The U.S. listing gap

Craig Doidge, G. Andrew Karolyi, and René M. Stulz*

December 2015

ABSTRACT

Relative to other countries, the U.S. has abnormally few listed firms today given its level of economic development and the quality of its institutions. We call this the "U.S. listing gap" and show that it is consistent with a decrease in the net benefit of a listing for U.S. firms. We find that the probability that a firm is listed is lower than at the listing peak in 1996 for all firm size categories though more so for smaller firms. From 1997 to the end of our sample period in 2012, the new list rate is low and the delist rate is high compared to U.S. history and to other countries. The high delist rate accounts for roughly 46% of the listing gap and the low new list rate for 54%. The high delist rate is explained by an unusually high rate of acquisitions of publicly-listed firms compared to previous U.S. history and to other countries. We rule out industry changes, changes in listing requirements, and the reforms of the early 2000s as explanations for the gap.

* Doidge is from the Rotman School of Management at the University of Toronto, Karolyi is from the Johnson Graduate School of Management at Cornell University, and Stulz is from the Fisher College of Business at The Ohio State University, NBER, and ECGI. We thank participants at the Florida State University SunTrust Beach Conference, FMA Asia Conference (Seoul), and at seminars at Aalto University, BI Norway, Columbia University, Cornell University, Dimensional Fund Advisors, Board of Governors of the Federal Reserve, Securities and Exchange Commission, Penn State University, Purdue University, Ohio State University, and the University of Oklahoma for helpful comments. We are grateful to Brian Baugh, Andrei Gonçalves, Alan Kwan, and Xiaofei Zhao for excellent research assistance, to Francois DeGeorge, Gustavo Grullon, Charles Jones, Crocker Liu, Hamid Mehran, Vesa Puttonen, Jay Ritter, and Scott Yonker for valuable comments, and to Frank Hatheway (NASDAQ) for a useful conversation.

1. Introduction.

In 1996, the peak year for U.S. listings, the U.S. has 8,025 listings. By 2012, that number has been cut almost in half as there are only 4,102 listings. Compared to other countries with similar institutions and similar economic development, the U.S. now has significantly fewer publicly-listed firms. We call this difference the U.S. "listing gap." This gap is a recent phenomenon. Our international data starts in 1990 and the gap only arises after 1999. We also find that this gap is large. By 2012, this gap exceeds 5,000 firms. After documenting the U.S. listing gap, we investigate possible explanations for it. To understand the gap, the evidence reveals it is necessary to focus on new lists as well as delists.[1] Had new lists stayed at the U.S. historical average rate rather than having fallen, the U.S. would still have a listing gap because delists also occurred at a higher rate than historically, mostly as a result of an unusually large pace of merger activity among public firms relative to the past.

Considerable attention has been devoted to the decrease in the number of listed firms in the U.S.[2] New laws have been proposed and even enacted in response to this phenomenon. However, without understanding better why the U.S. has fewer listed firms, little can be said about whether this phenomenon should be a source of concern. For instance, it could be that the optimal firm size has increased because of technological changes, so that there are fewer firms, but they are larger in size. In this case, the drop in listed firms would likely have nothing to do with the benefits and costs of being a public company and might even be a positive development for the economy. Alternatively, it could be that changes in the benefits and costs have made it unattractive for smaller firms to be public, in which case we might have too few public firms, possibly lowering economic growth. We show that the number of listed firms has fallen sharply in the U.S., but has increased on average in other countries. Hence, to explain the listing gap, our paper shows that it is essential to explain why the number of listed firms falls in the U.S. in particular and why specifically it has done so since 1996.

[1] We use "new listings" and its shorter form "new lists" interchangeably. We refer to both "delistings" and "delists" as departures of publicly-listed companies from stock exchanges and we use "listed" or "public" to refer to publicly-listed companies.

[2] The decline in U.S. listings has been noted by other researchers, including Ciccotello (2014), Rosett and Smith (2014a, 2014b), and Grullon, Larkin, and Michaely (2015), as well as in the media, e.g., "Wall Street's Dead End", *The New York Times* (February 13, 2011), "Missing: Public Companies – Why is the Number of Publicly Traded Companies in the US Declining?" *CFO Magazine* (March 22, 2011), and "The Endangered Public Company: The Big Engine that Couldn't", *The Economist* (May 19, 2012).

To frame the issue, it is useful to introduce some notation. Let the number of listed firms, L, equal the total number of firms in the economy, N, times the propensity of a firm to be listed, p, so that L equals $p \times N$. For the number of listed firms to fall, it has to be that either the propensity of a firm to be listed or the number of firms that can be listed falls. Specifically, the change in the number of listed firms over a period is equal to $\Delta p \times N + p \times \Delta N$, which is the effect of the change in propensity plus the effect of the change in the number of firms that can be listed. Hence, to understand the drop in the number of listed firms, we have to understand whether the propensity to be listed has fallen and/or whether the number of firms that can be listed has fallen.

