Following Wurgler (2000), we measure the elasticity of capital allocation as a proxy for the capital allocation efficiency of each country. We obtain the data to compute the variable from the Industrial Statistics Database of the United Nations Industrial Development Organization (UNIDO).[4] The 2013 version of the dataset provides industry-level data related to the amount of investment and value created by 151 manufacturing industries of 135 countries during 1991–2010.

We estimate the elasticity of capital allocation (β_c) using the following regression:

$$ln\ \frac{I_{cit}}{I_{cit-1}} = \alpha_c + \beta_c\ ln\ \frac{V_{cit}}{V_{cit-1}} + \varepsilon_{cit}, \tag{2}$$

where I_{cit} and V_{cit} are the gross fixed capital formation (investment) and value added in industry i of country c in year t, respectively. The coefficient captures the extent to which a country increases investment in its growing industries and decreases investment in its declining industries, and measures the degree of efficiency with which capital is allocated.

We apply the same data screening process as used by Wurgler (2000). First, we require a country to have at least 50 industry-year pairs of fixed capital formation and value added. Second, we exclude data for which the absolute value of fixed capital formation growth or value-added growth is greater than one. Third, we discard industry observations for which the value added is less than 0.1% of the country's total value added in each year. This screening process results in data for 32 countries from the basic dataset of 47 countries.

Following La Porta, Lopez-de-Silanes, Shleifer, and Vishny (1997), we create two variables as proxies for IPO activity: *IPO Amount/Pop.* and *IPO No./Pop.* We calculate *IPO Amount (No.)/Pop.* as the natural logarithm of one plus the IPO proceeds (the number of IPOs) in a year divided by a country's population. These variables capture the amount of financing by new firms and the number of new firms entering the market, scaled by the population.

[4] The official title of the CD-ROM for the data used is "Industrial Statistics Database at the 3- and 4-digit level of ISIC Code (Revision 3)" or "INDSTAT4 2013 ISIC Rev.3." Following Wurgler (2000), we use data at the 3-digit International Standard Industrial Classification (ISIC) code level.

Following Doidge, Karolyi, and Stulz (2013), we collect all equity issuance data flagged as original IPOs from the SDC Platinum Global New Issues Database of Thomson Reuters. We exclude international issuances, including American Depository Receipts (ADRs), and IPO data flagged as private placements. We also delete IPO data related to real estate investment trusts and investment funds (Standard Industrial Classification (SIC) codes: 6722, 6726, 6798, 6799), investment advice companies (6282), and special purpose finance companies (6198). In addition to the restrictions imposed by Doidge et al. (2013), we drop government-related IPOs (SIC codes in the 9000s) because a government agency's decision to pursue an IPO may not be affected by the functional efficiency of the stock market. These restrictions lead to the IPO data for 46 countries in the basic dataset during 1994–2013.

Typically, cross-country studies of innovation use data on patents filed with the U.S. Patent and Trademark Office (USPTO) as a proxy for innovation (Acharya and Subramanian, 2009; Hsu, Tian, and Xu, 2014). We collect the innovation data from the National Bureau of Economic Research (NBER) Patent Database, which provides detailed data related to patents during 1976–2006. Following Hsu et al. (2014), we construct four innovation proxies. We aggregate various patent data at the country level in each year. *Patent/Pop.* is the natural logarithm of one plus the number of patent applications (subsequently approved) in a year divided by a country's population. *Citation/Pop.* is the natural logarithm of one plus the number of citations received by the patents in a year divided by the country's population. As citations can be received beyond 2006, the number of citations is adjusted for the truncation using Hall, Jaffe, and Trajtenberg's (2005) weighting factors, in line with Hsu et al. (2014). *Generality/Pop.* is the natural logarithm of one plus the generality level of the patents in a year divided by the country's population. *Generality* measures the number of technology classes of patents that cite the submitted patent.

Originality/Pop. is the natural logarithm of one plus the originality level of the patent in a year divided by the country's population. *Originality* measures the number of technology classes of patents as cited by the submitted patent. *Patent/Pop.* represents the quantity of patents, and the other three variables measure the quality of the patents. The U.S. is excluded from the final sample. As the data source for innovation proxies is the U.S. Patent and Trademark Office, U.S. firms are more likely to overstate their number of patents when registering with the Office than firms from other countries. The final sample of patent variables consists of 43 countries from the period 1994–2006.

2.2. Summary statistics

Panel A of Table 1 presents the average values for the stock market concentration variables, the financial market development proxies, and the dependent variables of four different categories by country. First, the average value of stock market concentration displays large variations, even among developed countries. The *Mkt. Con. (top 5 (10) firms)* values of Finland, Ireland, and the Netherlands are 0.51 (0.61), 0.58 (0.73), and 0.53 (0.69), respectively, whereas those of Canada, Japan, and the U.S. are only 0.14 (0.22), 0.13 (0.20), and 0.09 (0.14), respectively. Among developing economies, the *Mkt. Con. (top 5 (10) firms)* values of Hungary and Kenya are conspicuously large at 0.76 (0.86) and 0.54 (0.74), respectively, whereas those of Brazil and China are quite low at 0.09 (0.12) and 0.13 (0.18), respectively. Figure 1 presents the time-series trend of stock market concentration. We plot the stock market concentration computed using the top five or ten firms averaged across the countries in each year during 1989–2008. A prominent feature in the figure is that the average stock market concentration continuously increases during the sample period; the stock market concentration by top five (ten) firms, for example, increases from 0.25

(0.35) in 1989 to 0.39 (0.52) in 2008, representing an increase of 56 (49)%.

The sizes of the financial markets of the sample countries also vary significantly. Hong Kong's *Mkt. Cap./GDP* value is the highest at 3.01. In contrast, that of Bangladesh is merely 0.04. Japan's *Credit/GDP* value is 1.96, but those of Argentina and Romania are only 0.17 and 0.18, respectively.

The sample countries' economies present different levels of economic growth, capital allocation efficiency, IPOs, and innovation. For example, China's economy grew almost 9% per capita annually for two decades, whereas Italy's grew a mere 0.41% per capita annually during the same period. In terms of capital allocation efficiency, the elasticities of France and Italy are 1.07 and 1.16, respectively, whereas that of Indonesia is only 0.07. Considering IPO activity, Australia and Hong Kong show the most dynamism when scaled by their populations. In terms of innovation, Japan and Switzerland present the highest number of patent applications and citations scaled by population. By contrast, IPO and innovation activity in countries such as Bangladesh, Pakistan, and Sri Lanka is dormant.

Panel B of Table 1 reports the correlations between the key variables: financial market development measures and the dependent variables in four categories. The variables tagged with "at *t*–5" (*Mkt. Con. (top 5 (10) firms)*, *Mkt. Cap./GDP*, *Turnover/Cap.*, and *Credit/GDP*) are those observed five years earlier than the dependent variables.

A few interesting features are worth noting. *Mkt. Con. (top 5 (10) firms)* are only weakly negatively correlated with *Mkt. Cap./GDP* (–0.04 and –0.07, respectively) and *Turnover/Cap.* (–0.03 and –0.05, respectively). This feature suggests that stock market concentration is a unique stock market characteristic that differs from the stock market's size or liquidity. The most interesting point of the correlation matrix and the main finding of this paper is that stock market concentration is negatively associated with future per capita GDP growth, the elasticity of the capital allocation, and the proxies for IPOs and innovation. Interestingly, the size variables, *Mkt. Cap./GDP* and *Credit/GDP*, are negatively correlated with per capita GDP growth despite being positively correlated with the IPO and innovation proxies. We now investigate these findings in detail using multivariate regression models.

3. Stock Market Concentration and Capital Allocation Efficiency

In this section, we examine the relationship between capital allocation efficiency and stock market concentration. Specifically, we test whether a more concentrated (less diversified) stock market allocates capital less efficiently. This experiment is an important step because we should see a negative correlation between the two, to the extent that the concentration measure is a good proxy for the inverse level of stock market functionality.

We calculate the elasticity of capital allocation from 1991 to 2010 for 32 countries.[5] We average the per capita GDP for the same period, and average the concentration and other financial market characteristics for the period for which the data are available, i.e., 1989–2008.[6] Table 2 reports the results of cross-sectional regressions of the efficiency measure (*Elasticity*) of capital allocation on stock market concentration and the other financial market characteristics, while controlling for per capita GDP. These regressions are analogous to the basic regression model used by Wurgler (2000, p.204, Table 3).

We find that in all regression models, per capita GDP is positively related to the elasticity measure, indicating that the capital allocation efficiency is higher in developed markets. In column

[5] The following 15 countries lack data and are excluded from the regressions: Argentina, Bangladesh, Brazil, Canada, China, Colombia, Egypt, Hong Kong, Kenya, Pakistan, Peru, South Africa, Sri Lanka, Switzerland, and Thailand.
[6] Ideally, we want to determine whether the current level of stock market concentration is correlated with future capital allocation efficiency to establish a causal relationship. However, the data are short in duration, preventing this line of investigation. The period of the concentration data is approximately the same as the period of the elasticity measure, but precedes it by two years.

(1), stock market concentration, *Mkt. Con. (top 5 firms)*, is significantly and negatively related to the elasticity measure. The magnitude of the estimate is also economically significant. A one standard deviation decrease (0.16) in stock market concentration by the top five firms predicts an increase of 0.11 (–0.16 × –0.66) in capital allocation efficiency. This magnitude implies an approximate 18% increase from the average capital allocation efficiency in the sample (0.61). In column (2), we replace *Mkt. Con. (top 5 firms)* with *Mkt. Con. (top 10 firms)*. Although the significance level of the estimate becomes weaker, it is still negative and significant at the 10% level. In columns (3) and (5), we regress the elasticity on the financial market size variables. *Mkt. Cap/GDP* (stock market) and *Credit/GDP* (credit market) are insignificantly related to the capital allocation efficiency. The coefficient estimate on *Turnover/Cap.*, the liquidity measure of the stock market, in column (4) is significantly positive but loses significance when the stock market concentration variables are included in columns (6) and (7). By contrast, stock market concentration is significantly and negatively correlated with the elasticity of capital allocation, even when the other financial market variables are included.

