

The changing role of public equity markets: International evidence

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We study the relation between institutionalization of capital and the reliance on public markets by corporations and investors. Country-level evidence indicates that capital under institutional management (ownership by mutual funds, pension funds, and insurance companies) is negatively related to the levels and growth rates of numbers of publicly listed companies and also negatively related to the levels and growth rates of aggregate market capitalization and trading activity on public equity markets. The results indicate that, as economies mature and direct ownership of equity by retail investors declines, financial systems move in the direction of being less public-market-centric to more institution-centric.

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Institutional investors, Financial liberalization, Economic development

JEL classification codes: G15, G18, G23, O16, O19, O43

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1. Introduction

A provocative set of recent articles and scholarly studies document an absolute decline in the number of U.S. listed firms, a finding that has raised concerns that the decline may hamper economic growth going forward. The concern is that without a broad public equity market, firms may have reduced access to external capital and other benefits of being public, such as liquid shares and a market for corporate control.¹ The concern appears to emanate, at least in part, from the traditional view that economic development and prosperity are linked to a large and growing public stock market. Against, this backdrop, we consider the possibility that reduced reliance on public equity markets is associated with the increased importance of institutional investors in equity markets. At high levels of institutional ownership reliance on public markets for raising capital, trading, liquidity, and valuation can be supplanted by private ownership and non-market exchange.

As we document in this paper, the U.S. is not unique in experiencing a decline in listings. Moreover, the declines are not random. Countries in Western Europe, and Latin America, have also experienced declines, whereas in other parts of the world the numbers of listings have generally continued to increase. The listings decline is also related to country income and OECD

¹ Based on data reported by the World Bank, the number of publicly listed companies in the U.S. peaked in 1996, and subsequently has declined by about 50%. As reported in Schwartz, Byrne, and Wheatley (2015), the first study to document the decline in U.S. public listings was a 2009 report published by Grant Thornton: "A wake-up call for America" (Weild and Kim (2009)). For academic studies of this phenomenon, see Doidge, Karolyi and Stulz (2013 and 2017). Also see Mauboussin, Callahan and Majd (2017). Concerns are reflected in numerous popular press articles, such as: "Why America should worry about the shrinking number of listed firms," *The Economist*, 4/22/2017, pg. 62.

membership. High-income OECD countries have experienced declining listings in recent years, whereas non-OECD countries and less wealthy countries have generally experienced increases.²

Early work by Schumpeter (1911) has given rise to a large literature on the important positive influence that robust financial markets have on a country's income level and growth rate.³ As we point out below, one of the more significant changes in the development of capital markets in recent decades is the decline of direct ownership of equity by individual (retail) investors. In the U.S. and other developed countries, ownership of equity and other assets has become concentrated among institutions including mutual funds, insurance companies, pension funds, and others.

Our primary research question is: Are the changes across countries in their reliance on public markets related to the growth of capital under institutional management? To address this question, we use several possible indicators of reliance: the growth rate of public firm listings, aggregate market capitalization, and trading volume. We test the hypothesis that, as a country develops and institutional ownership increases, the reliance on public equity markets declines.

The drivers of public equity market formation are well known. They include providing liquidity for investors and access to large amounts of capital for firms, facilitating diversification, and providing a consensus estimate of value and a medium of exchange. However, arguably, for institutions, liquidity can be achieved as well through private exchange and aggregation of capital

² OECD classifications by income group are in Figure 4.

³ See, for example, Bekaert, Harvey and Lundblad (2005) who show that public equity market liberalization, on average, has led to a 1% increase in annual real economic growth. More generally, Levine (2005) reviews and analyzes the large and complex research on the connections between financial system operations and economic growth, noting that the preponderance of evidence suggests that both financial intermediaries and financial markets (including stock markets) matter for growth and that reverse causality alone is not driving the relationship.

for large-scale projects can be accomplished as well through private transactions. Moreover, the values established in private transactions can be as reliable as those generated through market exchange and individual investors can achieve the benefits of diversification more efficiently by investing through institutions such as mutual funds and pension funds than by investing directly in large numbers of individual companies.

Our evidence, based on available data, is broadly consistent with the hypothesis. In a panel dataset that spans up to 40 years and includes up to 112 countries, using a commonly adopted measure of financial openness (Chinn and Ito, 2006), we find a positive relation between the financial openness of a country and institutional ownership of assets (mutual funds, pension funds, insurance companies). We view financial openness to be an important factor leading to the development of institutional ownership, including ownership by foreign institutions. However, compared to data on financial openness, data on institutional ownership are much more limited, generally to 80 or fewer countries and usually to the period from 2000 onward.

In regressions of listings on financial openness, institutional holdings measures, and other variables, we find evidence that measures of institutional holdings are negatively related to listings levels and year-to-year changes for all institutional types. We also find evidence that institutional holdings measures are negatively related to measures of levels and changes in aggregate market capitalization. Finally, we find evidence that institutional holdings measures are generally negatively related to measures of levels and changes in aggregate trading. The evidence on listings, market capitalization, and trading volume is consistent with our hypothesis that high levels of institutional ownership are associated with declining reliance on public equity markets for capital raising and trading.

In section 2, we review the related literature and develop the hypothesis. Section 3 describes the data, its limitations, and efforts to address incompleteness and inconsistencies in the data. Section 4 presents the analytical methodology and preliminary evidence. Section 5 reports the empirical analysis, and section 6 concludes.

2. Literature and Hypothesis Development

The initial motivation for this study was to better understand the decline in domestic listings on U.S. exchanges that began after 1996. The history of U.S. listings since 1980 is shown in Figure 1. The series is constructed from World Bank data as a continuously compounded index with 1980 as the base year. Although the U.S. decline may seem surprising, it is apparent from the figure that the U.S. is not unique. Based on data for all available country/years, the number of listings in Western European countries peaked in 2001 and after that has been declining. However, it is also apparent that the decline is not universal. The East Asia and Pacific region has continued to experience an increase in numbers of listings. Worldwide, the country average percentage change in listings reached a plateau around 2007 and has remained approximately flat thereafter.

The differing trends in Figure 1 raise the question of how changes in listings over time may relate to the financial development or maturity of a country. There is, of course, no simple definition of financial maturity. However, maturity is reflected in such things as the enforceability

of contracts, protection against fraud, protections against expropriation, the financial sophistication of individual investors, and the development of investment professionals.⁴

Researchers often think of public equity markets as the epitome of financial market evolution. There is a palpable concern reflected in many studies about the apparently declining importance of public equity market, especially in the U.S. The trend that has received the most attention is the sharp decline in U.S. listings and what that portends for future growth and employment.⁵ In particular, there is a concern that small and medium sized firms are not as likely to gain access to the public markets and this may result in limiting growth and employment. Other concerns are that the trends imply more concentrated industries (Grullon, Larkin, and Michaely, 2017) and that the public market is increasingly composed of larger and older firms with less informative financial statements (Kahle and Stulz, 2017). The trend also suggests that large firms may prefer to stay private, which limits individual investor ability to get full exposure to the economy by holding mutual funds indices and potentially has negative impacts on shareholder democracy and undermines popular support for business-friendly public policy (Ljungqvist, Persson, and Tåg, 2016).

Figure 2 describes a different perspective--that public equity markets are part of the evolution of financial market development and not necessarily the ultimate stage. In early-stages of financial development, equity ownership is closely held and the rights of stockholders are protected by closely held ownership and reliance on trust among families and friends. With the advent of legally enforceable minority rights and protections against fraud, arms-length

⁴ See Levine (1997, 2005), La Porta, Lopez-de-Silanes, Shleifer, and Vishny (1997, 1998, 2000).

⁵ Similar concern has been expressed about the listings decline in the U.K. See the panel discussion in Chapter 6 of Schwartz et al. (2015).

trading among anonymous individual investors is possible. Organized public markets can emerge and issuers of equity claims gain the ability to raise large amounts of capital from diffuse populations of individual investors. Holders of equity claims gain liquidity and the ability to rely on market prices as broad market-based assessments of value. With active trading by individuals in public market, it becomes feasible for professional investors to develop expertise in equity valuation, to earn returns by exploiting market mispricing, and to leverage their expertise by organizing institutions that invest on behalf of clients. In a market where individuals trade against sophisticated institutions, individuals are disadvantaged and generally underperform relative to the institutions.⁶ In the U.S. and in other countries, government entities have sought to protect individual investors and to maintain public equity markets where both individuals and institutions trade. They have done so by, for example, specifying standards for corporate reporting and information releases. Such regulations are not costless and do not entirely level the playing field. Increasingly, individuals learn that they are likely to be better off by relying on investment professionals and investing in diversified portfolios rather than individual securities.⁷ At the same time, potential issuers of shares learn that being publicly held is not worth the regulatory burden. Firms choose not to go public and many kinds of investment institutions find that they can do as well or better by circumventing the public markets.

⁶ Stoffman (2014), for example, finds, in a study of Finnish stocks that share prices decrease after institutions sell to individuals and increase after individuals sell to institutions. Barber and Odean (2000), in a U.S. study, find that individual investors substantially underperform the market. Barber, Lee, Liu, and Odean (2009) document individual losses to institutions in Taiwan.

⁷ Cremers, Ferreira, Matos, and Starks (2016) find that explicit indexation by mutual funds increased from 14% in 2002 to 22% in 2010.

The circumvention of public equity markets has many manifestations. Firms can elect to stay private and raise capital via private placements to institutions and high-net-worth investors.⁸ Firms that are already public may conclude that the regulatory burden is too high and may elect to go private.⁹ Rather than trading in the public market, institutional investors may trade directly with each other at negotiated prices in the “upstairs market” or “dark pools.”¹⁰ Mutual fund families, rather than selling and buying in the public market, may rebalance portfolios via bookkeeping entries among fund family members.¹¹ A brokerage firm that holds stock in street name, may cross trade among its clients via bookkeeping entries.¹² Even the acquisition of one public firm by another represents a move away from reliance on the public market because the separate shares of the parties are no longer available to investors and no longer separately priced. The merged firm may substitute an “internal capital market” for public market issuance. Our thesis is that, in developed markets where institutional holdings are high, all of these steps away from reliance on public markets are occurring.