Much of the literature on why fewer firms go public, or are listed, focuses on the idea that for a variety of reasons being listed has become either too costly or less beneficial for smaller firms (among others, see Weild and Kim, 2009, Djama, Martinez, and Serve, 2013, Gao, Ritter, and Zhu, 2013). We build a simple model in which the cost and benefit of being listed is a function of firm size. With this model, there is a fixed cost of listing and a variable cost. By contrast, the benefit of listing is zero for the smallest firms and increases with size. The idea is that a large share of the benefit is access to public markets, which is more valuable for larger firms. This, in turn, arises because it is harder for them to raise capital to finance themselves outside of public markets for the simple reason the amounts they have to raise are extremely large and hence require access to a large pool of investors. That is, the net benefit of being listed (defined as the benefit minus the cost) is negative for small firms and positive for large ones. Using this simple model, there is a size threshold above which firms are listed and below which they are not. This threshold is likely to be industry-specific and is consistent with the fact that the propensity to be listed increases with firm size. Importantly, a proportional rise in the cost of being listed or a proportional decline in the benefit of being listed as a function of firm size increase the minimum firm size threshold for listed firms and decrease p for constant N. An increase in the size threshold for being publicly listed means that the rate of IPO activity drops since firms have to grow more for an IPO to be worthwhile. Such an increase can also lead to more merger activity among public firms as the firms that have fallen below the threshold either delist or merge.

If the net benefit of being listed falls, our model predicts that (1) the propensity of being publicly listed drops; (2) listed firms exit through merger or go private; (3) fewer firms go public; and, (4) public firms become larger in size. We find support for these four predictions. Alternatively, the number of listed firms could have fallen because there are fewer firms that could be listed, because of poor market conditions, because of the emergence of new organizational forms that are more efficient, such as private firms with a private equity sponsor (in the spirit of Jensen, 1989), or because too many firms went public in the years before the peak that were too weak to survive as public firms in the years before the peak. We test but find no support for these alternative explanations. With international data on listings in hand, we show that the U.S. has fewer listed firms than expected using a model that predicts the number of listed firms across the world. This listing gap is inconsistent with theories of a decrease in listed firms that are not U.S.-centric. For example, theories that focus on technological change that affects firms irrespective of their location do not match the evidence. Hence, our findings point to explanations related to a decrease in the net benefit of being listed in the U.S., as opposed to more generally.

For our tests, we use the Longitudinal Business Database (LBD) of the U.S. Census Bureau. Specifically, our evidence shows that the number of public and private firms eligible to be listed actually increases over time. The Census Bureau classifies all firms by their number of employees, which allows us to gauge the differences in listing propensity across size categories defined by the number of employees. We find that the number of firms increases for each size category provided by the Census Bureau. Since the number of firms (N) increases but the number of listed firms falls since the listing peak in 1996, it has to be that the propensity of being listed (p) falls. We show that this is the case.

Our simple model prompts us to investigate whether the decrease in the propensity of being listing is consistent with an increase in the cost of being listed and/or a decrease in the benefit of being listed. We find that since the listing peak both the pace of new lists is low *and* that of delists is high. The decrease in the rate of new lists and the increase in the rate of delists implies a negative net new list rate, which means the propensity of being listed falls. An important finding in our paper is that both the decrease in new lists and the increase in delists are required to understand the U.S. listing gap. However, many of the arguments advanced by observers for an increase in listing costs centers on the impact of Sarbanes-Oxley

Act of 2002 (SOX) on smaller firms. We show that half of the increase in the listing gap is already present by the time SOX becomes law. As a result, the evidence implies that a decrease in the benefit of being listed plays an important role in the emergence of the U.S. listing gap.

We then investigate possible explanations for the increase in the rate of delisting. A possible explanation is that market conditions after the listing peak lead to more distressed firms and hence more delists. We find that taking into account market conditions actually increases the size of the listing gap. Fama and French (2004) show that weaker firms, measured in terms of lower profitability and slower growth in assets, went public in the late 1990s. As weaker firms go public, new list survival rates should fall and delists should increase. We show, however, that delists are no more highly concentrated among newly-listed firms compared to more seasoned firms after the listing peak. We find that the increase in delists can largely be explained by an increase in merger activity. This explanation for the increase in delists is consistent with a decrease in the net benefit of being listed in our model. We explore whether the increase in mergers could be due to firms that would have to delist but choose a merger instead or to firms that want to go private but do so through an acquisition by a private vehicle, such as a private equity firm. None of these explanations explains the increase in mergers.

Lastly, we show that the size of listed firms increases after the peak. The smallest listed firms are now much larger than the smallest listed firms at the listing peak. This evidence is consistent with our simple model of the implications of an increase in the cost of being listed and a decrease in the benefit.

2. The phenomenon.

In this section, we document the dramatic difference in the evolution in listings between the U.S. and other countries around the world over the past two decades using a variety of metrics. We use data on the number of listed firms in each country from two sources: the World Bank's World Development Indicators (WDI) database and the World Federation of Exchanges (WFE) database. Each year, the WFE collects information from its member and affiliated exchanges on the number of domestically incorporated companies listed on each country's stock exchanges at the end of the year. It does not include investment companies, mutual funds, real estate investment trusts (REITs), or other collective

investment vehicles.[3] The WDI data, by contrast, is primarily sourced from Standard & Poor's Global Stock Market Factbooks and supplemental S&P data. To create a comprehensive dataset, we merge the WDI and WFE databases (the WDI/WFE dataset). The Appendix provides the details of the construction of the dataset.