Overall, the results in Table 2 confirm the hypothesis that a more concentrated stock market is associated with less efficient capital allocation. This assures us that we can proceed to use the stock market concentration measure as a proxy for the inverse level of stock market functionality in testing whether the stock market helps economic growth.

4. Stock Market Concentration and Economic Growth

4.1. Regressions of real per capita GDP growth rates on stock market concentration

A common finding in the literature is that finance has a prolonged effect on growth. Comparisons of contemporaneous financial development measures and economic growth are thus not meaningful. We regress the economic growth of country *c* in year *t* on stock market concentration and other financial development measures in year *t*–5 by controlling for macroeconomic variables shown in the literature to affect economic growth. Using lagged values of stock market concentration allows us to investigate the long-term effects of concentration on growth and partially addresses concerns over reverse causality bias. Specifically, we estimate the following regression model:

$$Per\ Capita\ GDP\ Growth_{c,t} = \beta_0 + \beta_1\ Mkt.Con\ (top\ 5\ (10) firms)_{c,t-5} + \beta_2\ Mkt.Cap./GDP_{c,t-5} + \beta_3\ Turnover/Cap._{c,t-5} + \beta_4\ Credit\ /GDP_{c,t-5} + \sum_{i=5}^{n} \beta_i\ Control\ Variable_{c,i,t} + \varepsilon_{c,t} \tag{3}$$

In line with the literature, we add the following control variables to the regressions: *Initial Per Capita GDP*, the natural logarithm of real per capita GDP in 1993; *Initial Education*, the natural logarithm of the average number of years of education received by individuals aged 25 or older in 1990; *Gov. Spending/GDP*, the general government consumption divided by GDP; *Inflation*, inflation rates represented by the GDP deflator; and *Openness/GDP*, the sum of the export and import of goods and services divided by GDP. The data on *Initial Education* are available only once in the United Nations' International Human Development Indicators during the 1990s. We thus use the 1990 data as an alternative measure of the initial education level at the beginning of the regression period. We cluster standard errors in the regressions by both country and year (Petersen, 2009).[7]

Panel A of Table 3 presents the results of the panel regressions of real per capita GDP growth rates on the five-year lagged variables of stock market concentration, other stock market characteristics, and the level of credit provided in a country. In column (1), we include the stock

[7] We use the country-level clustering only when we run country fixed effects regressions.

market concentration variable, *Mkt. Con. (top 5 firms)*, together with the control variables. The signs of the control variables are in line with the findings of previous studies. *Initial Per Capita GDP* and *Gov. Spending/GDP* are negatively associated with future per capita GDP growth, confirming the converging effect of economic growth and the crowding-out effect of government spending. Meanwhile, the initial levels of human capital (*Initial Education*) and trade openness (*Openness/GDP*) of a country are positively related to future growth, implying the positive effect of human capital and the openness of an economy on growth. Interestingly, *Credit/GDP* is negatively related to future economic growth, consistent with the finding of recent studies that a credit amount exceeding a certain level hurts economic growth.[8]

The estimate on stock market concentration is negative and highly significant at the 1% level. The magnitude of the estimate has large economic implications. A one standard deviation decrease (0.16) in the level of stock market concentration by the top five firms predicts an increase of approximately 0.64 percentage point in real per capita GDP growth rates in five years (–0.16 × –3.98). As the average real per capita GDP growth rate in the sample is 2.26%, this increase represents an increase of 28.3% in the growth rate. The magnitude of the impact becomes even more substantial if one believes that it accumulates over time. In column (2), we replace *Mkt. Con. (top 5 firms)* with *Mkt. Con. (top 10 firms)* and find similar results.

In columns (3) and (4), we find that stock market size (*Mkt. Cap./GDP*) and liquidity (*Turnover/Cap.*) are insignificantly associated with economic growth five years later. This finding is consistent with that of Levine and Zervos (1998), who find no robust correlation between stock market size and economic growth. Yet, unlike Levine and Zervos (1998), we find that the liquidity measure (*Turnover/Cap.*) is not significantly correlated with future growth, even though the sign

[8] For example, Arcand et al. (2011) find that the credit provided to the private sector over GDP (%) has a negative impact on economic growth as long as it exceeds 100%.

is positive. In columns (5) and (6), we add the stock market concentration and stock market size and liquidity measures together and find that only the stock market concentration is consistently negative and significant.

Using lagged values of stock market concentration in the regressions partially addresses concerns about reverse causality bias. However, if unknown time-invariant country characteristic variables were correlated with both stock market concentration and future economic growth, the endogeneity concern would remain. We run country fixed effects regressions to mitigate endogeneity concerns. Panel B of Table 3 presents the results. The coefficient estimates on all variables are similar to those obtained from the pooled ordinary least squares (OLS) regressions in Panel A. *Mkt. Con. (top 5 (10) firms)* are significantly and negatively associated with future real per capita GDP growth rates in the regressions, even when we control for time-invariant country fixed effects.

In unreported regressions, we repeat the regressions in Table 3 by using the 10-year lagged values of stock market concentration, by excluding China as it has had exceptionally high growth rates over the years, by winsorizing all variables at the 1% and 99% levels to address the concern of outliers. The stock market concentration variables remain significant at the 1% level.

4.2. Endogeneity issue

In this section, we further examine the causal relationship between stock market concentration and growth. We use the identification strategy developed by Rajan and Zingales (1998). Finance theory suggests that financial markets help a firm overcome the problems of moral hazard and adverse selection, which reduces the firm's cost of financing externally. Based on this theoretical argument, Rajan and Zingales (1998) hypothesize that financial development should disproportionately help firms/industries that are typically dependent on external financing on their growth. In other words, an industry that requires a lot of external financing should grow faster than an industry that needs little external financing, in countries that are financially developed. They argue that such evidence is consistent with the working of theoretical mechanisms through which finance affects growth. Applying their approach to our context, we hypothesize that more (less) concentrated stock markets, i.e., less (more) functionally efficient stock markets, demote (promote) the growth of industries that are more dependent on external financing.

Our identification strategy requires industry-level data. We construct the variables of industry-level growth, external and equity financing dependences as follows. We compute the industry-level growth measure as the growth in each industry's value added ($ln(v_{cit}), \%$) in real terms:

$$\Delta ln(v_{cit}) = (ln(value\ added_{cit}) - ln(value\ added_{cit-1})) \times 100, \quad (4)$$

where c, i, and t denote country, industry, and year, respectively, and $value\ added_{cit}$ is deflated by GDP deflator. We collect the data from UNIDO and compute the variable for the 24 three-digit ISIC industries from 44 countries for the period 1994–2010.

As in the previous studies, we use the U.S. industry data in computing the extent of industry-level external financing needs and apply them to all sample countries. Notice that the measure of external financing using the industry data from each country captures not only the demand for external financing but also supply of capital in that country, whereas our objective is to measure the demand for external financing. Given that the U.S. has the most developed financial markets and its external financing supply is least frictionless, one may better capture the demand for external financing at the industry level using the U.S. data. We measure the degree of external and equity financing dependences of the U.S. firms from Compustat for the period 1994–2010. We compute a firm's external and equity financing dependences as:

$$External\ Financing\ Dependence_{jt} =$$

$$\frac{\sum_{t=1994}^{2010} \text{Capital Expenditures}_{jt} - \sum_{t=1994}^{2010} \text{Cash Flow from Operations}_{jt}}{\sum_{t=1994}^{2010} \text{Capital Expenditures}_{jt}}, \quad (5)$$

$$Equity\ Financing\ Dependence_{jt} = \frac{\sum_{t=1994}^{2010} \text{Net Amount of Equity Issues}_{jt}}{\sum_{t=1994}^{2010} \text{Capital Expenditures}_{jt}}, \quad (6)$$

where *j* and *t* denote firm and year, respectively. Summing the firms' external financing demands for the period 1994–2010 reduces the effect of temporal fluctuations and helps identify firms' intrinsic external financing needs. We measure an industry's external and equity financing dependences by the median of firms' external and equity financing dependences in each industry, where industries are classified according to six-digit North American Industry Classification (NAIC). Using the median alleviates the effect of outliers. We match NAIC codes with ISIC codes to merge industry-level external and equity financing dependences with industry-level growth. The sample includes 24 industries from 44 countries.[9] The sample period starts from 1994 and ends in 2010 until which the data on industry-level growth are available. We exclude the U.S. from the analyses because we employ the U.S. data to measure the external and equity financing dependences and use them as a benchmark. Following Rajan and Zingales (1998) and Wurgler (2000), we drop industry-year observations whose growth rates are greater than 100% or less than –100%.

We run the industry-level growth on the interactions of stock market concentration and the other financial market indicators with the measures of external and equity financing dependences, along with their stand-alone variables. In all regressions, we control for the county-industry fixed effects to absorb unobserved industry characteristics in each country. We do not add time-invariant external and equity financing dependence proxies in the regressions because they are subsumed

[9] Bangladesh and Pakistan lack data and are excluded along with the U.S.

by the country-industry fixed effects.