The notion that reliance on public equity markets is declining in importance is not new. Jensen, in 1989, observed that “New organizations are emerging in place [of public

⁸ Prequin (2016) estimates that as of 2015 the global value of private capital reached \$4.2 trillion, including \$2.4 trillion in private equity. Since 2000, total assets under management in private funds are estimated to have increased from \$709 billion, a compound annual growth rate of 12.6%. See also Kaplan and Stromberg (2009) who document changes and cycles in activity over time in both global and U.S. private equity activity. They infer that a significant part of the growth of private equity is permanent.

⁹ Engel, Hayes, and Wang (2007) document an increase in going private transactions and positive stock price reactions to going-private announcements after Sarbanes-Oxley.

¹⁰ Referencing a study by the Tabb Group, the *Wall Street Journal* reports that overall, off-exchange trading comprised 37.3% of all trading in October 2013 compared with about 15% in 2008 (Hope, 2013). FINRA (2014) reports that as of 2014 over 30% of total National Market System volume of exchange-listed shares traded occurred through alternative trading systems (i.e., dark pool trading).

¹¹ Regarding inter-family trades of mutual funds, see Blume (2002), Cici, Dahm, and Kempf (2014) and Gaspar, Massa, Matos (2006).

¹² The “upstairs” market includes both trades between broker-dealers and trades between clients of a single broker-dealer.

corporations]... Their primary owners are not households but large institutions and entrepreneurs.” In a 2007 speech, the then-serving SEC General Counsel, Brian Cartwright, coined the term “de-retailization” to refer to the dwindling percentage of retail investors in markets and the exclusion of retail investors from some new trading markets and asset classes, a trend, he indicated, that “shows no signs of abating.”¹³ Blume and Keim (2008) estimate that institutions represented less than 5% of stock ownership in 1945, but that their ownership share had reached 70% by 2006 (direct ownership by individuals did the converse). More recently, Martin (2014) offers the conjecture that institutional investors will continue the trend of “steering their investments away from public corporations, and that by 2039 we will wonder why we ever thought they were a superior form of business organization.”

In this paper we formally explore, in a cross-country setting, whether the gradual domination of equity ownership by institutional investors (as opposed to direct investment in equities by individuals) affects the size, importance, and reliance on public equity markets by corporations and individuals. Using country-level data, we find results consistent with expectations. As the assets under institutional management increase and direct ownership by retail investors decreases, public equity markets become smaller and narrower, and market-based trading activity declines. These results suggest that as economies develop, corporations and individuals rely less on public equity markets, which indicates a diminishing role for public equity markets.

¹³ Cartwright referred to dark pools as one aspect of de-retailization.
<http://www.sec.gov/news/speech/2007/spch102407bgc.htm>

The trend away from being public-market-centric has occurred even in the face of regulatory efforts that are designed to promote and encourage reliance on public capital markets.¹⁴ The implication for regulation is important because if the role of institutions is growing, regulators may want to focus on a different set of issues than those that are important when individual trading is more prevalent.¹⁵

A number of recent studies have drawn attention to the declining numbers of listed firms in the U.S. Doidge, Karolyi, and Stulz (2017) refer to “The U.S. Listing Gap” as the lower number of listings per capita in the U.S. compared to other countries.¹⁶ They examine and rule out several possible explanations as to why the number of listed firms in the U.S. seems low and has been declining. They find that the low numbers and declining trend since 1996 cannot be explained by industry changes, changes in listing requirements, or reforms related to SOX. They report that, compared to the pre-1996 period and to other countries in the post-1996 period, the post-1996 period in the U.S. is characterized by a low rate of new listings and high rate of delistings. They ascribe the high rate of delistings to acquisitions, which is one manifestation of firms stepping away from reliance on public capital markets. In cross-sectional comparisons, they test whether the U.S. is different from the panel of other countries or compare the U.S. to broad aggregates of other countries: all non-U.S. countries, non-U.S. developed countries, and emerging countries.

¹⁴ For example, provisions of the U.S. Investment Company Act of 1940 and subsequent interpretations by the SEC have materially limited the ability of mutual funds to invest in non-market (“alternative”) assets. Pension funds, in contrast, have not been restricted in the same way and have begun to allocate large portions of their resources to private equity and other alternatives. On the investor side, the Sarbanes-Oxley Act and Regulation FD are intended to provide assurance of reliable public information and a level playing field for all investors. The JOBS Act is intended to lower the costs to small firms of going public as opposed to remaining private.

¹⁵ As an example of the regulatory focus on institutions, as of 2016, the Securities and Exchange Commission (SEC) is creating “liquidity” standards for the investments held by open-end funds, including mutual funds and exchange-traded funds. (<http://www.wsj.com/articles/mutual-funds-are-risky-1454544816>)

¹⁶ See, also, Doidge, Karolyi, and Stulz (2013) and Schwartz et al. (2015).

In an investigation most directly focused on the Jensen (1989) conjecture, they conclude that another paradigm is needed to explain the “eclipse of the public corporation.”

In some respects the Doidge, et al. (2017) study is a jumping off point for ours, but our analysis of non-U.S. listings is more granular. Instead of exploring reasons for low listings per capita or declining listings per capita in the U.S. relative to the rest of the world, we seek to understand the reasons for declining listings or lower growth rates in some countries throughout the world. We do not delve separately into the composition effects of new listings or delisting via acquisition or by other means. Rather, we consider such changes to be among the manifestations of the growth of institutional ownership of equity. We also extend the analysis to the related considerations of effects on aggregate trading volume and total market capitalization as these measures are commonly used as indicators of the extent of reliance on public markets.

Our findings are part of several contrasting strands of literature. Studies in economic development indicate that a vibrant public stock market is important for a country’s financial development and a determinant of economic growth. See, e.g., La Porta, Lopez-de-Silanes, Shleifer, and Vishny (1997) and also Levine (1997, 2005).

Three main developments in the financial markets lead to the hypothesis that as financial markets mature and equity ownership becomes concentrated among institutions, the central role of public equity markets declines. First, the institutionalization of capital is partially due to advances in the theory of finance and in particular the emergence and increasing acceptance of portfolio theory. This development has changed investors’ choices and behavior. Individuals generally cannot expect to outperform the market via stock selection and institutions offer cost

effective diversification and other professional services to individuals. For example, mutual funds (including exchange-traded funds) provide a low cost mechanism for pooling of resources and for subdividing of shares in various enterprises. Further, investors in the 21st century generally are aware of the benefit of diversification and increasingly invest in mutual funds instead of in individual stocks (Campbell, 2006). Along with the growth of reliance on mutual funds has been the increasing concentration of wealth in pension funds. A 2015 OECD survey reports that the pension fund assets of OECD countries have increased from \$11 trillion in 2001 (51.8% of GDP) to \$25.1 trillion (61.9% of GDP). Thus, institutions like mutual funds and pension funds play complementary roles and can substitute for direct public market investment by individuals.¹⁷

Second, many institutions can invest in and trade non-market assets such as private equity and other alternatives. Most debt securities are privately placed with institutions and are traded over the counter. While institutional investors like mutual funds and pension funds can, and do, trade in organized exchanges, they also are able to engage in varieties of non-market transactions such as dark pool trades, and institutional investors such as defined benefit pension funds, insurance companies, and private equity funds can invest large amounts in non-market equities. While the requirement to regularly report net asset value limits the ability of publicly traded open-end mutual funds to invest in non-market assets, arguably, they can achieve liquidity as well through private exchange as in public markets. Moreover, aggregation of capital for large-scale projects can be accomplished as well by institutions as in public markets; and the values established in private transactions can be as reliable, although not as transparent, as those

¹⁷ Other institutional forms such as sovereign wealth funds and hedge funds serve in similar substitution roles.

generated through market exchange. Consequently, firms that seek large amounts of capital can decide to stay private, even as they grow. Big multi-divisional public firms are more quasi-private than are individual, focused firms, since the information about divisions is less transparent than is information about separate companies and market discipline of divisions is less effective than of separate companies.¹⁸

Third, the cost of firms going public, including the explicit and implicit costs of ongoing disclosure requirements, can outweigh the benefits of public market trading and thus firms can decide to stay private.

We test the hypothesis that the importance and extent of reliance on public equity markets changes as economies mature financially. For the test, we use three standard measures of “importance” or “reliance” — total public listings, market capitalization, and trading volume. While none is a perfect proxy, the data for listings is the most complete over time and is available for more countries than the others. It has also received the most attention and concern. The testable implication is that growth in the number of listings decreases and even becomes negative with increases in institutional ownership of assets. As institutional ownership becomes high, it is less important for companies to be publicly traded as opposed to being privately held or becoming an operating division of a public or private company. We also test whether, as economic activity is increasingly carried out by private firms, levels of market cap to GDP and changes in market cap are negatively related to institutional ownership of assets. Finally, we test whether the third measure, public market trading, is negatively related to institutionalization

¹⁸ For example, Martin (2014) describes an attempt by a group led by the Ontario Teachers’ Pension Plan to take Canada’s leading telecom provider, Bell Canada, private. The fund sought not to take the company public again but rather, to own the asset privately for the long term.

because diversification/indexation through funds reduces the need to trade and because trading among institutions can be accomplished through such means as private negotiation or simple bookkeeping reallocations of ownership among members of a fund family.¹⁹

The latter two measures pose interpretation issues since market capitalization and trading volume, are implicitly biased against the hypothesis. For example, in the U.S. off-market trading volume is included in reported trading volume as if the trades had occurred in the market. Similarly, a merger of public firms, while it reduces listings, does not materially affect market capitalization even though it represents a movement away from reliance on markets.

3. Data

We use annual country-level panel-data in the empirical analysis that follows. The primary data source is the World Bank's *Global Financial Development Database*. The sample covers the time period from 1975 through 2015 and 119 countries, though there are many missing observations, especially in years before 2000 and for less developed countries.