We start with the evolution of listings in the U.S. since 1975. Figure 1 (left axis) reports the number of firms listed in the U.S. since 1975. The figure shows an inverted U-shaped time-series pattern. Table 1 also shows the number of listings for selected years. The number of listed firms in 1975 is 4,775. In 2012, the number is 4,102, the lowest count across the four decades and 14% lower than in 1975. The peak number of listings is 8,025 in 1996. From 1975 to 1996 (the pre-peak period), the number of listed firms increases steadily from 4,775 to 8,025, a cumulative increase of 68%. Since the peak in 1996, listings fall each year from 1997 to 2012 (the post-peak period) and cumulatively decline by 3,923, or 49%, by 2012. Through we do not show the results in Figure 1, the inverted u-shape we observe for the U.S. as a whole holds separately for the NYSE and NASDAQ.

We turn next to the number of listings in other countries. We show only results for the countries included in Djankov, LaPorta, Lopez-de-Silanes, and Shleifer (DLLS, 2008) since these are the countries for which we can estimate the listing gap. These countries account for 96% of listed firms during our sample period. Figure 1 (right axis) shows the number of listings in non-U.S. countries follows a sharply different path than the number of listings in the U.S. Table 1 shows that, in 1975, there are 12,361 listings outside the U.S. The vast majority of these listings (91%) are domiciled in developed countries (using the Morgan Stanley Capital International, MSCI, country classification scheme as of 2014). The number of non-U.S. listings peaks in 2011 at 39,543. From 1975 to 2012, the number of non-U.S. listings increases by 219% whereas the number of U.S. listings decreases by 14%. The increase in non-U.S. listings is due to an increase in listings within countries as well as to the addition of new countries to the sample. Note, however, that there are no changes in the number of developed countries since 1994 and few changes in the number of emerging ones. Since the U.S. peak in 1996, the number of non-U.S. listings increases by

[3] The official definition from the WFE website states: "A company is considered domestic when it is incorporated in the same country as where the exchange is located. The only exception is the case of foreign companies which are exclusively listed on an exchange, i.e. the foreign company is not listed on any other exchange as defined in the domestic market capitalization definition." September 2013 is the last update.

28% while the number of U.S. listings falls by 49%. As a result of this evolution, there is a sharp increase in the number of non-U.S. listings relative to the number of U.S. listings. At the U.S. peak in 1996, the ratio of non-U.S. listings to U.S. listings is 3.8-to-1. It increases every year, almost tripling to 9.6-to-1 by 2012. The figure also shows the evolution of the number of listings for MSCI-classified developed countries and that number increases steadily throughout our sample period.

Because the number of countries with data on listing counts increases from 1975 to 2012, an obvious concern is that the growth in the number of countries in the sample could obscure a decrease in the number of listings within countries. We use a constant sample of developed countries and show that this is not the case. We show total listing counts for the constant sample of 13 countries that are classified as developed since 1975 both in Figure 1 and in Table 1. The listing count for this sample, 11,261 in 1975, is almost the same at 11,624 in 1996, increases sharply from then to 2006 when it reaches a peak of 17,846, and stays relatively constant thereafter. In 2012, the count is 17,210 so that listings in these countries increase by 53% over our sample period. The evolution is similar when we include all non-U.S. developed countries. Therefore, the evolution of listings in other developed countries since 1996 is dramatically different from that of the U.S. While U.S. listings drop by about half since 1996, listings in the constant sample of developed countries increase by 48%.

We now focus on the evolution of listings since the U.S. peak. Since we look at percentage changes in the number of listings, we eliminate the countries that have almost no listings in 1996. We use the 54 countries that have at least 50 listings in 1996. Figure 2 shows the percentage change in listing counts from 1996 to 2012. During that period, the number of listings in the U.S. drops by 49%; it increases in 32 countries and decreases in 22. Among the 22 countries with a decrease, only six have a greater percentage decrease than the U.S. (Venezuela, Egypt, Colombia, Portugal, Lithuania, and the Czech Republic). In that Figure, the U.S. is quite different from most developed countries as few other developed countries have a significant decrease in listings.

An obvious issue is that the number of listings differs across countries because countries differ in economic size. All else equal, larger countries should have more listings. The typical approach used to adjust for country size is to compute the number of listings on a per capita basis. Using population data

available from WDI, we compute the number of listings per one million inhabitants, or listings per capita. Table 1 shows listings per capita for selected years. In 1975, the U.S. has 22.1 listings per capita; this ratio peaks in 1996 reaching 29.8 and then falls to 13.1 in 2012. The number of listings per capita in 2012 is 59% of the number in 1975 and is 44% of its peak value. The number of listings per capita falls by 56% during the post-peak period. With this measure, the evolution of the U.S. is even more dramatic because its population increases while listings fall. As shown in Table 1, listings per capita for the constant sample of developed countries increase from 23.89 to 31.23 from 1975 to 2012 or by 38.6%.

3. Measuring the U.S. listing gap.

In this section, we investigate whether the U.S. has an *abnormal* number of listings per capita compared to other countries. For this investigation, we use existing cross-country regression models known to explain the number of listed firms per capita across countries. Specifically, La Porta, Lopes-de-Silanes, Shleifer, and Vishy (1997) regress the number of listed firms per capita on the log of GDP, GDP growth, a rule of law index, and an index of investor protection, their anti-director rights index. They find that the index for the rule of law and the anti-director index have positive, significant coefficients so that countries that protect the rights of investors better have more listed firms per capita. DLLS (2008) estimate similar regressions using the average number of listed firms per million habitants for 1999-2003. After controlling for the log of GDP per capita, they show that listings per capita are strongly positively related to the anti-self-dealing index, a measure of the extent to which related-party transactions are limited in a country.