Table 4 presents the results. In columns (1) and (2), the dependence measure we use is for an industry's external financing needs. In column (1), the interaction term between *Mkt. Con. (top 5 firms)* and the dependence is significantly negative at the 5% level. In column (2), we replace *Mkt. Con. (top 5 firms)* with *Mkt. Con. (top 10 firms)*. Again, the interaction term is significantly negative at the 5% level. These results indicate that stock market concentration disproportionately hampers the growth of industries that are in more needs of external financing. None of the interaction terms on other indicators of financial market development with the dependence are significant. In columns (3) and (4), we replace external financing dependence with equity financing dependence. Here, we expect even stronger results because our measure of financial development is for stock market. We find that the coefficient estimates on the interaction terms of *Mkt. Con. (top 5(10) firms)* with the dependence are significantly negative at the 5% level and the magnitude of the estimates is bigger in absolute term. We also find that the estimate on the interaction terms of *Mkt. Cap./GDP* with the dependence are significantly positive at the 10% level, suggesting that having a large stock market helps promote the growth of industries that are dependent on equity financing for their growth.

Overall, we find the evidence consistent with the theory that an industry in more need of external financing grows more than an industry in less need of external financing in countries with less concentrated stocks markets, suggesting that finance affects growth.

4.3. Robustness tests

In this section, we run a series of robustness tests to further substantiate the relation between stock market concentration and economic growth. First, we examine if stock market concentration is simply a manifestation of the stability measure studied in Fogel et al. (2008) who show that the stability of the largest businesses in a country is negatively associated with the country's economic growth. Second, we examine if stock market concentration is induced by bank concentration. Third, we examine how a country's institutional quality interacts with the stock market concentration in affecting the growth. Finally, we run regressions with economic growth rates averaged for the overlapping five-year period to deal with the concern that the lagged variable regressions do not abstract from the issue of business cycle fluctuations.

4.3.1. Stock market concentration and stability

Supporting the idea of Schumpeter (1912) that creative destruction is critical to economic development, Fogel et al. (2008) find that the stability of the largest businesses in a country (or, conversely, their turnover) is negatively (positively) associated with the country's economic growth. We investigate whether the stock market concentration measure is distinct from the stability measure. We construct the stability measure by counting the number of firms that remain in the top five (ten) list of firms in both the current year and five years ago and divide this number by five (ten). This measure lies between zero and one, with the latter corresponding to the perfect stability of the biggest five (ten) firms.

The stability measure we use differs from that used by Fogel et al. (2008) in several ways. First, they define a large business as the union of firms or a business group. Second, their proxy for business size is the number of employees. Third, they consider that big businesses are stable if they subsequently remain in the top business list or their employment grows no slower than the country's GDP.

Table 5 presents the results of the regression models in which the economic growth rates are regressed on both stock market concentration and stability measures. In these regressions, we simply check whether stock market concentration captures a different aspect of the stock market, i.e., stock market functionality, and not just the stability of the largest businesses in a country. The sample period in Table 5 is 1994–2008 because the computation of the stability measure ends in 2008.[10] In columns (1)–(3), we compute the stock market concentration and stability measures using the top five firms, and in columns (4)–(6), we do so using the top ten firms. In column (1), we find that the stability measure is negatively associated with the real per capita GDP growth rates with a significance level of 10%. In column (2), the stock market concentration is also significantly and negatively related to growth. When we include both stability and stock market concentration in the explanatory variables in column (3), we find that only stock market concentration is significant. The stability measure using the top five firms may not have enough variation. Consistent with this conjecture, when we use the top 10 firms to compute the stability measure, we find that it is significantly and negatively related to the per capita GDP growth rates as shown in columns (4) and (6), confirming the findings of Fogel et al. (2008). More importantly, the stock market concentration variables remain statistically significant when included with the stability measures in columns (3) and (6), suggesting that stock market concentration represents an aspect of a financial market or an economy distinct from the stability of the largest businesses. Both the stability and stock market concentration measures remain economically significant when they are included together in the regressions. For example, in column (6), a decrease of one standard deviation in the stability (0.16) and stock market concentration (0.19) measures predicts annual increases of 0.38% (–0.16 × –2.37) and 0.42% (–0.19 × –2.19), respectively, in the per capita GDP growth rates.

[10] The correlation between *Mkt. Con. (top 5 (10) firms)* at t–5 and *Stability* computed using the top five (ten) firms in the sample is 0.26 (0.25).

4.3.2. Stock market concentration vs. bank concentration

Cetorelli and Gambera (2001) find a negative effect of bank concentration on economic growth. One may argue that stock market concentration is simply induced by bank concentration.[11] Monopolized banking sector maintaining lending relationship with largest firms may provide more credit to the largest firms excessively than to small firms, which may lead to stock market concentration. We formally test the effect of stock market concentration on growth, controlling for bank concentration in this subsection. We define bank concentration as assets of the three largest banks as a share of assets of all commercial banks at the end of a year in each country. We obtain the data from Beck et al. (2000, 2009) and Čihák et al. (2012) for the period 1997 – 2008. As we lag bank concentration by five years, the regressions are run for the period 2002 – 2013.

Table 6 presents the results. In column (1), we include only bank concentration (*Bank Con.*) in the regression together with other control variables. Consistent with the finding by Cetorelli and Gambera (2001), bank concentration by top three banks is significantly and negatively associated with economic growth in five years. In columns (3) and (4), we include *Mkt. Con. (top 5 (10) firms)* without bank concentration. The regressions are run for the shorter period 2002 – 2013 but we find the similar results to those in Table 3 using the whole sample period of 1994 – 2013. In columns (4) and (5), we add *Bank Con.* along with *Mkt. Con. (top 5 (10) firms)* and find that the coefficient estimates on stock market concentration are significant at the 1% level and their magnitude little changes. Meanwhile, the coefficient estimates on bank concentration become no longer significant. We conclude that the effect of stock market concentration on growth is not driven by bank concentration.

[11] The correlations of bank concentration with stock market concentration by top five and ten firms are 0.35 and 0.36, respectively.

4.3.3. Stock market concentration and institutional quality

The negative effect of stock market concentration may not be necessarily uniform for all countries. Assuming the diminishing benefit of marginal funds, the role of finance should be much more critical for developing countries with poor institutions than for developed countries. We hypothesize that the negative impact of stock market concentration on growth is more severe in a corrupt and bureaucratic country. To test the hypothesis, we partition the sample countries in each year into two groups with respect to their corruption and bureaucracy indices by the median. We then run the regressions separately for each group of countries.

Table 7 reports the results. We include the same explanatory variables used in Table 3 in all regressions but do not report their estimates for brevity. In the first regression sets, in which the countries are divided by the corruption index, stock market concentration is negatively associated with future economic growth regardless of the level of corruption. However, the group of countries with a higher level of corruption (lower corruption index) has more negative coefficient estimates for the stock market concentration variables compared with the group with a lower level of corruption (higher corruption index). The coefficient estimates on *Mkt. Con. (top 5 (10) firms)* for the group with a higher level of corruption are more than twice as large in absolute value as those of the lower corruption group (–6.74 (–6.21) versus –2.45 (–2.40)).

The regressions in which the countries are partitioned by the bureaucracy index show a similar pattern. The coefficient estimates on stock market concentration for the group with a higher bureaucracy level (lower bureaucracy index) are more negative than those with a lower bureaucracy level (higher bureaucracy index). Overall, the results in Table 7 confirm the prediction that the negative impact of stock market concentration on economic growth is more severe if a society is more corrupt or more bureaucratic.

One may argue that institutional aspects such as the corruption or bureaucracy level of a country are latent factors that affect both its stock market concentration and economic growth. A plausible explanation is that a corrupt or bureaucratic government favors large corporations in return for bribery and financial benefits that can boost the stock market concentration level and hamper economic growth in the country. However, the stock market concentration variables remain statistically and economically significant when we include corruption or bureaucracy proxies or even country fixed effects in the regressions to control for unknown institutional factors. Furthermore, Table 7 shows that stock market concentration is significantly and negatively associated with future economic growth even in less corrupt or bureaucratic countries.

4.3.4. Generalized method of moments regressions with overlapping five-year averages

Thus far, we regress economic growth in year *t* on stock market concentration in year *t*–5. This allows us to investigate the long-term effects of concentration on real economic sectors and alleviates the concern on reverse causality bias. One concern with this approach is that the lagged variable regressions do not abstract from the issue of business cycle fluctuations. In this subsection, we run regressions with dependent variables averaged for the overlapping five-year period to deal with the concern, following the approach by Bekaert, Harvey, and Lundblad (2005) who study the effect of financial liberalization on growth.

We average Per Capita GDP growth rates and macroeconomic control variables (*Per Capita GDP*, *Gov. Spending/GDP*, *Inflation*, and *Openness/GDP*) from year *t* to year *t*+4 for 5 years on a rolling basis. Stock market concentration and the other financial market characteristics are lagged by 5 years (i.e., year *t–5*) as before to investigate the long-term effect. We run generalized method of moments (GMM) regressions. The GMM estimator is an instrumental variable estimator in nature and thus deals with the endogeneity issue better than the OLS estimator. Standard errors are corrected for heteroskedasticity and autocorrelation to account for the overlapping nature of the data.

Table 8 presents the results. In columns (1) and (2), we regress per capita GDP growth rates averaged for 5 years on stock market concentration. The coefficient estimates on stock market concentration are significantly negative at the 1% level. In columns (3) and (4), we regress the growth rates on stock market size and liquidity instead of stock market concentration. None of the size and liquidity measures are significant. In columns (5) and (6), we add stock market concentration along with stock market size and liquidity in the regressions. Again, the coefficient estimates on stock market concentration are significantly negative at the 1% level, controlling for stock market size and liquidity.

5. Stock Market Concentration, IPOs, and Innovation

In this section, we attempt to identify the channel through which a concentrated stock market suppresses growth. We hypothesize that a concentrated stock market structure makes it difficult for new, innovative firms to access the stock market and obtain the financing they need. Therefore, countries with high stock market concentrations experience fewer IPOs from new firms. Furthermore, we hypothesize that when young, innovative firms find it difficult to access necessary financing in a concentrated stock market, less innovation activity is expected under such a structure. We test these two hypotheses as follows.