3.1. Dependent variables

Our three dependent variables, firm listings, aggregate market capitalization, and trading volume are standard proxies for the development of public equity markets and are used in numerous studies exploring financial markets at the country level.²⁰ We use the natural logarithm transformations of all dependent variables. $\ln(Listings)$ is the natural log of the total

¹⁹ A countervailing effect is the growth of high-frequency trading by institutions. Baron, Brogaard, and Kirilenko (2012) provide evidence that small investors generally lose money to high-frequency traders.

²⁰ See, e.g., La Porta, et al. (1997); Rajan and Zingales, 2003; Beck et al., 2003; Stulz and Williamson, 2003; Djankov et al., 2008; and Hsu et al., 2014. Levine (2005) reviews these studies.

number of publicly listed companies. $\ln(MktCap)$ is the natural log of the country's stock market capitalization in constant dollars. $\ln(Volume)$ is the natural log of annual trading volume in constant dollars. In part of the analysis, we further transform these measures as continuously compounded year-to-year changes. In another part, we use the natural log levels as dependent variables but include the lagged value from the prior year as an independent variable. In levels models without the lags, we standardize the dependent variables in traditional ways. That is, we measure $\ln(Listings/capita)$ as the natural log of listings per million population in the measurement year. We measure $\ln((MktCap/GDP))$ as the natural log of the ratio of market capitalization to GDP. And we measure $\ln(Turnover)$ as the natural log of the average daily value of shares traded during a year as a percentage of the average market capitalization during the year.

3.2. *Independent variables*

We rely mainly on three proxies for country-level institutionalization of capital: (1) *Mutual Fund Assets/Mcap*, which is total mutual fund assets to stock market capitalization; (2) *Pension Fund Assets/Mcap*, which is total pension fund assets to stock market capitalization; and (3) *Insurance Companies Assets/Mcap*, which is total assets of insurance companies to stock market capitalization. We construct these measures from World Bank data reported for Mutual Funds/GDP, Pension Funds/GDP, and Insurance Company Assets/GDP. To mitigate the effects of outliers, we use the natural logs of these independent variables.

In addition to institutional holdings variables, we include data on financial openness from the Chinn-Ito 2015 update of their database as a proxy for financial development or maturity of a country. Their financial openness index (*Financial Openness*) is widely relied upon in the

economic development literature.²¹ The index is constructed by principle components factor analysis of four key indicators compiled in the International Monetary Fund's 2014 *Annual Report on Exchange Arrangements and Exchange Restrictions*. The underlying variables include whether a country has multiple exchange rates, whether there are restrictions on current account transactions, whether there are restrictions on capital market transactions, and whether there is a requirement to surrender export proceeds. Countries that score highly for financial openness are more likely to attract foreign investments in domestic equities and more likely to invest in foreign equities, which information is not available in the World Bank database. In this analysis, we have rescaled the Chinn-Ito measure over the 0-1 interval, where maximum openness is designated as 1.0 and minimum is 0.0.

In parts of the analysis, we also control for country wealth using *GDP/capita*. Because we include year fixed effects, the analysis is essentially cross-sectional.

3.3. *Data limitations*

One of the important challenges of this study is that availability of data varies greatly across countries and over time. Institutional ownership data, in particular, are quite limited and are mainly available for more recent year. Table 1 provides a summary of the annual frequency of observations for key variables in the analysis.

The primary focus of the empirical analysis is the number of listings by country/year. As shown, the number of reporting countries is low in early years, generally increasing over time, except for the most recent three years, where data reporting takes longer for some countries

²¹ In comparisons of several openness indexes, Quinn, Schindler, and Toyoda (2011) identify the Chinn-Ito measure as having the broadest and longest-term coverage and being the most readily available. They also provide evidence that the index is highly correlated with other prospective measures.

than others. Between its 2014 database and its 2016 database, the World Bank switched from reporting listings totals compiled by Standard and Poor's (S&P) to totals compiled by the World Federation of Exchanges. In years when data from both sources are available, there is a high degree of consistency between the two. However, both sources have limitations. Most importantly, the S&P series from the World Bank usually only goes through 2012, whereas the World Federation of Exchanges data often goes through 2015. However, the World Federation does not report some country-level data for securities that trade on multi-country exchanges such as the OMX exchange that combines several Baltic and Scandinavian counties. Those data through 2012 are available from S&P. For cases such as this, where World Federation data are not available but S&P data are, we use the S&P data.

There are also cases where, in earlier years the World Federation reports data but S&P does not. When both are reported we use the more recent database; otherwise, we use the data from the available source. For example, if it is apparent from the before-and-after data from the World Federation that the time series is consistent but for the missing years, we use data from S&P to complete the series. Occasionally, the time series for a country has a short episode of missing observations from both data providers. In the small number of cases where data are missing for a year or two and the before-and-after numbers indicate a consistent time series, we use linear interpolation to complete the series. Even after these efforts, the database includes a number of instances where a country's time series is interrupted by a few years of missing data and there is not a sufficient basis for interpolation.

As is true for other variables in the analysis, most of the listings data is concentrated in the period since the year 2000. As reported at the foot of the table, 55.3% of the observations

of listings are from 2000 or later.

Based on year-to-year changes in $\ln(Listings)$, there are clear occurrences in the data where a country's time series of listings is not consistent. These may be data errors, major regime changes, or cases where the World Federation or S&P has changed the set of exchanges included in the totals for a country. For example, between 1979 and 1980, the World Federation reports that the number of public companies in the U.S. increased by more than 100% (from 2401 to 5164). The increase appears to be due to the addition of companies listed on NASDAQ. Similarly, between 2002 and 2003, the reported number of listed companies in Canada increased by almost 200%, apparently due to inclusion of the Toronto Stock Exchange

There are a number of such occurrences and it is not possible to find compelling explanations for all of them. Rather than attempting to do so, we calculate the year-to-year change in the natural log of listings and we trim the sample by dropping observations of $\ln(Listings)$ where the absolute value of the continuously compounded change from the prior year is more than 50 percent. Accordingly, we also drop the observation for any year that is preceded by a missing observation. For example, all observations for 1975 are dropped because the data for 1974 are missing from the dataset. These filters reduce the number of usable observations of listings from the 2995 number reported in Table 1 to 2709.

There are similar issues related to aggregate trading volume and total market capitalization. Because there is no good way to identify data problems in these series, we use the same approach to merge the observations from S&P and the World Federation and to trim those variables. Here, again, because we are interested in indicators of the growth rates of public equity markets, we specify the variables in natural logs.

The independent variables that are central to our analysis include the measures of institutional ownership from the World Bank and the financial openness index of Chinn and Ito (2015). As shown in the bottom portion of Table 1, data on institutional ownership is heavily concentrated in the years after 2000. It is apparent from the table that mutual fund asset data are available beginning in 1980 but only for a few countries. Most of the country-level observations begin in 2000 or later. Also apparent from the table, data limitations are more severe for pension funds. There are few observations before 1998. The ownership data are most complete for insurance companies.

We are concerned that because the ownership observations are concentrated in recent years, the evidence may not be convincing. To address this, we include *Financial Openness* as an indicator that is associated with institutional ownership and is more consistently available over the sample period. Openness is a catalyst for institutionalization of ownership, including international ownership. Accordingly, we include it as an indirect indicator of the propensity for institutionalization of ownership. *Financial Openness* has other issues of interpretation. In particular, it does not discriminate well among countries that are relatively open. As reported at the foot of the table, generally more than half of the observations of institutional ownership are concentrated in country-years where *Financial Openness* is at its maximum value. To an extent, we can view institutional ownership as discriminating among countries that are ranked high for *Financial Openness*. Thus, we expect both the ownership measure and the index to contribute to the understanding of how institutional ownership affects the role of public equity markets.

3.4. *Institutional ownership over time*

Table 2 contains summary statistics on the worldwide time series of institutional

ownership relative to market capitalization, as well as the time series of *Financial Openness*. Because reported holdings percentages of market cap occasionally include large positive outliers, statistics for institutional holdings in the table are computed from the natural logs of ownership percentages. Because of changes in the numbers of reporting countries over time, it is not possible to make strong statements as to trends in institutional ownership percentages. Observations in early years are usually from countries with more mature economies, where institutional holdings are relatively high, so that increases over time in the number of reporting countries impart negative bias to the apparent trends in ownership percentages. Nonetheless, mutual fund asset ownership in Table 2 is clearly increasing over time relative to equity market capitalization, and insurance and pension fund ownership are approximately flat percentages from 2000 onward, years in which the sample sizes are relatively large. *Financial Openness* is more consistently available and has been increasing over time.

3.5. *The endogeneity of institutional ownership*

One way to address the data limitations related to institutional ownership is to extend the time series backward using only variables that are correlated with and causally related to institutional ownership. We argue that financial openness is a catalyst for the growth of institutional ownership and that institutions are also more likely to develop in wealthy economies. Table 3 examines the relationships of institutional ownership to openness and GDP per capita. For each institution type, we report two models, one with clustering by year and one with year fixed effects. The results of both specifications are similar.

As expected, mutual fund ownership is positively related to openness and wealth. The r^2 of 0.25 indicates that a material fraction of institutional ownership is explained by openness and

wealth. Accordingly, in models where mutual fund ownership is excluded, we interpret financial openness as a weak proxy for the level of mutual fund ownership.

Evidence regarding insurance and pension fund ownership is less clear. There is no significant relationship between insurance holdings and openness. This may be because in more developed economies traditional insurance is giving way to term insurance coupled with mutual fund and pension fund investments. Although we find a significant positive relationship between pension fund holdings and openness, the explanatory power of the model is low so that the proxy reasoning is not persuasive.

4. Preliminary Evidence

4.1. Regional and income-related patterns in listings, market capitalization, and turnover

We begin the empirical examination with some simple studies of trends in number of listings, aggregate market capitalization, and trading volume. Figure 3 contains plots of time series continuously compounded growth of median values of these variables by region. We index the growth to 1989 to limit the effects of missing data, which is prevalent in early years for some regions. Regions are defined by the World Bank. We divide the World Bank's Europe and Central Asia Region into more traditional Eastern and Western Europe sub-regions that are more closely aligned with financial market maturity. The classification of countries into these sub-regions is listed in the figure. We plot cumulative effects because region-based differences in year-to-year changes are difficult to discern and we focus on medians to mitigate the effect of outliers.