We estimate similar regressions that explain the number of listed firms per capita across the world. Multiplying the fitted value for the U.S. from these regressions by the actual population, we can then compare the predicted number of listings to the actual number of listings to assess whether the U.S. has an abnormal number of listings given its institutions and economic development. Following DLLS, we estimate a regression of the log of listings per capita on the anti-self-dealing index and on the log of GDP

per capita.[4] Model (1) of Table 2 estimates a cross-country regression for 1990. We start with 1990 as it is the first year for which we have at least 50 countries. We find that the anti-self-dealing index has a positive significant coefficient as does GDP per capita. The coefficient on the anti-self-dealing index is very similar to the coefficient in DLLS. They report a coefficient of 1.08 compared to 1.416 in our table. Models (2) and (3) re-estimate the regression for 1996 and 2012. The coefficients are similar to those in Model (1). Though we do not report the results in the table, we also estimate these regressions using a common law indicator variable instead of the anti-self-dealing index and find similar results.

We next estimate regressions using a panel from 1990 through 2012, with standard errors clustered by country. In these regressions, we include GDP growth as an additional variable to better capture changing economic conditions as well as year fixed effects estimated relative to 1990 (not reported). In Model (4) we again find significant coefficients for the anti-self-dealing index and GDP per capita while that for GDP growth is not significant. The adjusted R^2 is 48%. In Model (5) we add an indicator variable that equals one for non-U.S. countries. The coefficient is positive and significant but adding that variable has no impact on the other variables. Finally, in Model (6), we allow the indicator variable for non-U.S. countries to interact with the year fixed effects. The coefficients on the year fixed effects capture the U.S.-specific residuals. They allow us to assess how actual U.S. listings differ each year from the predicted listings.

For Figure 3, we extract from the coefficients on the year fixed effects in Model (6) the size of the listing gap in terms of the number of missing listed firms. The U.S. residuals (measured relative to 1990) are statistically insignificant until 1995, positive and significant in 1995 and 1996, insignificant for the next two years, and then significantly negative and increasing in absolute value until 2012. In other words, the U.S. has a listing gap from 1999 to 2012 and the gap becomes larger every year. By 2012, the listing gap is 5,436 listings. Without this gap, the U.S. would have had 9,538 listings instead of 4,102. It follows from this that if the number of listed firms per capita in the U.S. were the same as in similar countries in terms of institutions and economic development, the U.S. would have a much larger number of listed firms.

[4] In addition, DLLS use a variable which is the time that it takes to collect on a bounced check. That variable is not significant in the relevant regression in their paper and we ignore it.

4. A simple model.

In this section, we present a simple model of how the propensity to be listed is related to firm size. Much of the public policy discussion surrounding the decrease in IPOs and the decrease in the number of listed firms focuses on views that changes in the organization of markets, in financial intermediation, or in laws and regulations, have decreased the net benefit for small firms to be publicly listed.[5] We first introduce our model and then show how the issues discussed in relation to the decrease in IPOs and the number of listed firms are associated with the propensity to be listed.

The finance literature has identified both costs and benefits of a public listing. Important costs that are discussed include the listing fee that has to be paid to the exchange, the administrative costs of preparing filings required of listed companies, competitive costs of disclosures required of public companies, and costs of communicating with public shareholders (for example, Bushee and Miller, 2012). There are other costs of being public that tend to be more controversial. For instance, there is much discussion of deadweight costs associated with quarterly reporting. Public firms can be the subject of unwanted takeover attempts and pressure from activist investors. The potential agency costs associated with the separation of ownership and control are larger for public firms. Finally, public firms can be subject to more political pressures than private firms because they are more visible and have to make extensive disclosures.

Many of these costs have a fixed component. Minimal reporting requirements exist for any public company irrespective of its size. The cost of complying with these requirements is generally considered to increase only moderately with firm size. Large firms are typically less subject to competitive pressures, less likely to be subjected to unwanted takeover attempts when they are undervalued, and better able to resist pressures from analysts and activist investors. The cost of communicating with investors has a fixed component. For instance, the cost of preparing a press release or organizing an earnings call does not depend on the number of shareholders (for example, Karolyi and Liao, 2015). The impact of listing on

[5] Many of these arguments were put forward in the years leading up to the passage of the Jumpstart our Business Startups (JOBS) Act in 2012 (e.g., Pinelli and Muscat, 2007; Weild and Kim, 2010; Ernst and Young, 2009; the IPO Task Force Report to the U.S. Treasury, 2011).

agency costs is harder to determine as small firms typically tend to retain concentrated ownership. It is therefore possible that costs of entrenchment are larger for larger firms, but in general firms become larger because they have been successful and hence have managed to find ways to address these costs. In summary, therefore, we expect the cost of being listed to increase only moderately with firm size. This is shown in Figure 4, where we propose a simple cost function of being listed such that the cost curve is positive for any firm regardless of size but increases slowly with size. The cost of being listed as a function, C, starts positive because of the initial fixed cost.