5.1. Stock market concentration and IPOs

To test the hypothesis that a concentrated stock market is associated with fewer IPOs, we run panel regressions of the two IPO proxies, *IPO Amount/Pop.* and *IPO No./Pop.*, on stock market concentration. To normalize the dependent variables, we take the logarithm of (1 + the IPO proxies). We add 1 to the IPO proxy before the log transformation because the IPO proxy variables happen to be zero in some country-year observations. We do the same for innovation proxies in a later section. As in the regressions of real per capita GDP growth rates, the stock market concentration variables are lagged by five years to capture the long-term effects on IPO activity and to avoid the reverse causality bias. The law and finance literature emphasizes the importance of institutions enforcing minority shareholders' rights on financing activities including IPOs. We include country fixed effects in the regressions to control for any time-invariant institutional factors. We conduct the analysis for 46 countries during 1994–2013.[12]

Table 9 presents the results. In columns (1) and (2), we regress *IPO Amount/Pop.* on *Mkt. Con. (top 5 (10) firms)*, the two financial market size measures (*Mkt. Cap./GDP* and *Credit/GDP*), and the liquidity proxy (*Turnover/Cap.*) while controlling for macroeconomic variables and country fixed effects. The signs of the macroeconomic variables are generally consistent with the predictions: IPO activity is more prominent in high-income countries and open economies and negatively associated with government size and inflation. Interestingly, the financial market size (*Mkt. Cap./GDP* and *Credit/GDP*) and liquidity (*Turnover/Cap.*) measures are significantly and negatively related to *IPO Amount/Pop.* five years later. Controlling for cross-country variation due to time-invariant country characteristics, the growth in IPO activity appears to be lower in countries with bigger financial markets.[13] More importantly, stock market concentration is

[12] Peru is excluded from analysis as it is missing from the SDC Platinum Global New Issues Database.
[13] When we exclude country fixed effects from the regression, the financial market size variables lose their significance.

significantly and negatively associated with *IPO Amount/Pop.* at the 5% level in columns (1) and (2). The effect of concentration on IPO activity is economically nontrivial. A decrease of one standard deviation (0.16) in the level of stock market concentration by the top five firms leads to an increase in the dependent variable of approximately 0.17 (–0.16 × –1.09) in column (1). As the average of *IPO Amount/Pop.* in our sample is 1.99, this change represents a 9.3% increase from the average.

In columns (3) and (4), we replace the dependent variable of *IPO Amount/Pop.* with *IPO No./Pop.* and repeat the regressions. The results are largely similar to those using the IPO amount. Stock market concentration is negatively associated with the number of IPOs scaled by the country's population, although the significance level in column (3) appears marginal.

While not reported, we regress *IPO Amount/Pop.* and *IPO No./Pop.* on the 10-year lagged values of stock market concentration controlling time-invariant country fixed effects. The results are even stronger than those in Table 9; the coefficient estimates on the IPO proxies are significant at the 1% or 5% level and their magnitude in absolute term is approximately twice as large as that in Table 9.

5.2. Stock market concentration and innovation

When young, innovative firms find it difficult to access necessary financing in a concentrated stock market, less innovation activity is likely. To test this hypothesis, we run panel regressions of the innovation proxies on stock market concentration with a five-year lag for 43 countries in the basic dataset during 1994–2006.[14] As in the regressions of IPO activity, we include country fixed

[14] Bangladesh, Pakistan, and Romania are excluded from analysis because they are missing from the patent files of the NBER. Additionally, the U.S. is excluded in consideration of home bias. The regressions end in 2006 because the data available in the database end in that year.

effects in the regressions to control for any institutional effects that may affect a country's innovation activity. We use four innovation proxies: one quantity (*Patent/Pop*.) and three quality measures (*Citation/Pop.*, *Generality/Pop.*, and *Originality/Pop*.). As in the previous section focusing on IPO proxies, to have dependent variables that conform to the normal distribution, we take a logarithm of (1 + the innovation proxies).

Table 10 presents the results. In columns (1) and (2), we regress the proxy for innovation quantity (*Patent/Pop.*) on stock market concentration (*Mkt. Con. (top 5 (10) firms)*), the two financial market size measures (*Mkt. Cap./GDP* and *Credit/GDP*), and the liquidity proxy (*Turnover/Cap.*) while controlling for macroeconomic variables and country fixed effects. We find that innovation activity is less vibrant in high-income countries. Although this seems counterintuitive, it may suggest that when we control for country fixed effects, which removes any cross-country variations in time-invariant country characteristics, the growth in innovation activity is lower in high-income countries. In fact, when we exclude country fixed effects, per capita GDP turns significantly positive. We also find that a high inflation environment discourages innovation activity. As in the regressions of IPO activity in the previous section, the two financial market size measures (*Mkt. Cap./GDP* and *Credit/GDP*) and the liquidity proxy (*Turnover/Cap.*) are significantly negatively associated with innovation activity five years later. The finding that *Mkt. Cap./GDP* is negatively associated with innovation activity seems inconsistent with the findings of Hsu et al. (2014), who show that a larger stock market promotes innovation in industries that are more dependent on external finance. However, their main finding is a positive correlation between contemporaneous stock market capitalization and innovation activity.[15] Here, we examine the long-term effects (at least five years) of stock market concentration and other financial market

[15] We also find that *Mkt. Cap./GDP* is significantly and positively associated with contemporaneous innovation proxies.

characteristics including size and liquidity on innovation.

The stock market concentration measures are significantly and negatively associated with the number of patents scaled by a country's population. The effect of concentration on the innovation activity is economically large. For example, a decrease of one standard deviation (0.16) in the level of stock market concentration by the top five firms is associated with an increase of approximately 0.38 (–0.16 × –2.39) in column (1), which represents 19.2% increase from the average of 1.98 patents per the population of a million.

In columns (3)–(8), we replace the quantity measure of innovation with the three quality measures of innovation (*Citation/Pop*, *Generality/Pop.*, and *Originality/Pop.*) as dependent variables and repeat the regressions in the same manner as in columns (1) and (2). The results consistently show that stock market concentration is significantly and negatively associated with all of the quality measures of innovation. The magnitude of the effect of concentration on the quality innovation measures is even more considerable. A decrease of one standard deviation (0.16) in the level of stock market concentration by the top five firms is associated with increases of 26.0%, 48.0%, and 19.4% in the averages of *Citation/Pop*, *Generality/Pop.*, and *Originality/Pop*, respectively.

Following Hsu et al. (2014), we re-run the regressions of the innovation proxies for manufacturing industries only, as it is more critical for manufacturing industries than other sectors to innovate and gain patents.[16] The unreported results are qualitatively similar to those in Table 10. We also regress the innovation proxies on the 10-year lagged values of stock market concentration controlling time-invariant country fixed effects and find the similar results.

[16] We use a data file matching 3-digit class codes of the USPTO with 2-digit SIC codes provided by Hsu et al. (2014) to identify manufacturing industries.

6. Conclusion

The *primary* function of any financial system is to facilitate the efficient allocation of capital and economic resources (Merton and Bodie, 1995). A developed financial market should allocate more capital to more productive, innovative firms. In investigating the relationship between financial market development and economic growth, finance researchers have commonly used financial market size as a proxy for the degree of financial market development. The implicit assumption is that financial market size is commensurate with financial market development. However, a larger financial market is not necessarily functionally more efficient. In this study, we propose a new measure of stock market functionality—stock market concentration—and explore the relationship between stock market functionality and economic growth. We also investigate the channel through which stock market concentration affects growth. We provide evidence that stock market concentration is negatively associated with capital allocation efficiency, IPOs, innovation, and finally economic growth, and that the negative effect of stock market concentration on growth is economically large.

Appendix A. Data Sources and Variable Definitions

"Datastream" = Thomson Reuters' Datastream; "IMD WCC" = International Institute for Management Development, World Competitiveness Center; "NBER" = National Bureau of Economic Research's Patent Database; "SDC Platinum" = Thomson Reuters' SDC Platinum Global New Issues; "UNIDO" = United Nations Industrial Development Organization, Industrial Statistics; "UN IHDI" = United Nations International Human Development Indicators; and "WB WDI" = World Bank World Development Indicators.

Variables	Description	Data source	Sample period
(1) Financial Development Measures			
Mkt. Con. (top 5 (10) firms)	Stock market capitalization of the largest five (ten) firms divided by the total stock market capitalization of domestic stock exchanges at the end of a year.	Datastream	1989–2008
Mkt. Cap./GDP	Market capitalization of domestically incorporated companies listed on domestic stock exchanges at the end of a year divided by GDP during the year.	WB WDI	1989–2008
Turnover/Cap.	Total value of shares traded on domestic stock exchanges during a year divided by stock market capitalization at the end of the year.	WB WDI	1989–2008
Credit/GDP	Total domestic credit provided to the private sector divided by GDP during a year.	WB WDI	1989–2008
Bank Con.	Assets of the three largest banks as a share of assets of all commercial banks at the end of a year in a country.	Beck et al. (2000,2009) Čihák et al. (2012)	1997–2008
(2) Dependent Variables			
Per Capita GDP Growth ($\Delta\, ln(y_{ct})$)	Growth in real per capita GDP (%), calculated as: $\Delta\, ln(y_{ct}) = ln(per\ capita\ GDP_{ct}) - ln(per\ capita\ GDP_{ct-1})\ \times 100$ where c and t denote country and year, respectively, *per capita GDP* is in constant 2005 U.S. dollars.	WB WDI	1994–2013
Elasticity of Capital Allocation (β_c)	Coefficient estimated from regressions of the growth of I_{cit} on the growth of V_{cit}. It is estimated from the following regression: $ln\ \frac{I_{cit}}{I_{cit-1}} = \alpha_c + \beta_c\ ln\ \frac{V_{cit}}{V_{cit-1}} + \varepsilon_{cit}$ where I_{cit} and V_{cit} are the investment and value added in each country-industry-year, respectively. The industry data are at the 3–digit level.	UNIDO	1991–2010
Industry Growth ($\Delta ln(v_{cit})$)	Growth in each industry's value added (%), calculated as: $(\Delta ln(v_{cit}))$ =(ln($value\ added_{ict}$) $-$ ln($value\ added_{ict-1}$)) ×100	UNIDO	1994–2010