As can be seen from the first plot in Figure 3, North America and Latin America have experienced declines in listings since 1996, and Western Europe has experienced a decline since

2000. Compared to other regions, these three regions also experienced relatively low growth rates throughout the 1990s. Results and inferences are similar if mean changes are plotted instead of medians. The second plot in Figure 3 indicates that the three regions with slowly growing or declining listings are not unusual in terms of their growth rates of market capitalization. The trends presented in first two plots in Figure 3 imply that the market capitalization of public firms in North America, Latin America and Western Europe are increasing more rapidly than in other regions. The third plot indicates that trading volume in regions other than South Asia has been increasing over time.

Figure 4 shows similar plots of median values of the cumulative changes in listings, aggregate market capitalization, and trading volume over time by country income group. World Bank income groups are listed in the figure. The World Bank subdivides the High-income group into OECD Member and Non-OECD Member sub-groups. The first plot shows an important dichotomy between OECD and non-OECD high-income groups. Listing changes of OECD members are steadily negative beginning around 2000, whereas listings of Non-OECD high-income countries continue to increase and the growth path is similar to that of low-income countries. Generally, the OECD countries have long financial histories, whereas some non-OECD countries have become wealthy recently or are recognized tax havens. The Upper-middle Income category (which includes many Latin and South American countries, among others) experiences a decline that is similar to that of the OECD members but less extreme. The second plot in the figure shows that OECD and non-OECD countries are similar in their rates of growth of market capitalization. The third plot again suggests that OECD countries are different from non-OECD countries in their growth rates of volume.

Figures 3 and 4 are provocative, as they suggest that trends in numbers of listings are not random or idiosyncratic. Rather, they indicate that there are systematic differences across regions and by wealth and OECD membership. We posit that the underlying driver of these differences is capital market maturity and the concomitant growth of institutional ownership.

4.2. *Institutional ownership and indicators of equity market centrality*

The testable implication of our hypothesis is that institutional ownership has a negative effect on measures of investor reliance on public equity markets. However, the effect is likely to be gradual. Both the levels of institutional ownership and the levels of the variables that proxy for reliance on public markets, listings, aggregate market capitalization, and trading volume, change gradually. Hence, the levels-on-levels regressions are unlikely to be convincing and changes-on-changes regressions are unlikely to reveal the relationships. Accordingly, our empirical analysis is focused mainly on how levels of institutional ownership relate to changes in $\ln(Listings)$, $\ln(MktCap)$ and $\ln(Volume)$. The empirical analysis is even more challenging because all measures are noisy and measured with error, and because of the above noted structural breaks in some of the data series.

We begin the examination with bivariate tests of the relations between annual changes in listings, market capitalization and market volume and the differences in levels of institutional ownership. The dependent variables in these tests are the natural logs of year-to-year changes, where observations of changes that are greater than 0.5 in absolute value are trimmed. Because the ownership variables are noisy and include some large outliers, we employ a portfolio approach of stratifying ownership into fractiles. We then test the significance of the differences in the dependent variables between the top and bottom 10% of each institutional holdings

sample. Because of the possible effects of outliers and skewness in the tails, we test both medians and means. We report the results of this analysis in Table 4.

In the first panel, we find that changes in $\ln(Listings)$ between the top and bottom fractiles are in the expected direction – institutional holdings are negatively related to the change in listings. The relationships are statistically significant for medians and means of mutual funds and insurance companies, with two-tailed p-values of 0.1 or better (one-tailed p-values of 0.05 or better). A possible reason for the weaker relationship between listings and pension fund holdings is the migration that is occurring away from defined benefit to defined contribution pension funds. During the period that is covered by most of our pension holdings data, defined benefit plans have moved aggressively into alternative assets, whereas the investment choices of defined contribution plans are usually restricted to public market assets.²²

The second panel shows changes in market capitalization by institutional holdings fractile. Differences in changes in $\ln(MktCap)$ between high and low institutional holdings groups are negative and significant for both medians and means of all three institutional types. The evidence shows that the rate of growth of public markets is lower when the level of institutional ownership is high. In part, consistent with our hypothesis, the negative relationships may reflect the shift into alternative (non-public market) assets.

In the last panel of the table, we find that the year-to-year median and mean changes in constant dollar trading volume, $\ln(Volume)$, are negatively related to ownership of the institutional holdings groups, and significantly so for mutual funds and insurance companies. The

²² See Willis Towers Watson (2016).

results are consistent with the view that many institutions tend to be buy-and-hold investors so that trading volume declines as institutional holdings increase.

4.3. *Financial Openness and indicators of equity market centrality*

In a similar manner to the above, we use a bivariate approach to test the relations between *Financial Openness* and the dependent variables, which are indicators of equity market centrality in an economy. As discussed, we include *Financial Openness* as an indication of market conditions that foster the growth of capital markets and the rise of institutional ownership. Results are shown in Table 5. Changes in the dependent variables are measured in the same way as in Table 4. *Financial Openness* is grouped over five fractiles of varying percentages. The low and high group sizes are determined, respectively, by the numbers of observations where the index value is zero (minimum) or one (maximum). In each dependent variable test, the percentages of country-year observations that are ranked zero by the index are low, whereas the percentages that are ranked in the top category are quite high. The other three fractiles are constructed to be approximately equal-sized but actual percentages are affected by discreteness of the reported openness index.

As expected, the medians of all three dependent variables are negatively related to *Financial Openness*. The strongest result is for listings, where the mean difference is also statistically significant. The most open economies have the lowest rates of listings growth, as well as lower rates of growth in market capitalization and trading volume.

5. **Multivariate Analysis**

We approach the multivariate analysis in two stages. First, we report the results of a

levels-on-levels approach that is similar to that of Doidge, et al. (2017). Results of this approach are subject to the concern that there may be omitted factors that are correlated with the institutional holdings variable of interest and with the dependent variables. Second, to address this concern, we follow with a (effectively) changes-on-levels approach where the lagged value of the dependent variable is included as an additional explanatory variable. Inclusion of the lag as a control addresses the concern about omitted factors, but also, because of noisy data, makes it more difficult to uncover true causal relationships between holdings and the dependent variables.

5.1. Explaining the levels of listings, market capitalization, and trading volume

Our central research focus is on how the level of institutional holdings affects the role of public equity markets as reflected in the growth of domestic publicly listed companies. Causality is an important concern. Institutions may be attracted to countries with markets that are growing, but markets in such countries may also grow because they are attracting institutional investors. It does not, however, seem that institutions would be attracted to invest in countries with markets that are exogenously declining. Yet, in the U.S., for example, mutual fund assets increased from 39.8% in 1996 to 60.0% in 2014, the same period over which the number of publicly listed companies declined by half. Insurance and pension asset ownership remained approximately constant over the period. Anecdotally, it does not appear that institutions were retreating from the market as the number of listings was declining.

The reverse causality concern would be elevated if we were to find positive relationships between the dependent variables and institutional holdings. A negative relationship, in contrast, is supportive of the hypothesis that reliance on the public equity market is negatively impacted

by high levels of institutional holdings. In levels regressions, we find that listings per capita, market capitalization relative to GDP, and turnover all are negatively related to institutional holdings relative to market capitalization.

In this portion of the analysis, because countries vary in population, wealth, and market size, it is necessary to scale the dependent variables. We scale listings by population (*listings/capita*), market capitalization by GDP (*MktCap/GDP*), and trading volume by market capitalization (*Turnover*) and we use the natural log of each standardized measure. The independent variables are natural logs of holdings by institution type, *Financial Openness*, and *GDP/capita*. All models include year fixed effects, making the empirical results essentially pooled cross-sections. We test statistical significance both with and without clustering of standard errors by country. Since, given the unbalanced sample, it is not clear that country clustering is appropriate, we include both significance tests.²³ We report results of the analysis in Table 6.

5.1.1. Listings

In the table, the natural log of listings per (million) capita is negatively related to the natural logs of each of the institutional holdings levels. Significance levels are generally lower in models with country-level clustering. The evidence is consistent with the expectation that institutionalization of ownership negatively affecting listings. Declining or more slowly growing listings can reflect mergers of public companies, choices of firms to withdraw from the public market, and choices of non-publicly held firms to remain private. As discussed above, all of these factors are reflective of declining importance of public markets when institutional holdings are

²³ Institutional holdings levels change very slowly over time. Because, for many countries, there is little meaningful time-series variation in holdings, we, like others who study similar questions, are unable to include country fixed effects without substantial loss of explanatory power for the variables of interest.

high.

In these models, we find positive relationships between listings per capita and *Financial Openness*. The positive sign indicates that reliance on public markets increases with openness. In particular, as implied based on Table 1, very large fractions of the observations used in the Table 6 models are of country-years when the index value is at its maximum. For example, about 90% of the observations in the mutual fund model have *Financial Openness* values of 1.0. Thus, the coefficient on the index is mainly comparing more mature to less mature economies, whereas the coefficient on mutual funds is mainly testing the effects of differences in institutional holdings on listings. In unreported results, when we drop *Financial Openness*, the coefficient on mutual fund holdings is not materially changed and significance levels are similar to those shown in the table and when we drop institutional holdings *Financial Openness* remains positive and significant.