The benefits of being listed discussed in the literature are numerous (see, among others, Da Rin, Hellman, and Puri, 2012). Some of these benefits include the ability to tap the public markets to raise funds, the ability to use shares to pay for acquisitions, price discovery, gains from bonding to a legal, regulatory or exchange regime either directly or through secondary cross-listing, liquidity for the stock that permits pre-IPO shareholders to sell shares, monitoring by capital markets, and the ability to pay employees on better terms in shares and options.

We would expect these benefits to increase rapidly with firm size beyond some threshold. Small firms have lower funding requirements in dollar terms, so that they can satisfy these requirements with fewer investors. Being publicly traded may not make it easier for these firms to find investors since, if a firm is small, the liquidity of its stock will generally be low and monitoring by capital markets will be weak. As the firm becomes larger, their common stock will be more liquid and monitoring will be more active. As a result, the firm's common stock will be more easily accepted as an acquisition currency and in compensation contracts. As the firm becomes larger, it will often not be able to undertake acquisitions that make a material difference to its profile without using common stock either to raise financing or to pay for the acquisition. We expect the benefit of being listed to be rather small for the smallest firms, but to increase with firm size. Some of the benefits of being listed are higher for firms that have greater funding needs since such firms will use public markets more to raise funds. Therefore, we would expect the benefit curve B in Figure 4 to slope more steeply upward to reflect firms' better growth opportunities. It follows that we would expect the propensity to be listed to differ across industries with different growth

opportunities. Given our discussion, the benefit curve B in Figure 4 starts below the cost curve, but there is a size threshold, S, such that beyond that threshold the benefit of being listed exceeds the cost.

The difference between the benefit curve and the cost curve is the net benefit of being listed. When that net benefit is negative, a firm does not list. Hence, firms to the left of the intersection point S of the two functions choose to be private and those to the right of the intersection of the two curves choose to be public. The figure now makes it possible to examine changes in the market, legal, and regulatory environment on the propensity to be listed. Suppose first that listed firms have to satisfy increased regulatory requirements regardless of their size so that cost of being listed increases without an equivalent or greater increase in the benefit. Such a change would raise the cost curve for all sizes. Consequently, the propensity to be listed falls and the size of listed firms increases.

Next, suppose that there is a shift in the monitoring by public markets due to a regulatory change, so that smaller firms receive less attention. Such a shift would decrease the benefit of being listed for smaller firms but not as much for larger ones, thus tilting the benefits curve to be steeper. Again, however, the propensity to be listed would fall. Consider finally a scenario in which it becomes easier for firms to raise funds without being listed. For instance, the development of the internet and the growth of the private equity industry mean that search costs have become lower to find equity capital without being listed. In this case, the benefit curve would fall, but more so for smaller firms, at least to the extent that a firm that needs a large amount of capital would not benefit as much from the decrease in the cost of finding investors without being listed. Hence, the propensity of being listed would fall as well.

More generally, the figure shows the impact on the listing size threshold of an increase in the cost curve from C to C^* and a decrease in the benefit curve from B to B^*. With these changes, the size threshold beyond which firms choose to be listed increases from S to S^*. For our purpose, a monotone decrease in the net benefit of being listed increases the size threshold beyond which it is advantageous for a firm to list.

The various explanations advanced for a decrease in the propensity of being listed amount to arguing that the cost curve has increased, while the benefit curve has fallen, but more so for smaller firms in both

cases. With such arguments, we expect smaller firms to drop out of the exchanges. They could do so by going private or by being acquired. These arguments predict that the propensity to be listed has fallen for small firms, but our model implies that this decrease would not be uniform across industries or types of firms. This is because listing is intrinsically more valuable for firms in industries with better growth opportunities. However, we would expect that the distribution of listed firms changes so that it is more heavily weighted towards larger firms. With these arguments, listed firms increase in size but there is no reason for unlisted firms to become larger in size. An increase in the size of private firms similar to the increase in the size of public firms would be evidence of a common technological factor that makes it optimal for firms to be larger that would have nothing to do with being listed. The next step is to test these specific propositions.

5. The decline in U.S. listings: Lower propensity to be listed or fewer firms that can be listed?

In this section, we examine the evolution of the propensity of U.S. firms to be listed. Using the notation introduced earlier, the question addressed in this section is whether L, the number of listed firms, falls because of a decrease in p, the propensity to be listed, a decrease in N, the number of firms that can be listed, or a decrease in both p and N.

There is no publicly-available database that provides characteristics of a comprehensive sample of unlisted firms in the U.S. over our sample period. The lack of such a database limits the analysis that can be conducted as ideally we would estimate the probability that an identical firm is listed in the peak listing year of 1996 and in 2012, the year with the largest listing gap. However, the Longitudinal Business Database (LBD) of the U.S. Census Bureau provides information about the total number of firms (public and private firms) in the U.S. from 1977 until 2012. To obtain counts of listed firms, we use the Center for Research on Security Prices (CRSP) database to identify firms listed on AMEX, NASDAQ, or NYSE. We use CRSP to get information on U.S. listing counts because we later want to examine the size of listed and unlisted firms. Information on firm size is not available from the WDI/WFE dataset. We use U.S. common stocks (Share Codes 10 and 11) and exclude investment funds and trusts (SIC Codes 6722,

6726, 6798, and 6799). We seek to examine whether the number of listed firms falls because of a decrease in the propensity of being listed (p) or in the number of firms that can be listed (N).