	where value added is deflated by GDP deflator. The industry data are at the 3–digit level.		
IPO Amount/Pop.	Logarithm of (1 + amount of IPOs (in million U.S. dollars) in domestic exchanges during a year divided by the country's population (in millions)).	SDC Platinum, WB WDI	1994–2013
IPO No./Pop.	Logarithm of (1 + number of IPOs in domestic exchanges during a year divided by the country's population (in millions)).	SDC Platinum, WB WDI	1994–2013
Patent/Pop.	Logarithm of (1 + number of patent applications to USPTO in a year divided by the country's population (in millions)).	NBER	1994–2006
Citation/Pop.	Logarithm of (1 + number of citations received by patents in a year divided by the country's population (in millions)).	NBER	1994–2006
Generality/Pop.	Logarithm of (1 + generality level of the patents in a year divided by the country's population (in millions)). *Generality* measures the number of technology classes of patents that cite the given patent.	NBER	1994–2006
Originality/Pop.	Logarithm of (1 + originality level of patents in a year divided by the country's population (in millions)). *Originality* measures the number of technology classes of patents cited by the given patent.	NBER	1994–2006
(3) Control/Other Variables			
(Initial) Per Capita GDP	Logarithm of real per capita GDP (in 1993).	WB WDI	1994–2013
Initial Education	Logarithm of the average number of years of education received by people aged 25 or older in 1990.	UN IHDI	1990
Gov. Spending/GDP	General government consumption expenditure divided by GDP during a year.	WB WDI	1994–2013
Inflation	Inflation rates, GDP deflator during a year.	WB WDI	1994–2013
Openness/GDP	Sum of exports and imports of goods and services divided by GDP during a year.	WB WDI	1994–2013
Bureaucracy	Index that ranges from 0 to 10 based on an executive survey on the bureaucracy level of a country in each year, with 10 being the lowest level of bureaucracy.	IMD WCC	1995–2013

Corruption	Index that ranges from 0 to 10 based on an executive survey on the bribery and corruption level of a country in each year, with 10 being the lowest level of bribery and corruption.	IMD WCC	1995–2013
Stability	Index from 0 to 1 generated by counting the number of firms that stay in the top 5 (10) in both the current year and 5 years ago and dividing it by 5 (10).	Datastream	1994–2008
External Financing Dependence	Median of external financing dependences of U.S. firms in each industry. A firm's external financing dependence is calculated as: $\frac{\sum_{t=1994}^{2010} \text{Capital Expenditures}_{jt} - \sum_{t=1994}^{2010} \text{Cash Flow from Operations}_{jt}}{\sum_{t=1994}^{2010} \text{Capital Expenditures}_{jt}}$ where j and t denote firm and year and each item is summed up for the period of 1994–2010.	Compustat	1994–2010
Equity Financing Dependence	Median of equity financing dependences of U.S. firms in each industry. A firm's equity financing dependence is calculated as: $\frac{\sum_{t=1994}^{2010} \text{Net Amount of Equity Issues}_{jt}}{\sum_{t=1994}^{2010} \text{Capital Expenditures}_{jt}}$ where j and t denote firm and year and each item is summed up for the period of 1994–2010.	Compustat	1994–2010

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Figure 1
Average Stock Market Concentration by Year
Figure 1 plots the average stock market concentration computed using the top five (ten) firms in each year during 1989–2008.

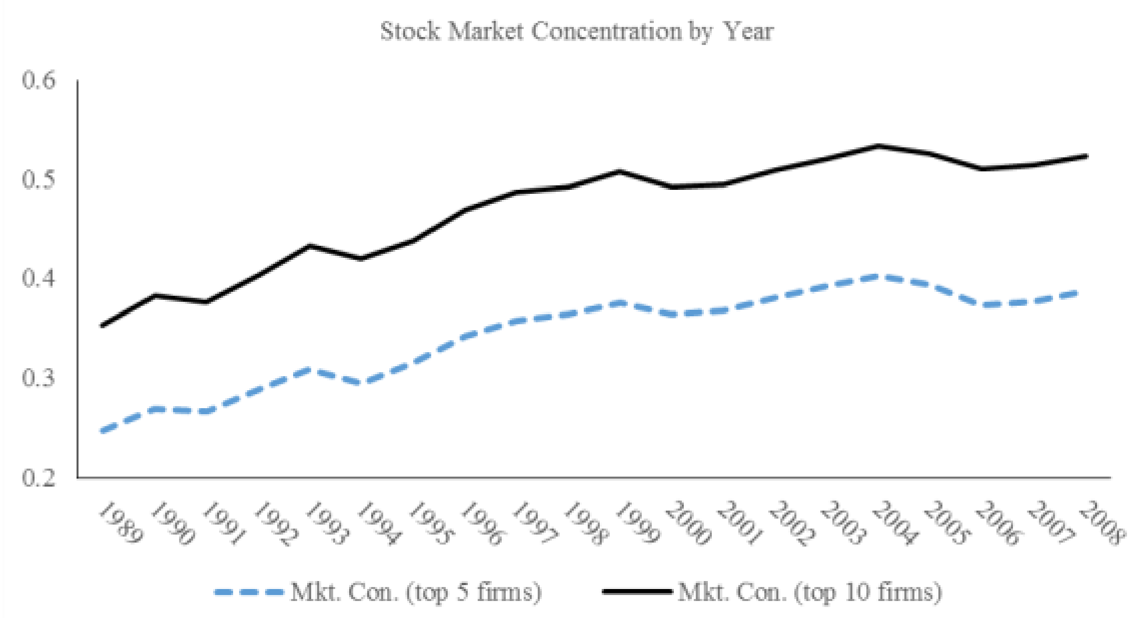

Table 1
Summary Statistics and Correlations of the Main Variables

Panel A: Average Value by Country
Panel A illustrates the average value (except for *Elasticity*) of the main variables used to analyze the sample of 47 countries. All of the variables are as defined in Appendix A. "IPO amount/Pop.," "Patent/Pop.," and "Citation/Pop." are the figures before the logarithm is taken. "Mkt. Con. (Top 5 (10) firms)," "Mkt. Cap./GDP," "Turnover/Cap.," and "Credit/GDP" are the averages during 1989–2008. "Per Capita GDP growth" and "IPO Amount/Pop." are the averages during 1994–2013. "Patent/Pop." and "Citation/Pop." are the averages during 1994–2006. The elasticity (of capital allocation) is estimated for 1991–2010.

Country	Mkt. Con. (top 5 firms)	Mkt. Con. (top 10 firms)	Mkt. Cap. /GDP	Turnover /Cap.	Credit /GDP	Per Capita GDP Growth	Elasticity	IPO Amount /Pop.	IPO No. /Pop.	Patent /Pop.	Citation /Pop.
Argentina	0.33	0.42	0.29	0.21	0.17	2.49	.	1.35	0.03	0.20	0.57
Australia	0.27	0.39	0.86	0.59	0.84	2.00	0.80	103.34	4.10	26.13	215.82
Austria	0.40	0.58	0.22	0.45	1.03	1.48	0.69	28.37	0.29	27.83	119.92
Bangladesh	0.34	0.48	0.04	0.51	0.29	4.23	.	0.05	0.01	.	.
Belgium	0.40	0.57	0.56	0.29	0.72	1.32	0.49	28.79	0.44	34.42	224.88
Brazil	0.09	0.12	0.42	0.51	0.36	2.33	.	5.92	0.02	0.21	0.36
Canada	0.14	0.22	0.85	0.59	1.23	1.64	.	62.09	3.11	60.39	736.90
China	0.13	0.18	0.42	1.26	1.06	8.56	.	13.64	0.11	0.11	0.42
Colombia	0.39	0.58	0.21	0.09	0.31	2.17	.	4.78	0.01	0.05	0.15
Denmark	0.36	0.48	0.49	0.64	0.96	1.11	0.48	22.77	0.69	55.62	334.23
Egypt	0.38	0.49	0.47	0.30	0.49	2.45	.	1.73	0.02	0.01	0.00
Finland	0.51	0.61	0.87	0.76	0.70	2.11	0.76	36.84	0.90	125.30	1,344.53
France	0.23	0.37	0.60	0.75	0.90	1.14	1.07	43.09	0.65	45.11	304.76
Germany	0.28	0.42	0.38	1.23	1.06	1.36	0.98	28.55	0.37	91.05	595.82
Greece	0.34	0.49	0.43	0.43	0.51	0.72	0.38	30.57	0.81	0.41	1.61
Hong Kong	0.40	0.53	3.01	0.53	1.49	2.54	.	124.83	4.92	19.44	187.07
Hungary	0.76	0.86	0.21	0.64	0.37	2.32	0.11	2.24	0.06	1.68	4.98
India	0.25	0.36	0.43	1.05	0.30	5.18	0.68	0.76	0.14	0.12	0.32
Indonesia	0.39	0.55	0.26	0.48	0.36	2.39	0.07	1.74	0.06	0.01	0.11
Ireland	0.58	0.73	0.57	0.52	1.24	1.13	0.39	19.68	0.20	17.44	86.71
Israel	0.40	0.50	0.66	0.51	0.84	1.72	0.87	9.44	0.21	36.49	126.21
Italy	0.36	0.49	0.33	0.82	0.71	0.41	1.16	39.22	0.25	17.83	103.67
Japan	0.13	0.20	0.80	0.71	1.96	0.76	0.45	55.20	0.90	222.54	2,184.21