5.1.2. *Market Capitalization to GDP*

As noted by Rajan and Zingales (1998), who also use the market capitalization to GDP measure, some countries provide tax incentives for firms to list, which artificially boosts stock market capitalization without indicating greater external financing or stock market development. It also does not necessarily reflect how well the market facilitates exchange. Nonetheless it is a reasonable and widely-used proxy.²⁴ As shown, we find that the effects of institutional holdings on market capitalization as percentages of GDP are negative. The coefficients are statistically significant in all models. Results for *Financial Openness* in these models are somewhat puzzling,

²⁴ Our focus on percentage changes in Table 7 mitigates the concern that such policies may inflate the levels of this measure for some countries.

as the coefficient is negative and significant in the mutual fund and pension fund models but positive and significant in the insurance company model. It appears that this occurs because higher levels of openness are positively related to mutual fund and pension fund holdings but negatively related to insurance holding. That is, as economies mature, more assets are invested through mutual funds and pension funds, whereas insurance company holdings decline. Nonetheless, market capitalization to GDP is negatively related to higher insurance holdings. Here again, when we drop *Financial Openness*, the coefficients on institutional holdings variables are similar to those reported and significance levels remain high. In models without holdings, the coefficient on the openness measure is positive and significant.

5.1.3. Turnover

Levine (2005) points out that the turnover ratio is not a direct measure of trading costs or the ability to sell securities at posted prices; rather it measures trading relative to the size of the market and reflects trading frictions and information that induces transactions. It is unclear, *ex ante*, whether institutional holdings should affect turnover positively or negatively. The effect of increasing indexation should, of course, be negative. However, institutions can also contribute positively to high-frequency trading. Our evidence in Table 6 is consistent with the view that the net effect of mutual fund ownership is approximately neutral between indexation and high-frequency trading, whereas the significant negative coefficients for insurance company and pension holdings are consistent with a predominance of indexation. This dichotomy seems plausible as pension fund sponsors and insurance companies are more likely to be aware of the evidence on underperformance of actively managed funds than are the individual investors in

mutual funds.²⁵ The significant negative coefficients on financial openness are consistent with the view that as capital markets mature investors turn increasingly to passive investing.

5.2. *Explaining the changes in listings, market capitalization, and trading volume*

The concern about the evidence in Table 6 is that there could be some omitted factor that accounts for the results. For example, perhaps the more financially mature economies with higher levels of institutional holdings also happen to be the economies with low levels of listing per capita, market cap to GDP, and turnover. Since we cannot include country fixed effects, we cannot exclude this possibility through regression of levels on levels. In Table 7, we address this concern by including the lagged value of the dependent variable as an additional explanatory variable. Because the coefficients on the lagged variables are always very close to 1.0, the results are similar to what would result from a regression of changes in the dependent variables on levels of holdings and the other control variables. If the results in Table 6 are due to country-specific omitted factors that affect the levels of the dependent variables, this concern should be addressed through the lag structure. Further, by including the lag, we further reduce any possible concern about reverse causality. The results in Table 7, though statistically weaker than those in Table 6, are consistent with our core hypothesis and with the previously discussed evidence.

5.2.1. *Financial Openness*

Before turning to institutional holdings, in the Market Maturity panel of Table 7, we report models excluding holdings measures. As discussed above, we view *Financial Openness* as a

²⁵ See, Callaghan (2017), Flood (2016), Moreolo (2016), and Walden (2015).

catalyst for the growth of institutional ownership. Because openness data are available for more countries and years compared to institutional holdings, the sample sizes in the first panel are considerably larger than in the other panels. As expected, the relationship between openness and listings is significantly negative in a model where the lag of listings is included as a control. Relationships to market capitalization and trading volume, however, are not significantly different from zero. The somewhat smaller sample sizes for these models compared to the listings model reflect lower cross-sectional variation in these models. That is, the data are mainly available for mature economies that are classified at the maximum of the openness measure.

5.2.1. *Listings*

Controlling for the prior year's level of listings, we find, in the first column of Table 7, that the natural log of listings is negatively related to each institutional holdings variable. Significance levels are lower than the ones reported in Table 6, but this is not surprising in light of the noisiness of measurement of the variables and inclusion of the lagged dependent. Our results indicate that countries with high levels of institutional holdings experience lower growth rates of listings. In contrast to the Table 6 results, here we find that *Financial Openness* is negatively related to the growth rate of listings even with inclusion of institutional holdings. The negative coefficients indicate that more-open economies have lower growth rates of listings, even though, from Table 6, the level of listings per capita is higher in these countries. Dropping financial openness from the listings models does not materially affect the results.

5.2.2. *Market capitalization*

Controlling for the prior level of market capitalization, we find, in the second column, that market capitalization is consistently negatively related to institutional holdings. The coefficients

are generally significant at the (two-tailed) 10% level or beyond. The coefficients on *Financial Openness* have the same signs as in the Table 6 models but only the coefficient in the mutual fund model is statistically significant. Dropping financial openness does not materially affect the results but the coefficient in the mutual fund model becomes more significant.

5.2.3. *Trading volume*

In the third column of Table 7, we find that trading volume is explained almost entirely by prior year volume and year fixed effects. Beyond this, we find a significant negative relation of volume to insurance company holdings but a puzzling positive relation to pension fund holdings. As discussed in Table 6, the positive relationship may result from the movement from defined benefit to defined contribution plans. Data limitations preclude testing this conjecture. Relations to financial openness are not statistically significant.

5.3. *Robustness*

It is reasonable to question whether increasing institutionalization and changes in reliance on public equity market may also be correlated with other worldwide trends or country-specific events. A number of alternative explanations can be rejected based on patterns in the data. For example, the listings decline in the U.S. begins after 1996, which is before Sarbanes-Oxley (2002) or Dodd-Frank (2010).²⁶ While the U.S. decline corresponds approximately to a world-wide peak in privatizations of state-owned enterprises and a high level of interest in emerging markets, the number of listings in Central and Latin America turns down at around the same time. Since this region was the focus of much of the privatization activity, it seems that shifting investor interest

²⁶ A discussion of regulation-based conjectures and counterarguments for the U.S. decline in listings appears in Schwartz, et al., Chapter 6 (2015).

to emerging markets at this time should have the opposite effect. While the downturn in Western Europe around 2000 corresponds roughly to the introduction of the Euro in 1999, its introduction can be ruled out as an explanation because the downturns and slowdowns in listings, market capitalization, and trading occur at different times in different EU countries, even though they are simultaneously affected by the Euro introduction.

We perform additional tests to evaluate the robustness of the results. We find that the reported results are not sensitive to estimating over different time periods (e.g., leaving out the dot.com period). Indeed, the results are robust to leaving the U.S. out of the sample entirely. Moreover, inclusion of year fixed effects in the regressions addresses global factors such as the financial collapse. However, we cannot rule out the possibility that some other unidentified paradigm shift may be associated with the changes.

6. Conclusion

We study the changing role of public equity markets using international data for up to four decades. The over-arching hypothesis is that reliance on public equity markets changes over time as countries become more financially open and individuals begin to invest less directly in individual firms and instead invest them through financial institutions like mutual funds. While growth rates of institutional ownership vary considerably across countries, we do discern a worldwide trend toward increasing institutionalization, especially for wealthier, more economically developed countries. Our measures include ownership by mutual funds, insurance companies, and pension funds. Moreover, increasing institutionalization appears to be negatively related to cross-country variation in reliance on public markets, as measured by specifications of

levels and changes in three variables: the number of listings of public firms, market capitalization and trading volume. The regression-based evidence, using levels and changes in the dependent variables, though not always statistically significant across all three measures, is generally strong and robust to limiting the sample to the post dot-com crash and to excluding the U.S. The relationships are also apparent in bivariate comparisons of changes in the dependent variables to measures of changes in institutional holdings.

The evidence has implications for public policy for economic development and securities market regulation. Currently, in the U.S. and other countries, a main focus of public policy concerns finding ways to increase the number of publicly listed firms. If going public and being public becomes less important for capital raising, then it is not clear that these efforts are well-placed or likely to be effective. Also, the nature of regulation can be expected to be modified as financial markets become increasingly dominated by institutional investors. Historically, the focus of regulation related to investing has been on the individual investor, maintaining confidence in public markets, and “leveling the playing field” for individuals. The evidence in this paper suggests, however, that forward-looking regulatory efforts and oversight may be more relevant if focused on institutional investing.

A related policy concern is that with fewer public firms to choose from, retail investors may be unable to diversify optimally. Additionally, the pool of listed public firms from which to choose may be more limited as, for example, public firms in the U.S. have become increasingly older and larger than in previous eras. Grullon, Larkin and Michaely (2017) document that in real terms the average U.S. publicly traded firm is three times larger today than it was twenty years ago. While there are trading platforms that can be used to trade privately held securities (e.g.

Second Market, SharesPost and AngelList), these platforms are not widespread or accessible to most investors.

The evidence here also raises the question as to whether the size of the public equity market is a reliable indicator of economic development. While it is clear that in early stages of development this relationship is positive, our evidence indicates that as institutionalization becomes prevalent, the focus of investing can move away from reliance on public markets.

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Table 1

Panel Data Frequency by Year

The table shows the numbers of observations (countries) of key variables by year from 1975 through 2015. Except as noted otherwise, data for these variables is from the World Bank *Global Financial Development Database*. Mutual Fund Assets, Insurance Company Assets, and Pension Fund Assets are expressed relative to Total Market Capitalization and are constructed from the *Global Financial Development Database*. To reduce the occurrence of missing information, World Bank data are compiled by merging information from their 2014 and 2016 databases. The *Financial Openness Index* is from the 2015 update of the Chinn-Ito index, and is based on International Monetary Fund data. The latest reported index values are from 2013 and those values are assumed to extend through 2015.