Table 3 shows in Columns (1) through (3) the total number of firms from LBD, the number of listed firms from CRSP, and the propensity of firms to list, respectively. The U.S. has 3,417,883 firms in 1977. This number increases to 4,693,080 in 1996, the peak year for the number of listings. During the post-peak period, the number of firms keeps increasing, albeit at a slower rate, to reach 5,030,962 in 2012. In contrast, Column (2) shows that the number of listed firms decreases each year during this period. Note that the decrease in the rate of growth of the number of firms is consistent with evidence that the rate at which firms come into existence has fallen (see, for example, Decker, Haltiwanger, Jarmin, and Miranda, 2014). However, the slowdown in the startup rate cannot explain the evolution of listings because it extends through most of our sample period (see column (5)). The propensity to be listed in Column (3) increases from 0.138% in 1977 to 0.171% in 1996. Since the peak in 1996, the propensity falls steadily to 0.082% in 2012, so that in 2012 it is 52% lower than what it is in 1996. From 1977 to 2012, the lowest propensity to be listed is in 2012. In other words, firms are never less likely to be listed from 1977 to 2012 than in 2012. If the propensity to be listed in 2012 had been the same as in 1996, the number of listed firms would have been 8,602 rather than 4,102, implying 578 more listed firms than at the peak in 1996.

The analysis so far concludes that the number of listed firms falls because of a decrease in the propensity to be listed. However, this analysis ignores differences in firm sizes. We would expect a large firm to have a higher propensity to be listed. Hence, it could be that this propensity did not fall for larger firms, but fell only because of the inclusion in the total number of listed firms (N) too many firms that were too small to be listed in the first place.

Data for private firms is limited and we can reliably measure firm size only by the number of employees. Based on this measure, the LBD classifies firms into size groups. We employ eight such

groups.[6] To get data on the number of employees for listed firms, we merge our dataset of listed firms from CRSP with Compustat. Figure 5 shows, the propensity to be listed for each size group. It is immediately clear from the figure that the propensity to be listed falls for all size groups throughout our sample period. Importantly, the propensity to be listed falls both because there are fewer listed firms (a decrease of the numerator) and because there are more firms (an increase in the denominator) for all size groups. Consider that, in 1996, 563 firms in Compustat have more than 10,000 employees, the largest LBD size group. In contrast, there are 1,156 firms with less than 100 employees, the smallest LBD size group. In 2012, there are more listed firms in the largest size group (542) than there are in the smallest size group (409). For the largest size group, the propensity to be listed falls from 48.36% to 42.71% during the post-peak period, a decrease of 11.7%. The decrease is much sharper for firms in smaller size groups. For example, the propensity to be listed falls by 60.03% for firms with 100 to 249 employees and by 53.61% for firms with 1,000 to 2,499 employees. Except for the largest size group, there is no statistically significant difference across the seven remaining size groups in the drop in the propensity to being listed.

We conclude that the drop in the number of listed firms is due to a decrease in *p*, the propensity to be listed. The number of firms that could be listed, *N*, has actually increased since the peak of U.S. listings, so that the drop in listings cannot be attributed to a fall in *N*. Further, these results hold for firms of different sizes.

6. New lists, delists, and the evolution of the propensity to be listed.

The propensity to be listed can fall because the number of listed firms falls or because the total number of firms increases. We already know that the number of listed firms has fallen and the total number of firms has increased. For the number of listed firms to fall, there has to be more delists than new

[6] The eight size groups are: (1) less than 100 employees (this group aggregates five groups reported separately by the LBD, 1 to 4, 5 to 9, 10 to 19, 20 to 49, and 50 to 99); (2) between 100 and 249 employees; (3) between 250 and 499 employees; (4) between 500 and 999 employees; (5) between 1,000 and 2,499 employees; (6) between 2,500 and 4,999 employees; (7) between 5,000 and 9,999 employees; and, (8) over 10,000 employees.

lists. In this section, we examine the evolution of the pace of new lists and of delists for the U.S. and compare it to the evolution for other countries.

6.1. New lists and delists in the U.S.

To analyze new lists and delists for the U.S., we use listed firms from the CRSP database. We count a new list as such in the year a record first enters the database and we count a delist as such in the year in which a record drops out of the database.[7] Using these criteria each year from 1975 through 2012, we compute the number of U.S. listed firms as well as the number of new lists and delists.

Panel A of Table 4 shows the number of new lists and delists from 1975 to 2012. It is immediately clear that there is considerable time-series variation in these numbers. However, the patterns for more recent years are noticeably different. On average, there are 518 new lists and 408 delists per year during the pre-peak period compared to 283 and 520 during the post-peak period. Before 1996, there are no extended periods with more delists than new lists and net new lists are positive on average. During the post-peak period, the number of delists exceeds the number of new lists every year so that net new lists are always negative.