Kenya	0.54	0.74	0.23	0.06	0.28	1.35	.	1.01	0.01	0.01	0.00
Korea	0.31	0.40	0.47	2.00	0.72	4.08	0.69	51.50	1.23	63.37	540.84
Malaysia	0.24	0.34	1.63	0.42	1.17	3.04	0.58	21.94	1.56	0.47	2.71
Mexico	0.34	0.45	0.26	0.33	0.22	1.49	0.38	3.02	0.02	0.21	1.40
Morocco	0.51	0.71	0.38	0.17	0.44	3.20	0.27	3.01	0.06	0.01	0.01
Netherlands	0.53	0.69	0.88	1.03	1.23	1.47	0.33	34.85	0.24	68.78	452.48
New Zealand	0.42	0.54	0.39	0.39	1.03	1.68	0.65	28.96	0.79	15.70	104.33
Norway	0.48	0.59	0.39	0.85	0.67	1.52	0.64	91.09	1.76	32.67	232.33
Pakistan	0.42	0.54	0.21	2.21	0.26	2.07	.	0.22	0.01	.	.
Peru	0.34	0.47	0.39	0.11	0.22	4.76	.	.	.	0.01	0.00
Philippines	0.34	0.50	0.54	0.25	0.36	2.52	0.38	0.99	0.04	0.01	0.03
Poland	0.47	0.62	0.21	0.42	0.29	3.56	0.76	17.79	0.49	0.08	0.18
Portugal	0.55	0.77	0.30	0.53	1.01	1.01	0.92	26.05	0.17	0.43	1.53
Romania	0.49	0.56	0.12	0.20	0.18	4.22	0.66	2.67	0.03	.	.
Singapore	0.40	0.57	1.59	0.56	0.94	3.29	0.32	77.57	6.21	43.76	546.30
South Africa	0.16	0.25	1.63	0.28	1.23	1.33	.	1.47	0.03	0.95	4.43
Spain	0.33	0.46	0.58	1.22	1.06	1.29	0.78	20.44	0.12	2.89	14.44
Sri Lanka	0.30	0.43	0.15	0.14	0.25	4.60	.	0.79	0.08	0.00	0.00
Sweden	0.31	0.43	0.87	0.94	1.03	1.87	0.46	57.19	0.87	125.77	1,194.36
Switzerland	0.46	0.58	1.73	0.87	1.62	1.04	.	92.63	0.51	164.70	1,038.76
Thailand	0.30	0.43	0.54	0.78	1.13	2.85	.	7.96	0.30	0.08	0.54
Turkey	0.35	0.52	0.22	1.35	0.20	2.83	0.64	5.19	0.09	0.04	0.56
United Kingdom	0.22	0.32	1.21	0.89	1.33	1.62	0.71	68.74	1.33	31.10	263.67
United States	0.09	0.14	1.08	1.37	1.60	1.52	0.88	96.43	0.89	.	.
Total	0.35	0.48	0.66	0.68	0.81	2.26	0.61	32.45	0.84	34.78	290

Panel B: Correlations

Panel B presents Pearson's correlations among the main variables. The sample includes country-year observations for 47 countries during 1994–2013 except for the elasticity of capital allocation, which is estimated for 1991–2010, and "Patent/Pop." and "Citation/Pop.," whose data are collected for 1994–2006. The asterisks denote statistical significance at or below the 5% level.

Variables	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]
[1] Mkt. Con. (top 5 firms) at *t*–5	1.00										
[2] Mkt. Con. (top 10 firms) at *t*–5	0.97*	1.00									
[3] Mkt. Cap./GDP at *t*–5	–0.04	–0.07*	1.00								
[4] Turnover/Cap. at *t*–5	–0.03	–0.05	0.04	1.00							
[5] Credit/GDP at *t*–5	–0.20*	–0.21*	0.52*	0.25*	1.00						
[6] Per Capita GDP Growth	–0.14*	–0.16*	–0.11*	–0.04	–0.23*	1.00					
[7] Elasticity of Capital Allocation	–0.29*	–0.30*	–0.03	0.21*	0.18*	–0.07	1.00				
[8] IPO Amount/Pop.	–0.24*	–0.25*	0.25*	0.03	0.33*	0.21*	0.22*	1.00			
[9] IPO No./Pop.	–0.18*	–0.18*	0.36*	–0.05	0.26*	0.15*	0.03	0.74*	1.00		
[10] Patent/Pop.	–0.13*	–0.18*	0.16*	0.01	0.45*	–0.11*	0.19*	0.47*	0.43*	1.00	
[11] Citation/Pop.	–0.20*	–0.24*	0.11*	–0.04	0.40*	–0.09*	0.19*	0.47*	0.45*	0.97*	1.00

Table 2

Cross-sectional Regressions of the Elasticity of Capital Allocation on Stock Market Concentration

Table 2 presents the results of cross-sectional regressions in which the elasticity of the capital allocation of each country (β_c) are regressed on stock market concentration. The elasticity of capital allocation is estimated from the following regression during 1991–2010:

$$ln\ \frac{I_{cit}}{I_{cit-1}} = \alpha_c + \beta_c\ ln\ \frac{V_{cit}}{V_{cit-1}} + \varepsilon_{cit}.$$

where I_{cit} and V_{cit} are the investment and value added in each country-industry-year observation, respectively. The sample includes 32 countries. Per capita GDP is the average for 1991–2010, and the financial development measures, including *Mkt. Con. (top 5 (10) firms)*, are the averages for 1989–2008. All variables are as defined in Appendix A. The *t*-statistics in parentheses are based on robust standard errors. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Mkt. Con. (top 5 firms)	–0.66**					–0.87*	
	(–2.11)					(–2.01)	
Mkt. Con. (top 10 firms)		–0.56*					–0.73
		(–1.83)					(–1.66)
Mkt. Cap./GDP			–0.08			–0.16	–0.16
			(–0.76)			(–1.24)	(–1.28)
Turnover/Cap.				0.20**		0.11	0.11
				(2.44)		(1.22)	(1.12)
Credit/GDP					–0.01	–0.12	–0.10
					(–0.07)	(–0.57)	(–0.47)
Per Capita GDP	0.07**	0.07**	0.08**	0.06*	0.08	0.10*	0.09*
	(2.15)	(2.14)	(2.09)	(1.75)	(1.63)	(1.90)	(1.81)
Constant	0.19	0.25	–0.13	–0.08	–0.12	0.09	0.18
	(0.56)	(0.72)	(–0.35)	(–0.27)	(–0.29)	(0.24)	(0.49)
No. of Observations	32	32	32	32	32	32	32
R^2	0.236	0.229	0.134	0.204	0.121	0.348	0.334

Table 3
Panel Regressions of Per Capita GDP Growth on Stock Market Concentration at *t*–5
Table 3 presents the results of the panel regressions in which per capita GDP growth rates are regressed on stock market concentration at *t*–5. This sample includes country-year observations for 47 countries during 1994–2013. All variables are as defined in Appendix A. The *t*-statistics in parentheses are based on standard errors clustered by both year and country (panel A) and by country (panel B). ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Panel A. Pooled OLS Regressions of Per Capita GDP Growth on Stock Market Concentration at *t*–5

Variables	(1)	(2)	(3)	(4)	(5)	(6)
Mkt. Con. (top 5 firms) at *t*–5	–3.98***				–4.27***	
	(–3.44)				(–3.42)	
Mkt. Con. (top 10 firms) at *t*–5		–3.88***				–4.23***
		(–3.57)				(–3.61)
Mkt. Cap./GDP at *t*–5			–0.50		–0.63	–0.72*
			(–1.41)		(–1.62)	(–1.78)
Turnover/Cap. at *t*–5				0.16	0.21	0.18
				(0.77)	(1.09)	(0.98)
Credit/GDP at *t*–5	–1.39***	–1.45***	–0.66	–0.99**	–1.14***	–1.16***
	(–3.24)	(–3.62)	(–1.14)	(–2.06)	(–2.98)	(–3.21)
Initial Per Capita GDP	–0.54	–0.53*	–0.54	–0.55	–0.54*	–0.52*
	(–1.64)	(–1.69)	(–1.49)	(–1.49)	(–1.69)	(–1.74)
Initial Education	1.07**	0.91*	1.11**	1.17**	1.15**	0.97*
	(2.23)	(1.95)	(2.43)	(2.42)	(2.23)	(1.93)
Gov. Spending/GDP	–7.51*	–6.70*	–11.57***	–10.77***	–8.40**	–7.67*
	(–1.93)	(–1.68)	(–2.89)	(–2.59)	(–2.24)	(–1.96)
Inflation	–0.03	–0.03	–0.03	–0.03	–0.03	–0.03
	(–1.34)	(–1.33)	(–1.27)	(–1.30)	(–1.37)	(–1.35)
Openness/GDP	0.57***	0.64***	0.43***	0.23	0.88***	1.00***
	(3.69)	(3.84)	(3.14)	(1.40)	(4.41)	(4.37)
Constant	8.53***	9.01***	7.48***	7.41***	8.40***	8.95***
	(4.31)	(4.55)	(3.67)	(3.68)	(4.47)	(4.78)
No. of Observations	834	834	834	832	832	832
*R*2	0.170	0.178	0.142	0.137	0.181	0.192

Panel B. Country Fixed Effects Regressions of Per Capita GDP Growth on Stock Market Concentration at *t*–5