Year	Number of Listings	Aggregate Trading Volume	Total Market Cap	Mutual Fund Assets	Insurance Company Assets	Pension Fund Assets	Financial Openness Index
1975	22	19	17				76
1976	22	19	17				81
1977	21	19	16				82
1978	22	20	18				82
1979	24	22	21				83
1980	29	30	22	2	6		84
1981	28	29	24	2	6		85
1982	28	30	25	2	6		85
1983	30	31	25	2	6		85
1984	32	31	25	2	6		87
1985	33	32	26	2	6		88
1986	34	33	26	2	6		90
1987	35	33	26	3	6		90
1988	53	33	26	4	7		91
1989	53	50	50	5	8		91
1990	57	49	50	5	10	2	91
1991	67	53	53	5	8	1	91
1992	70	58	60	6	10	1	91
1993	81	70	72	6	10	1	91
1994	88	75	75	6	11	4	93
1995	94	88	86	7	14	4	94
1996	98	95	95	7	14	5	110
1997	105	97	97	9	17	8	112
1998	107	99	100	9	19	13	112
1999	105	101	99	12	33	18	112
2000	104	98	99	51	48	37	112

Table 1 Continued

2001	107	103	100	50	59	50	112
2002	104	103	102	51	68	57	112
2003	109	108	108	56	78	59	112
2004	112	110	110	61	82	66	112
2005	112	112	111	57	89	64	112
2006	112	114	113	63	92	67	112
2007	112	107	105	62	88	67	112
2008	110	109	105	58	92	64	112
2009	111	108	105	66	94	64	112
2010	112	107	106	57	96	65	112
2011	113	109	108	59	98	67	112
2012	111	107	107	60	93	66	112
2013	79	78	59	41	41	36	112
2014	76	69	57	24	29	25	112
2015	73	50	54				112
Total	2995	2808	2700	914	1356	911	4069
Pct since 2000	55.33%	56.70%	57.37%	89.28%	84.59%	93.74%	44.04%
Pct w/ Max Openness				51.87%	48.67%	50.60%	

Table 2

Natural Logs of Institutional Ownership and Financial Openness Over Time

The table shows the natural logs of institutional ownership percentages and the scaled values of the Chinn-Ito Financial Openness Index over time. Numbers of observations are increasing over time except in the most recent years.

Year	Mutual Fund Assets				Insurance Company Assets			
	Mean	Median	Std Dev	Obs.	Mean	Median	Std Dev	Obs.
1975								
1980	1.38	1.38	1.41	2	4.17	3.94	1.00	6
1985	2.13	2.13	1.32	2	3.60	3.68	0.28	6
1990	2.51	2.62	0.82	5	3.22	3.48	0.86	10
1995	2.59	2.90	0.86	7	3.63	3.82	0.97	14
2000	2.76	3.04	1.35	51	3.56	3.59	1.33	48
2005	2.82	3.06	1.33	57	3.16	3.07	1.15	89
2010	2.84	2.92	1.63	57	3.29	3.17	1.19	96
2013	3.19	3.14	1.48	41	3.41	3.27	0.98	41

Year	Pension Fund Assets				Financial Openness			
	Mean	Median	Std Dev	Obs.	Mean	Median	Std Dev	Obs.
1975					0.37	0.16	0.33	76
1980					0.42	0.41	0.34	84
1985					0.38	0.16	0.37	88
1990	4.37	4.37	0.16	2	0.40	0.16	0.38	91
1995	3.15	3.87	1.72	4	0.57	0.42	0.33	94
2000	3.16	3.47	1.32	36	0.60	0.70	0.36	112
2005	2.65	3.13	1.83	64	0.68	0.75	0.35	112
2010	3.06	3.38	2.07	65	0.67	0.76	0.36	112
2013	2.99	3.38	1.50	36	0.64	0.70	0.37	112

Table 3

Financial Development and Institutional Ownership to Market Capitalization

Dependent variables are natural logs of institutional ownership to market capitalization. The independent variable indicator of financial market maturity is the Chinn-Ito index of financial openness. Gross Domestic Product per (thousand) capita is included as a control. Significance levels are from two-tailed t-tests. Significance levels in Model A are based on standard errors clustered by year. Significance levels in Model B are based on inclusion of year fixed effects.

	Model A		Model B	
	Coef.	p-value	Coef.	p-value
Mutual Fund Assets				
Financial Openness	0.6197	0.000	0.7172	0.000
GDP per capita (000)	0.0334	0.000	0.0328	0.000
Constant	1.6632	0.000	1.6030	0.000
R-square	0.296		0.247	
N	880		880	
Insurance Company Assets				
Financial Openness	0.0936	0.240	0.0955	0.348
GDP per capita (000)	0.0206	0.000	0.0202	0.000
Constant	2.9147	0.000	2.9196	0.000
R-square	0.106		0.106	
N	1292		1292	
Pension Fund Assets				
Financial Openness	0.6544	0.000	0.7369	0.001
GDP per capita (000)	0.0069	0.000	0.0064	0.106
Constant	2.4132	0.000	2.3618	0.000
R-square	0.029		0.029	
N	851		851	
Year Cluster	Y		N	
Year FE	N		Y	

Table 4

Changes in Listings, Market Cap, and Trading Volume by Institutional Ownership Fractile

The table shows median and mean annual continuously compounded year-to-year changes in listings, market cap, and trading volume by institutional ownership fractile. Dependent variable observations are trimmed at the plus or minus 0.5 year-to-year change level to remove likely errors or structural discontinuities. Institutional ownership fractiles are constructed by stratifying observations into six groups as shown. Two-tailed significance test p-values are based on tests of differences in medians (Pearson chi2) and differences in means (t-test) between the top 10% and bottom 10% of ownership observations for each institutional ownership category. Median and mean values for observations without dependent variable or ownership data are reported as "Missing".

Listing Change	Median Change by Fractile			Mean Change by Fractile		
	Mutual Fund	Insurance	Funds	Mutual Fund	Insurance	Pension Funds
Holdings Fractile						
Missing	0.6%	0.9%	0.8%	2.9%	3.3%	2.9%
0-10% (Low)	0.0%	2.8%	-0.6%	0.4%	2.4%	0.3%
10-25%	0.8%	0.4%	1.1%	1.3%	0.5%	0.5%
25-50%	-0.2%	0.0%	-0.3%	-0.6%	1.2%	-1.0%
50-75%	0.0%	0.0%	-1.1%	-0.2%	0.1%	0.1%
75-90%	-0.8%	-1.0%	-1.5%	0.0%	-1.0%	-0.4%
90-100% (High)	-3.6%	-2.3%	-1.6%	-3.1%	-1.8%	-1.5%
High-Low	-3.6%	-5.1%	-1.0%	-3.5%	-4.2%	-1.8%
p-value	0.000	0.000	0.760	0.014	0.002	0.430
Market Cap Change						
	Mutual Fund	Insurance	Funds	Mutual Fund	Insurance	Pension Funds
Holdings Fractile						
Missing	10.5%	10.8%	11.8%	9.4%	9.8%	9.9%
0-10% (Low)	23.9%	18.3%	21.0%	17.5%	13.4%	14.9%
10-25%	14.5%	17.0%	18.0%	10.7%	13.2%	14.7%
25-50%	14.1%	14.0%	13.0%	9.1%	10.8%	12.2%
50-75%	16.0%	13.1%	12.5%	13.4%	9.8%	7.8%
75-90%	10.7%	11.0%	7.9%	9.3%	8.7%	6.9%
90-100% (High)	7.0%	5.6%	5.8%	6.5%	3.5%	5.4%
High-Low	-16.9%	-12.7%	-15.3%	-11.0%	-9.9%	-9.5%
p-value	0.032	0.056	0.013	0.009	0.003	0.014
Volume Change						
	Mutual Fund	Insurance	Funds	Mutual Fund	Insurance	Pension Funds
Holdings Fractile						
Missing	4.0%	5.0%	6.0%	4.2%	4.8%	5.0%
0-10% (Low)	12.0%	6.5%	2.5%	4.6%	5.2%	1.5%
10-25%	7.0%	15.0%	11.0%	5.6%	12.1%	6.6%
25-50%	7.0%	4.0%	3.0%	6.1%	4.3%	3.3%
50-75%	12.0%	7.0%	6.0%	9.6%	5.5%	5.4%
75-90%	1.0%	5.0%	4.0%	2.6%	4.2%	5.4%
90-100% (High)	-5.0%	-10.0%	-4.0%	-4.2%	-9.1%	-2.7%
High-Low	-17.0%	-16.5%	-6.5%	-8.8%	-14.3%	-4.2%
p-value	0.023	0.015	0.489	0.091	0.001	0.449

Table 5

Changes in Listings, Market Cap, and Volume by Financial Openness Fractile

The table shows median and mean annual continuously compounded year-to-year changes in listings, market cap, and trading volume by *Financial Openness* fractile. Dependent variable observations are trimmed at the plus or minus 0.5 level of year-to-year change to remove likely errors or structural discontinuities. Financial openness fractiles are constructed by stratifying observations into five groups as shown, where the low group are country-years with an index value of 0.0 and the high group are those with an index value of 1.0. The percentage of usable observations from each fractile is reported. Two-tailed significance test p-values are based on tests of differences in medians (Pearson chi²) and differences in means (t-test) between the low and high financial openness observations. Median and mean values for observations without dependent variable or openness data are reported as "Missing".

Openness Fractile	Listing Change			Market Capitalization Change			Volume Change		
	Obs.	Median	Mean	Obs.	Median	Mean	Obs.	Median	Mean
	Missing	0.0000	0.0289	Missing	0.0933	0.0751	Missing	0.0200	0.0212
Low	5.1%	0.0140	0.0393	3.0%	0.1665	0.1232	3.4%	0.1300	0.0979
	20.6%	0.0128	0.0336	15.1%	0.0987	0.0909	17.7%	0.0400	0.0482
	15.4%	0.0085	0.0300	14.5%	0.1338	0.1000	14.7%	0.0400	0.0185
	23.0%	0.0000	0.0112	24.2%	0.1024	0.0904	21.9%	0.0450	0.0366
High	35.9%	0.0000	0.0053	43.2%	0.1292	0.1102	42.3%	0.0600	0.0593
High - Low		-0.014	-0.034		-0.037	-0.013		-0.070	-0.039
		0.011	0.000		0.078	0.693	0.000	0.063	0.275

Table 6

Levels of Listings, Market Cap, and Volume on Holdings and Financial Openness

The dependent variables are the natural logs of listings per (million) capita, market capitalization relative to GDP, and trading volume relative to market cap (turnover). Independent variables are the lagged values of the dependent variable in each model, a measure of financial maturity (Financial Openness) and a measure of wealth (GDP per (thousand) capita). Each model includes a measures of institutional holdings (mutual fund, insurance company, and pension fund) relative to market capitalization. Holdings variables are in natural logs. All models include year fixed effects. For each model specification, p-values are reported without and with country-level clustered standard errors.