New lists peak at 987 in 1996 and fall sharply to 152 by 2001. The yearly number of new lists in the 2000s is lower than the yearly number of new lists in any year before 2000. Delists peak in 1998 but remain high through 2001 and then start to decline. Delists drop less than new lists, which explains why the net change in listings, which we call *net* new lists, is negative. It is interesting to note that there is a surge of delists following the surge in new lists of the 1990s. As young firms have a higher delist rate (Fama and French, 2004), this may not be surprising. What is surprising, however, is that after this surge of delists the historical pattern of positive net new lists does not re-establish itself.[8] CRSP also provides

[7] Information for a security can change over time in CRSP. For example, a record might initially have a share code or SIC code that we exclude, e.g., SIC code 6722. We do not count these records as a new list or include them in listing counts. If in a subsequent year, CRSP assigns a different SIC code to such a record, we do not count it as a new list, but do include it in the listing counts. To ensure that the listing counts and the annual flows add up (e.g., the list count in year *t-1* plus new lists in year *t* minus delists in year *t* equals the new list count in year *t*), we keep track of these "false new lists." Similarly, we keep track of "false delists," which can arise if a security is initially included in list counts, but CRSP later changes its SIC code to one that we exclude. We drop it but do not count it as a delisting. Finally, stocks switching exchanges are not counted as new lists or delists.

[8] The post-peak period is exceptional during our sample period, but it is also exceptional relative to the whole history of the public equity universe captured by the CRSP database. Compared to 1997 to 2012 when the number of delists exceeds the

delisting codes which allow us to categorize the reason firms delist. First, firms can choose to delist because they no longer find it valuable to be listed ("voluntary"). In our model of Section 4, an increase in the cost of listing could lead a firm to choose to delist because it is no longer advantageous for that firm to be a public firm. A number of the critiques of SOX argue that it represents an increase in the cost of being listed, especially for the smaller firms, and that it led to firms wanting to delist.[9] Second, a firm can be delisted by the exchange because it no longer meets the continuing listing requirements ("for cause"). For instance, delisting for cause may arise if the firm has not been profitable for several years, if its market capitalization becomes too small or if the stock price is too low. Third, a firm can be delisted because it is acquired by another firm ("merger"). In that case, the firm can be acquired by a listed firm or by a private firm. We follow Fama and French (2004) in categorizing CRSP Delist Codes 200-399 as mergers and Codes 400 and above as delists for cause except for Codes 570 and 573, which we categorize as voluntary delists.

Panel A of Table 4 shows that the most likely reason a firm delists during our sample period is a merger (9,749), the second most likely is for cause (7,120), and the third is that it chooses to voluntarily delist (434). There are more delists for cause than for merger in eight out of 38 years during our sample period and only two of these years are after the listing peak in 1996. From 1975 to 1996, 45% of delists are for cause compared to 37% from 1997 to 2012. Though the proportion of delists for cause is lower in the post-peak period, there is evidence of a surge in delists for cause from 1997 to 2003 due perhaps to the preceding surge in new lists.

The delist rate in percent is shown yearly in Panel A of Table 4 as well. For the pre-peak period, the average delist rate was more than two percentage points lower than it was during the post-peak period

number of new lists each year, the period from 1926 to 1996 sees delists exceed new lists in only 17 out of those 70 years (data available from the authors). The largest number of consecutive years in which delists exceed new lists is four – from 1931 to 1934 during the Great Depression. Before NASDAQ is added to CRSP in 1972, years with more delists than new lists are extremely rare (only six out of 46 years). After NASDAQ is added to CRSP, years with more delists than new lists are more frequent. From 1972 to 1996, there are 11 such years out of 24 and six of these occur immediately after NASDAQ is added.

[9] See Leuz (2007) for an extensive review of the empirical evidence on the impact of SOX. Leuz, Triantis, and Wang (2008), in particular, distinguish between firms going private, in which the firms are no longer publicly-traded after the transaction, and firms going dark, in which firms deregister from disclosure obligations to the SEC. They find a large increase in going dark decisions immediately after the Act was passed. However, most firms going dark were not listed on an exchange before going dark but instead traded on the OTC markets. For instance, Marosi and Massoud (2007) have a sample of 261 firms going dark from 1996 to 2004, but only 38 of these firms announced their deregistration while trading on a major exchange.

(7.29% versus 9.49%). The difference is statistically significant (the *t*-statistic from a two-sample, unequal variance *t*-test equals 3.10). The increase is due to an increase in the merger rate which increased significantly from 3.92% to 5.64% (*t*-statistic equals 3.59%). The average rate of delists for cause over these two periods is not significantly different (3.25% vs. 3.50%).

Macey, O'Hara, and Pompilio (2008) study delists from 1995 to 2005. They have a much larger number of delists than we do and, in particular, they have a much larger number of delists for cause. Their total number of delists is 9,273. Over this period, we record 6,932 delists using CRSP. The difference between these two numbers likely has to do with the data source. Macey, O'Hara, and Pompilio (2008) obtain their data directly from the exchanges. Since their data includes all delists from each exchange, the counts include delists by firms that are not incorporated in the U.S., delists from firms that switch from one exchange to another, and delists of listings that are excluded from our sample because they are not operating firms (such as REITs and trusts).

Throughout the sample period there are few voluntary delists. There are 163 voluntary delists from 1975 to 1996 and 271 from 1997 to 2012, accounting for 1.82% and 3.25% of delists during these periods. Both before and after 1996 voluntary delists are not important for understanding the evolution of the number of listings in the U.S. An important caveat is necessary, however. Suppose that management decides to take the firm private and to do so by creating a private shell company that acquires the public company. Such a transaction would be counted as a merger and not as a voluntary delisting. Yet, functionally, this is equivalent to a transaction in which the public company acquires the shares of most investors and then delists and deregisters. This transaction would be counted as a voluntary delisting. We return to this potential concern at the end of Section 8.