Variables	(1)	(2)	(3)	(4)	(5)	(6)
Mkt. Con. (top 5 firms) at *t*–5	–4.19***				–3.66**	
	(–3.00)				(–2.41)	
Mkt. Con. (top 10 firms) at *t*–5		–4.11***				–3.79***
		(–3.26)				(–2.77)
Mkt. Cap./GDP at *t*–5			–1.17**		–1.05**	–1.06**
			(–2.69)		(–2.19)	(–2.21)
Turnover/Cap. at *t*–5				–0.05	0.01	0.02
				(–0.24)	(0.04)	(0.12)
Credit/GDP at *t*–5	–1.85***	–1.82***	–1.81***	–1.88***	–1.77***	–1.74***
	(–3.48)	(–3.48)	(–3.39)	(–3.33)	(–3.21)	(–3.22)
Gov. Spending/GDP	–60.07***	–58.47***	–62.60***	–63.71***	–59.16***	–57.53***
	(–3.52)	(–3.46)	(–3.59)	(–3.64)	(–3.39)	(–3.33)
Inflation	–0.05	–0.05	–0.05	–0.05	–0.05	–0.05
	(–1.39)	(–1.40)	(–1.34)	(–1.34)	(–1.37)	(–1.39)
Openness/GDP	1.72**	1.71**	2.39**	1.19*	2.68**	2.70**
	(2.45)	(2.50)	(2.35)	(1.74)	(2.57)	(2.60)
Constant	11.78***	11.92***	10.84***	11.01***	11.49***	11.66***
	(5.52)	(5.71)	(5.17)	(5.26)	(5.19)	(5.39)
Country Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
No. of Observations	834	834	834	832	832	832
$R2$	0.325	0.326	0.327	0.311	0.336	0.338

Table 4
Panel Regressions of Industry Growth on Stock Market Concentration at *t*–5

Table 4 presents the results of the panel regressions in which industry growth rates are regressed on stock market concentration at *t*–5 interacted with external or equity financing dependence. The sample includes country-industry-year observations for 24 industries from 44 countries during 1994–2010. All variables are as defined in Appendix A. The *t*-statistics in parentheses are based on standard errors clustered by country. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Variables	Dependence			
	External Financing		Equity Financing	
	(1)	(2)	(3)	(4)
Mkt. Con. (top 5 firms) at *t*–5 × Dependence	–3.40**		–4.29**	
	(–2.10)		(–2.33)	
Mkt. Con. (top 10 firms) at *t*–5 × Dependence		–2.73**		–3.62**
		(–2.03)		(–2.31)
Mkt. Cap./GDP at *t*–5 × Dependence	0.55	0.53	0.82*	0.79*
	(1.38)	(1.36)	(1.74)	(1.71)
Turnover/Cap. at *t*–5 × Dependence	–0.13	–0.14	–0.04	–0.05
	(–0.66)	(–0.71)	(–0.20)	(–0.23)
Credit/GDP at *t*–5 × Dependence	1.00	0.99	1.33	1.32
	(1.22)	(1.17)	(1.34)	(1.32)
Mkt. Con. (top 5 firms) at *t*–5	–7.84		–6.91	
	(–0.95)		(–0.83)	
Mkt. Con. (top 10 firms) at *t*–5		–6.66		–5.85
		(–0.82)		(–0.72)
Mkt. Cap./GDP at *t*–5	0.80	0.61	0.61	0.43
	(0.29)	(0.22)	(0.22)	(0.16)
Turnover/Cap. at *t*–5	1.24	1.21	1.22	1.20
	(1.11)	(1.09)	(1.08)	(1.06)
Credit/GDP at *t*–5	1.00	1.01	0.71	0.73
	(0.28)	(0.28)	(0.20)	(0.20)
Per Capital GDP	22.40***	22.42***	22.40***	22.42***
	(3.18)	(3.10)	(3.18)	(3.10)
Gov. Spending/GDP	–213.88**	–212.16**	–214.03**	–212.27**
	(–2.67)	(–2.67)	(–2.67)	(–2.67)

Inflation	–0.00	–0.00	–0.00	–0.00
	(–0.01)	(–0.00)	(–0.01)	(–0.00)
Openness/GDP	–1.85	–1.92	–1.83	–1.91
	(–0.27)	(–0.28)	(–0.27)	(–0.28)
Constant	–172.00***	–171.84**	–171.99***	–171.84**
	(–2.71)	(–2.65)	(–2.71)	(–2.65)
Country × Industry Fixed Effects	Yes	Yes	Yes	Yes
No. of Observations	10,256	10,256	10,256	10,256
R^2	0.143	0.143	0.144	0.143

Table 5

Panel Regressions of Per Capita GDP Growth on Stock Market Concentration at *t*–5 and Stability Measure

Table 5 presents the results of panel regressions in which per capita GDP growth rates are regressed on stock market concentration at *t*–5, a stability measure. Columns (1)–(3) and (4)–(6) use the stability and stock market concentration measures of the top 5 and 10 firms, respectively. The sample includes country-year observations for 47 countries during 1994–2008. All variables are as defined in Appendix A. The *t*-statistics in parentheses are based on standard errors clustered by both year and country. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Variables	Concentration and Stability Measures Computed Using Top 5 Firms			Concentration and Stability Measures Computed Using Top 10 Firms		
	(1)	(2)	(3)	(4)	(5)	(6)
Stability	–1.26*		–0.90	–2.96**		–2.37**
	(–1.87)		(–1.52)	(–2.31)		(–2.08)
Mkt. Con. at *t*–5		–2.39**	–2.06**		–2.79***	–2.19***
		(–2.28)	(–2.13)		(–2.76)	(–2.63)
Mkt. Cap./GDP at *t*–5	–0.72	–0.84	–0.76	–0.70	–0.90	–0.78
	(–1.22)	(–1.34)	(–1.20)	(–1.16)	(–1.39)	(–1.18)
Turnover/Cap. at *t*–5	0.51**	0.54**	0.54**	0.46*	0.53**	0.49**
	(2.10)	(2.34)	(2.32)	(1.91)	(2.37)	(2.16)
Credit/GDP at *t*–5	–0.51	–0.73	–0.74	–0.46	–0.80*	–0.75*
	(–0.93)	(–1.49)	(–1.58)	(–0.89)	(–1.69)	(–1.66)
Initial Per Capita GDP	–0.45	–0.48	–0.45	–0.43	–0.46	–0.42
	(–1.35)	(–1.43)	(–1.39)	(–1.41)	(–1.47)	(–1.46)
Initial Education	1.24**	1.15**	1.18**	1.16**	1.02*	1.02*
	(2.35)	(2.13)	(2.19)	(2.28)	(1.90)	(1.93)
Gov. Spending/GDP	–6.76	–5.16	–5.40	–6.26	–4.28	–4.42
	(–1.46)	(–1.09)	(–1.18)	(–1.40)	(–0.89)	(–0.97)
Inflation	–0.04	–0.04	–0.04	–0.04	–0.04	–0.04
	(–1.54)	(–1.57)	(–1.57)	(–1.58)	(–1.54)	(–1.58)
Openness/GDP	0.68***	0.85***	0.85***	0.74***	0.97***	0.98***
	(3.83)	(3.81)	(3.80)	(4.07)	(3.79)	(3.97)
Constant	6.26***	6.64***	6.67***	7.19***	7.09***	7.75***
	(3.29)	(3.49)	(3.62)	(3.76)	(3.83)	(4.32)
No. of Observations	599	599	599	599	599	599
R^2	0.127	0.132	0.136	0.145	0.143	0.159

Table 6

Panel Regressions of Per Capita GDP Growth on Stock Market and Bank Concentrations at *t*–5

Table 6 presents the results of panel regressions in which per capita GDP growth rates are regressed on stock market and bank concentrations at *t*–5. The sample includes country-year observations for 47 countries during 2002–2013. All variables are as defined in Appendix A. The *t*-statistics in parentheses are based on standard errors clustered by both year and country. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Variables	(1)	(2)	(3)	(4)	(5)
Bank Con. at *t*–5	–1.29**			–0.56	–0.46
	(–2.01)			(–0.79)	(–0.60)
Mkt. Con. (top 5 firms) at *t*–5		–3.98***		–3.82***	
		(–3.93)		(–3.55)	
Mkt. Con. (top 10 firms) at *t*–5			–3.75***		–3.64***
			(–3.73)		(–3.29)
Mkt. Cap./GDP at *t*–5	0.10	–0.06	–0.14	–0.06	–0.13
	(0.39)	(–0.21)	(–0.47)	(–0.18)	(–0.44)
Turnover/Cap. at *t*–5	0.20	0.17	0.14	0.19	0.15
	(0.80)	(0.76)	(0.61)	(0.79)	(0.63)
Credit/GDP at *t*–5	–0.38	–0.79*	–0.79**	–0.82*	–0.81**
	(–0.68)	(–1.92)	(–1.97)	(–1.92)	(–1.98)
Initial Per Capita GDP	–1.04***	–0.99***	–0.95***	–0.99***	–0.95***
	(–2.81)	(–3.17)	(–3.27)	(–3.11)	(–3.21)
Initial Education	1.69***	1.68***	1.51***	1.71***	1.53***
	(3.02)	(2.88)	(2.65)	(2.95)	(2.74)
Gov. Spending/GDP	–10.53***	–8.79***	–8.79***	–8.56***	–8.60***
	(–3.39)	(–3.01)	(–2.95)	(–2.94)	(–2.91)
Inflation	0.02	0.01	0.01	0.01	0.01
	(0.49)	(0.44)	(0.24)	(0.36)	(0.19)
Openness/GDP	0.53***	0.83***	0.89***	0.86***	0.91***
	(3.31)	(5.23)	(5.24)	(5.34)	(5.52)
Constant	10.42***	10.54***	10.99***	10.76***	11.15***
	(5.51)	(5.96)	(6.20)	(6.26)	(6.53)
No. of Observations	541	541	541	541	541
R^2	0.273	0.300	0.306	0.301	0.306