	ln(Listings/capita)			ln(MktCap/GDP)			Ln(Turnover)		
	Coeff.	p-value	p-value	Coeff.	p-value	p-value	Coeff.	p-value	p-value
Mutual Fund Assets									
Ln (Mutual Fund)	-0.05763	0.052	0.493	-0.13510	0.000	0.049	-0.00346	0.913	0.968
Financial Openness	0.79756	0.000	0.019	-0.34489	0.007	0.420	-1.03169	0.000	0.018
GDP per capita (000)	0.03500	0.000	0.000	0.03690	0.000	0.000	0.03890	0.000	0.000
Constant	1.44605	0.000	0.074	3.66743	0.000	0.000	3.52865	0.000	0.000
R-square	0.346			0.221			0.194		
N	856			880			826		
Insurance Company Assets									
Ln (Insurance)	-0.18478	0.000	0.037	-0.63377	0.000	0.000	-0.12036	0.001	0.207
Financial Openness	0.94368	0.000	0.004	0.31389	0.001	0.331	-0.66128	0.000	0.090
GDP per capita (000)	0.03860	0.000	0.000	0.04720	0.000	0.000	0.05190	0.000	0.000
Constant	1.66503	0.000	0.000	4.57588	0.000	0.000	3.11311	0.000	0.000
R-square	0.370			0.108			0.276		
N	1242			1292			1166		
Pension Fund Assets									
Ln (Pension Fund)	-0.05377	0.017	0.341	-0.21255	0.000	0.027	-0.21697	0.000	0.002
Financial Openness	0.75142	0.000	0.031	-0.16695	0.222	0.703	-0.62010	0.000	0.161
GDP per capita (000)	0.03740	0.000	0.000	0.03650	0.000	0.000	0.05010	0.000	0.000
Constant	1.30298	0.000	0.000	3.72812	0.000	0.000	3.43511	0.000	0.000
R-square	0.363			0.293			0.341		
N	827			851			789		
Year FE		Y	Y		Y	Y		Y	Y
Country Cluster		N	Y		N	Y		N	Y

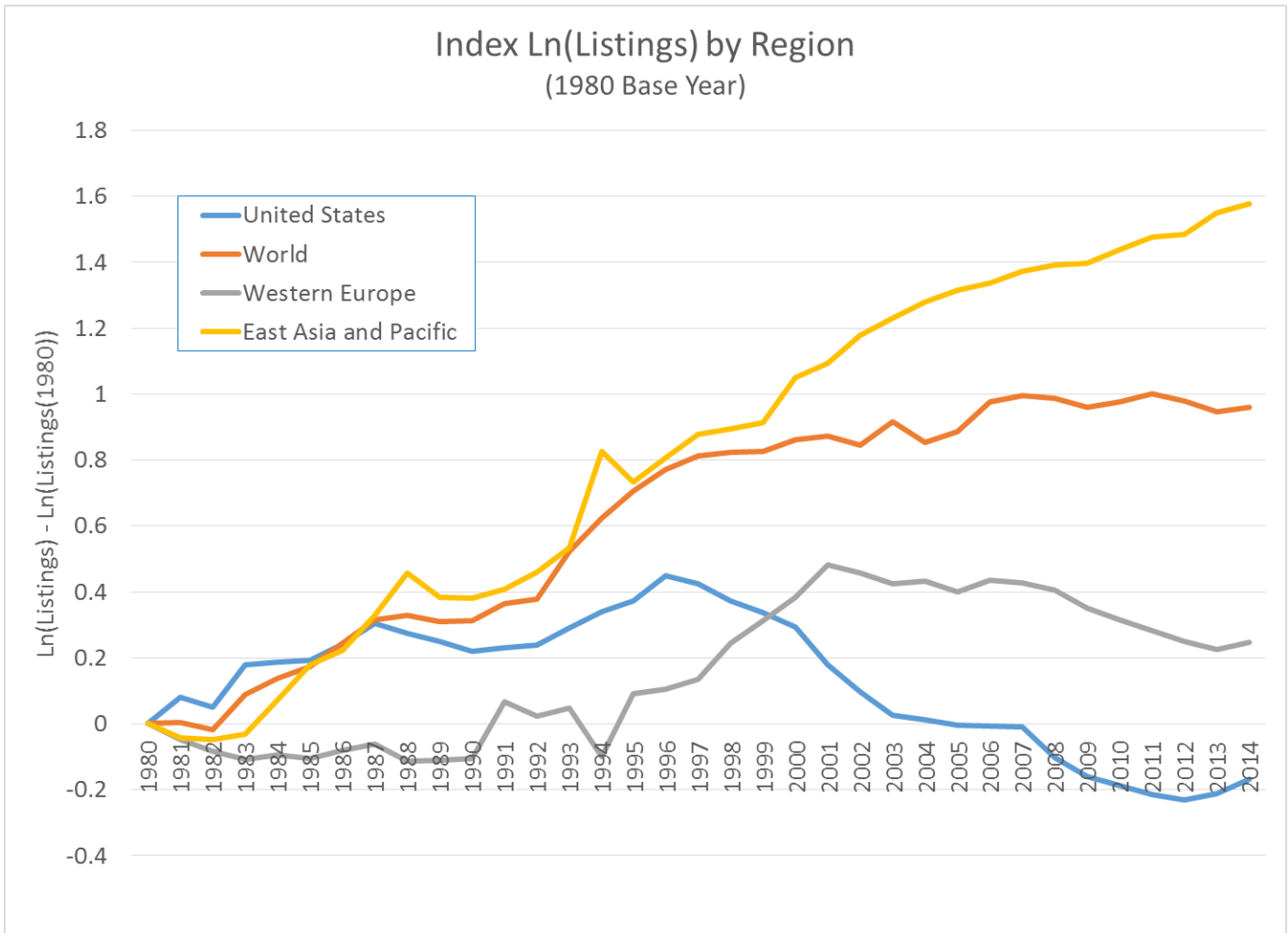
Table 7

Changes in Listings, Market Cap, and Volume on Holdings and Financial Openness

The dependent variables are the natural logs of listings, market capitalization, and trading volume. Independent variables are the lagged values of the dependent variable in each model, a measure of financial maturity (*Financial Openness*) and a measure of wealth (*GDP per (thousand) capita*). Each model includes a measures of institutional holdings (mutual fund, insurance company, and pension fund) relative to market capitalization. Holdings variables are in natural logs. All models include year fixed effects. For each model specification, p-values are reported without and with country-level clustered standard errors.

	ln(Listings)			ln(MktCap)			Ln(Volume)		
	Coeff.	p-value	p-value	Coeff.	p-value	p-value	Coeff.	p-value	p-value
Market Development									
Lag Ln(dependent)	0.97426	0.000	0.000	0.99696	0.000	0.000	1.00251	0.000	0.659
Financial Openness	-0.05801	0.001	0.018	0.00043	0.980	0.976	-0.00715	0.762	0.784
GDP per capita (000)	0.00059	0.177	0.290	0.00000	0.219	0.096	0.00070	0.248	0.215
Constant	0.18558	0.000	0.000	0.10831	0.000	0.000	0.02129	0.302	0.388
R-square	0.973			0.993			0.995		
N	2427			1772			1433		
Mutual Fund Assets									
Lag Ln(dependent)	0.98909	0.000	0.000	0.99201	0.000	0.000	1.00614	0.000	0.000
Ln (Mutual Fund)	-0.01197	0.062	0.193	-0.00979	0.093	0.103	-0.00382	0.640	0.652
Financial Openness	-0.07023	0.021	0.147	-0.05592	0.050	0.020	-0.04225	0.280	0.256
GDP per capita (000)	0.65800	0.287	0.506	0.00132	0.030	0.002	0.11800	0.889	0.889
Constant	0.14227	0.000	0.074	0.19237	0.000	0.074	0.02727	0.550	0.597
R-square	0.979			0.991			0.992		
N	879			737			633		
Insurance Company Assets									
Lag Ln(dependent)	0.98344	0.000	0.000	0.99157	0.000	0.000	1.00190	0.000	0.000
Ln (Insurance)	-0.00870	0.188	0.464	-0.02994	0.000	0.000	-0.03521	0.000	0.001
Financial Openness	-0.04683	0.039	0.139	0.00506	0.811	0.810	0.00368	0.907	0.908
GDP per capita (000)	0.38000	0.467	0.666	1.52000	0.004	0.010	1.13000	0.141	0.059
Constant	0.19235	0.000	0.021	0.20722	0.000	0.000	0.12242	0.005	0.003
R-square	0.981			0.993			0.995		
N	1280			1042			869		
Pension Fund Assets									
Lag Ln(dependent)	0.98866	0.000	0.000	0.99275	0.000	0.000	1.00270	0.000	0.000
Ln (Pension Fund)	-0.00832	0.085	0.239	-0.01114	0.014	0.017	0.01321	0.035	0.026
Financial Openness	-0.04501	0.118	0.264	-0.03165	0.257	0.174	-0.03964	0.317	0.340
GDP per capita (000)	-0.15200	0.785	0.839	0.00098	0.090	0.021	-0.23900	0.772	0.730
Constant	0.12948	0.001	0.089	0.17568	0.000	0.000	0.01460	0.761	0.768
R-square	0.980			0.992			0.994		
N	847			696			593		
Year FE		Y	Y		Y	Y		Y	Y
Country Cluster		N	Y		N	Y		N	Y

Figure 1



The figure is constructed from data downloaded from the World Bank in March 2017. Western Europe is defined to include Austria, Belgium, Switzerland, Germany, Denmark, Spain, Finland, France, United Kingdom, Greece, Ireland, Iceland, Italy, Luxembourg, Netherlands, Norway, Portugal, and Sweden. East Asia and the Pacific includes Australia, China, Fiji, Hong Kong, Indonesia, Japan, South Korea, Mongolia, Malaysia, New Zealand, Philippines, Papua New Guinea, Singapore, Thailand, and Vietnam.

Figure 2

The Financial Development of Economies and the Evolution of Equity Ownership and Trading

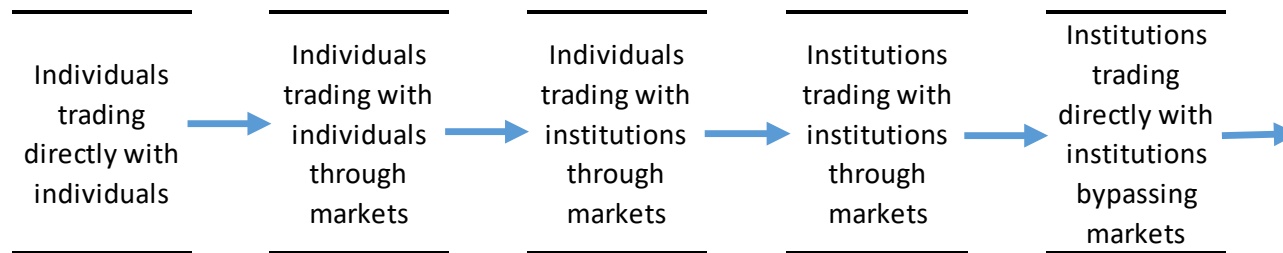
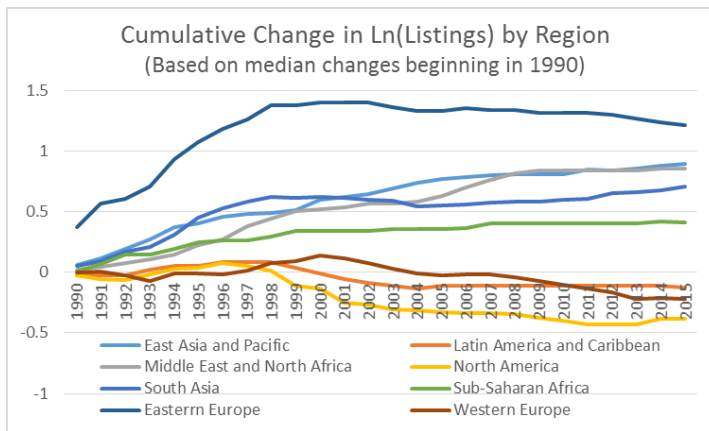


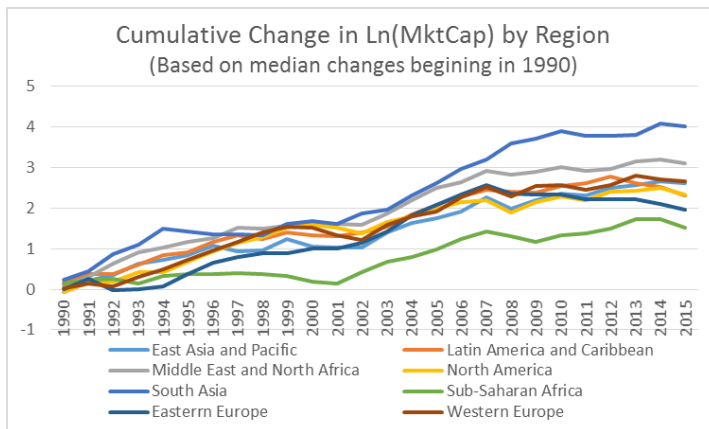
Figure 3

Cumulative Changes in Dependent Variables by Region
(1989 Base Year)



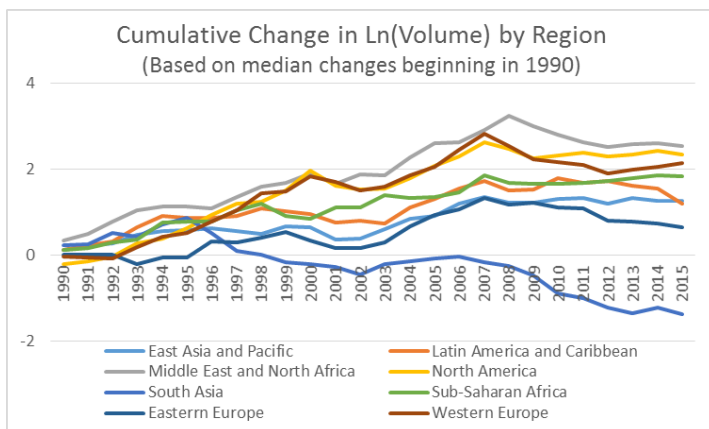
Domestic Listings on Public Markets

Regional classifications are assigned by the World Bank. Europe is divided into Eastern and Western sub-regions. Plots are based on median year-to-year changes in natural logs of listings.



Total Equity Market Capitalization

Plots are based on median year-to-year changes in natural logs of total equity market capitalization.



Annual Volume of Shares Traded

Plots are based on median year-to-year changes in natural logs of total trading volume.

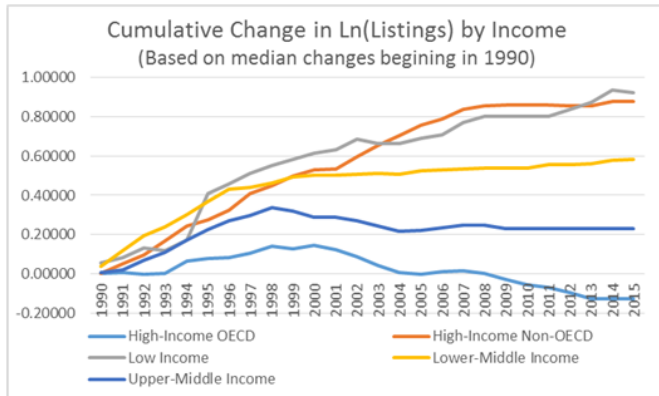
Sub-regions of Europe and Central Asia

Eastern Europe: Armenia, Azerbaijan, Bulgaria, Croatia, Cyprus, Czech Republic, Estonia, Georgia, Hungary, Kazakhstan, Kyrgyz Republic, Latvia, Lithuania, Macedonia, Moldova, Montenegro, Poland, Romania, Russian Federation, Serbia, Slovak Republic, Slovenia, Turkey, Ukraine, Uzbekistan

Western Europe: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom

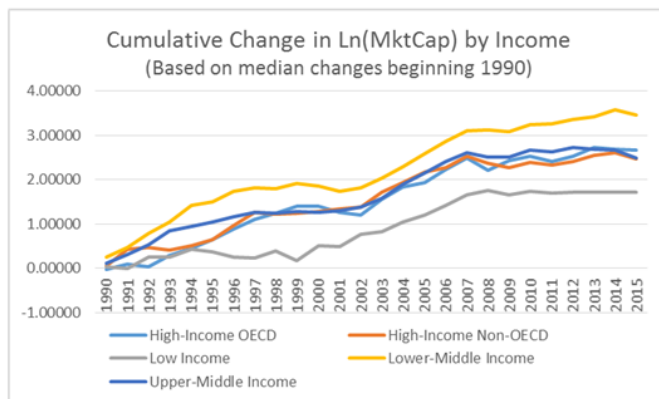
Figure 4

Cumulative Changes in Dependent Variables by Region
(1989 Base Year)



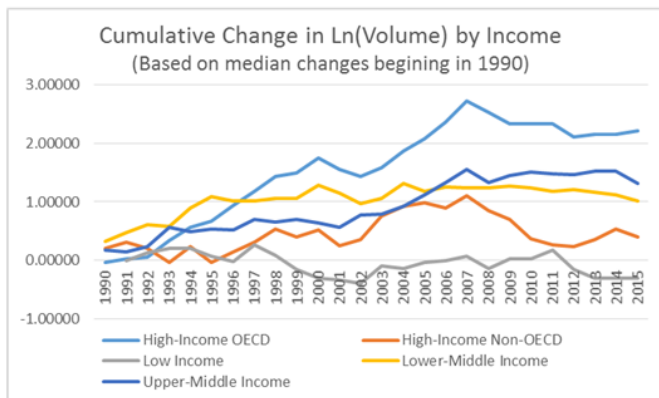
Domestic Listings on Public Markets

Income group classifications are based on World Bank. High income is divided by OECD membership.



Total Equity Market Capitalization

Plots are based on median year-to-year changes in natural logs of total equity market capitalization.



Annual Volume of Shares Traded

Plots are based on median year-to-year changes in natural logs of total trading volume to total market capitalization.

Income Groups

High-income, OECD: Australia, Austria, Belgium, Canada, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Israel, Italy, Japan, South Korea, Luxembourg, Netherlands, New Zealand, Norway, Poland, Portugal, Slovak Republic, Slovenia, Spain, St. Kitts and Nevis, Sweden, Switzerland, United Kingdom, United States

High-income, Non-OECD: Bahrain, Barbados, Bermuda, Cayman, Islands, Croatia, Cyprus, Hong Kong, Kuwait, Malta, Oman, Qatar, Saudi Arabia, Singapore, Trinidad and Tobago, United Arab Emirates

Higher-Middle Income: Argentina, Azerbaijan, Botswana, Brazil, Bulgaria, Chile, China, Colombia, Costa Rica, Dominican Republic, Ecuador, Iran, Jamaica, Jordan, Kazakhstan, Latvia, Lebanon, Lithuania, Macedonia, Malaysia, Mauritius, Mexico, Montenegro, Namibia, Panama, Peru, Romania, Russian Federation, Serbia, South Africa, Thailand, Tunisia, Turkey, Uruguay, Venezuela

Lower-middle Income: Armenia, Bhutan, Bolivia, Cote d'Ivoire, Egypt, El Salvador, Fiji, Georgia, Ghana, Guatemala, Guyana, Honduras, India, Indonesia, Moldova, Mongolia, Morocco, Nigeria, Pakistan, Papua New Guinea, Paraguay, Philippines, Sri Lanka, Swaziland, Ukraine, Uzbekistan, Vietnam, West Bank and Gaza, Zambia

Low Income: Bangladesh, Kenya, Kyrgyz Republic, Malawi, Nepal, Tanzania, Uganda, Zimbabwe