Table 7

Panel Regressions of Per Capita GDP Growth on Stock Market Concentration at *t*–5 Partitioned by Corruption and Bureaucracy Indices

Table 7 presents the results of panel regressions in which per capita GDP growth rates are regressed on stock market concentration at *t*–5. The observations are divided into two groups based on the corruption and bureaucracy indices. The sample includes country-year observations for 47 countries during 1995–2013. The other financial development measures and control variables in Table 3 are included in all regressions, but are not shown to save space. All variables are as defined in Appendix A. The *t*-statistics in parentheses are based on standard errors clustered by both year and country. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

	(Corruption Level)			
	High		Low	
	(1)	(2)	(3)	(4)
Mkt. Con. (top 5 firms) at *t*–5	–6.74***		–2.45**	
	(–4.13)		(–2.57)	
Mkt. Con. (top 10 firms) at *t*–5		–6.21***		–2.40***
		(–3.86)		(–2.92)
Control Variables	Yes	Yes	Yes	Yes
No. of Observations	359	359	351	351
R^2	0.219	0.232	0.153	0.157
	(Bureaucracy Level)			
	High		Low	
	(1)	(2)	(3)	(4)
Mkt. Con. (top 5 firms) at *t*–5	–6.06***		–2.46**	
	(–2.98)		(–2.06)	
Mkt. Con. (top 10 firms) at *t*–5		–5.53***		–2.48**
		(–2.86)		(–2.31)
Control Variables	Yes	Yes	Yes	Yes
No. of Observations	359	359	351	351
R^2	0.227	0.236	0.170	0.174

Table 8

Generalized Method of Moments Regressions of overlapping five–year averages of Per Capita GDP Growth on Stock Market Concentration at *t*–5

Table 8 presents the results of the generalized method of moments (GMM) regressions in which overlapping five–year averages of Per Capita GDP Growth rates are regressed on stock market concentration at *t*–5. The sample includes country-year observations for 47 countries during 1994–2013. All variables are as defined in Appendix A. Per Capita GDP growth rates and macro-economic variables such as *Per Capita GDP, Gov. Spending/GDP, Inflation,* and *Openness/GDP* are averaged for five-years (from *t* to *t*+4) on a rolling basis. The *t*-statistics in parentheses are based on standard errors corrected for heteroskedasticity and autocorrelation to account for the overlapping nature of the data. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Variables	(1)	(2)	(3)	(4)	(5)	(6)
Mkt. Con. (top 5 firms) at *t*–5	-3.70***				-3.79***	
	(-4.81)				(-4.74)	
Mkt. Con. (top 10 firms) at *t*–5		-3.69***				-3.81***
		(-5.02)				(-5.02)
Mkt. Cap./GDP at *t*–5			-0.39		-0.41	-0.50*
			(-1.54)		(-1.49)	(-1.75)
Turnover/Cap. at *t*–5				0.15	0.20	0.17
				(0.74)	(1.07)	(0.95)
Credit/GDP at *t*–5	-0.86**	-0.94**	-0.06	-0.38	-0.63	-0.66
	(-2.08)	(-2.39)	(-0.10)	(-0.84)	(-1.31)	(-1.43)
Initial Per Capita GDP	-0.73***	-0.72***	-0.74***	-0.77***	-0.72***	-0.70***
	(-3.28)	(-3.39)	(-3.16)	(-3.13)	(-3.37)	(-3.47)
Initial Education	0.90**	0.74*	1.02**	1.08**	0.97**	0.79*
	(2.18)	(1.82)	(2.42)	(2.46)	(2.29)	(1.91)
Gov. Spending/GDP	-3.07	-2.07	-6.44*	-5.49	-3.69	-2.88
	(-0.81)	(-0.54)	(-1.68)	(-1.37)	(-0.99)	(-0.76)
Inflation	-0.13	-0.15	-0.05	-0.10	-0.10	-0.11
	(-0.60)	(-0.69)	(-0.24)	(-0.45)	(-0.44)	(-0.50)
Openness/GDP	1.29***	1.50***	0.66	0.41	1.68***	1.96***
	(3.02)	(3.38)	(1.35)	(0.92)	(3.29)	(3.60)
Constant	8.96***	9.45***	7.92***	8.07***	8.59***	9.07***
	(6.12)	(6.43)	(5.53)	(5.72)	(6.37)	(6.75)
No. of Observations	626	626	626	624	624	624
*R*2	0.318	0.337	0.262	0.257	0.328	0.349

Table 9
Panel Regressions of IPO Activity on Stock Market Concentration at *t*–5

Table 9 presents the results of panel regressions in which measures of IPO activity are regressed on stock market concentration at *t*–5. The sample includes country-year observations for 46 countries during 1994–2013. All variables are as defined in Appendix A. The *t*-statistics in parentheses are based on standard errors clustered by country. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Dependent Variable	IPO Amount/Pop.		IPO No./Pop.	
	(1)	(2)	(3)	(4)
Mkt. Con. (top 5 firms) at *t*–5	–1.09**		–0.24	
	(–2.05)		(–1.63)	
Mkt. Con. (top 10 firms) at *t*–5		–1.20**		–0.29**
		(–2.26)		(–2.13)
Mkt. Cap./GDP at *t*–5	–0.68***	–0.68***	–0.21***	–0.21***
	(–4.16)	(–4.24)	(–3.56)	(–3.62)
Turnover/Cap. at *t*–5	–0.23**	–0.23**	–0.06*	–0.05
	(–2.03)	(–2.02)	(–1.68)	(–1.66)
Credit/GDP at *t*–5	–1.26***	–1.25***	–0.20**	–0.20**
	(–3.40)	(–3.40)	(–2.07)	(–2.06)
Per Capita GDP	1.21***	1.23***	0.05	0.06
	(3.18)	(3.27)	(0.33)	(0.39)
Gov. Spending/GDP	–27.25***	–26.71***	–4.17***	–4.03***
	(–5.23)	(–5.06)	(–2.83)	(–2.73)
Inflation	–0.02***	–0.02***	–0.00***	–0.00***
	(–5.67)	(–5.73)	(–3.08)	(–3.13)
Openness/GDP	0.36	0.37	0.10	0.10
	(1.03)	(1.04)	(0.65)	(0.66)
Constant	–5.54	–5.71	0.29	0.24
	(–1.58)	(–1.64)	(0.21)	(0.18)
Country Fixed Effects	Yes	Yes	Yes	Yes
No. of Observations	820	820	820	820
*R*2	0.571	0.572	0.725	0.726

Table 10

Panel Regressions of Innovation on Stock Market Concentration at *t*–5

Table 10 presents the results of panel regressions in which measures of innovation are regressed on stock market concentration at *t*–5. The sample includes country-year observations for 43 countries during 1994–2006. All variables are as defined in Appendix A. The *t*-statistics in parentheses are based on standard errors clustered by country. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Dependent Variable	Patent/Pop.		Citation /Pop.		Generality/Pop.		Originality/Pop.	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Mkt. Con. (top 5 firms) at *t*–5	–2.39**		–4.60***		–2.97***		–2.12**	
	(–2.58)		(–3.04)		(–3.78)		(–2.58)	
Mkt. Con. (top 10 firms) at *t*–5		–2.52***		–4.90***		–3.13***		–2.24***
		(–2.97)		(–3.56)		(–4.46)		(–3.01)
Mkt. Cap./GDP at *t*–5	–0.40*	–0.40**	–1.05**	–1.03**	–0.85***	–0.84***	–0.41**	–0.40**
	(–2.01)	(–2.10)	(–2.31)	(–2.42)	(–2.91)	(–3.10)	(–2.15)	(–2.24)
Turnover/Cap. at *t*–5	–0.28*	–0.27*	–0.47*	–0.46*	–0.17	–0.17	–0.25*	–0.24*
	(–1.95)	(–1.97)	(–1.84)	(–1.87)	(–1.21)	(–1.21)	(–1.99)	(–2.01)
Credit/GDP at *t*–5	–1.11*	–1.05*	–1.86*	–1.76*	–0.68	–0.61	–0.87	–0.82
	(–1.89)	(–1.85)	(–1.83)	(–1.79)	(–1.36)	(–1.27)	(–1.66)	(–1.61)
Per Capita GDP	–1.68**	–1.67**	–4.73***	–4.72***	–2.83***	–2.82***	–1.19*	–1.19**
	(–2.30)	(–2.44)	(–2.97)	(–3.19)	(–3.06)	(–3.33)	(–1.92)	(–2.02)
Gov. Spending/GDP	4.95	5.98	3.59	5.67	–4.47	–3.19	3.61	4.53
	(0.68)	(0.85)	(0.29)	(0.46)	(–0.52)	(–0.37)	(0.56)	(0.71)
Inflation	–0.01***	–0.01***	–0.02***	–0.02***	–0.01***	–0.01***	–0.01***	–0.01***
	(–2.83)	(–2.88)	(–2.74)	(–2.82)	(–3.33)	(–3.40)	(–2.75)	(–2.80)
Openness/GDP	–0.19	–0.18	–1.05	–1.03	–0.05	–0.04	–0.14	–0.13
	(–0.46)	(–0.44)	(–1.07)	(–1.02)	(–0.10)	(–0.08)	(–0.36)	(–0.34)
Constant	15.20**	15.29**	43.12***	43.25***	26.21***	26.33***	10.94**	11.01**
	(2.48)	(2.65)	(3.16)	(3.41)	(3.28)	(3.57)	(2.11)	(2.24)
Country Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
No. of Observations	473	473	473	473	473	473	473	473
*R*2	0.842	0.845	0.808	0.814	0.765	0.775	0.824	0.827