6.2. New lists and delists outside the U.S.

We next examine whether the new list and delist rates in the U.S. after 1996 are unusual relative to the equivalent rates in the rest of the world. Since the WDI/WFE databases provide annual information on listing counts but not on new lists and delists, we use Thomson Reuters' Datastream International and

Worldscope databases to estimate the numbers of new lists and delists for other countries. Appendix A shows the details of the construction of the dataset. The resulting sample has 41 countries.

Panel B of Table 4 shows the evolution of the new list and delist rates for non-U.S. countries. Since the peak number of U.S. listings is in 1996, we compare the post-peak period to the pre-peak period. Since the non-U.S. data is much more reliable starting in 1990, we use 1990-1996 as our pre-peak period. To compute the non-U.S. new list (delist) rates we add all new lists (delists) across the 41 countries and divide by the respective total number of listings in the prior year.

Listing and delisting activity outside the U.S. evolves differently than it does in the U.S. The average non-U.S. new list rate is 9.42% from 1990 to 1996 and 6.04% during the post-peak period. In contrast, the delist rate increases from 2.85% to 4.14%. Thus, the net new list rate outside the U.S. falls from 6.57% to 1.90%. In contrast, the net new list rate for the U.S. computed from Datastream data falls from 2.08% to -2.38% over these periods (using CRSP data, the net new list rate falls from 3.45% to -4.43%). Although the net new list rate falls in the U.S. and in non-U.S. countries, it actually becomes negative in the U.S. while it remains positive in other countries. A large part of this difference is due to the higher delist rate in the U.S. after 1996. The net new list rate in the U.S. is 1.38 percentage points lower than that for non-U.S. countries while the delist rate is 2.90 percentage points higher (the same comparisons made using CRSP data for the U.S. are 0.98 and 5.35 percentage points, respectively).

In our analysis of U.S. delists in Section 6.1, we find that the typical delist is a merger delist. We also find that merger delists are more likely after 1996. Because Datastream does not provide delisting codes it is not possible for us to identify which firms delist because of a merger. To assess the importance of merger delists for non-U.S. countries, we use Thomson Reuters' Securities Data Company's merger and acquisition database (SDC). For each year since 1990, we count the number of public targets acquired in the U.S. and in non-U.S. countries.

We find that from 1990 to 2012, 7,858 non-U.S. public targets are acquired, but the bulk of these acquisitions, 6,367, take place after 1997. In contrast, the U.S. has 6,452 from 1990 to 2012 and 4,997 of these acquisitions take place after 1997. However, throughout the post-peak period, these non-U.S.

countries have 4.98 times more listings than the U.S. on average. If these countries had experienced the same frequency of public target acquisitions as the U.S., they would have had roughly 21,400 acquisitions over that period. Consequently, the rate of delists by merger in the rest of the world is proportionally much lower than it is in the U.S. Indeed, if the U.S. had had the same merger delisting rate as these countries from 1997 to 2012, it would have had 3,729 fewer delists over that period.

6.3. New lists, delists, and closing the listing gap.

Recall that our regression estimates from Table 2 show that the U.S. has a listing gap relative to the rest of the world. The gap arises because the new list rate drops sharply after 1996 in the U.S. while the delist rate increases. In this section, we investigate whether the changing pattern of new list and delist rates in the U.S. can explain the listing gap. If the new list and delist rates in the U.S. from 1975 to 1996 continued to apply from 1997 to 2012, would there still be a listing gap?

To address this question, we combine two of our datasets. We use the WDI/WFE data because it has listing counts for the U.S. and for the non-U.S. countries and we use the CRSP data to compute new list and delist rates for the U.S. We then simulate predicted WDI/WFE listing counts for the U.S. from 1997 to 2012 by applying the historical CRSP new list and delist rates to them.[10] Recall from Table 4 that the historical new list and delist rates computed as the averages from 1975 to 1996 are, respectively, 9.22% and 7.29%. We apply these rates each year from 1997 to 2012 to compute the number of new lists, delists, and listing counts that the U.S. would have had if the historical rates applied to this period. For example, the U.S. has 8,025 listings in 1996. Applying the historical rates to this base yields 740 predicted new lists, 585 predicted delists, and overall 8,180 predicted listings for 1997 (compared to only 7,905 actual listings).

With this approach, the U.S. would have had 10,897 listed firms in 2012, a count which is 6,795 more than it actually had. The reason the number of listed firms is higher is that the historical net new list rate in the U.S. is positive and we apply that rate to 1997 to 2012, which is a period when the actual net new

[10] Combining these datasets is a reasonable approximation because the net new list rates for CRSP and WDI/WFE are similar. For the CRSP data, the average net new list rate implied by changes in listing counts for 1975 to 1996 is 2.0% compared to 2.4% for the WDI/WFE data. For 1997 to 2012, the averages are -4.29% and -4.06%, respectively.

list rate is negative. To isolate the impact of the decrease in the new list rate, we apply the historical new list rate to 1997 to 2012, but use the actual delist rates in the post-peak period. In this case, the U.S. would have had 7,659 listings in 2012. Similarly, we can isolate the impact of the increase in the delisting rate by applying the historical delisting rate to the post-peak period but by using the actual new list rates. In this case, the U.S. would have had 5,570 listings in 2012 instead. The impact of the increase in the delist rate is lower than that of the decrease in the new list rate, in part, because the higher delist rate applies to fewer firms.

We use these predicted listing counts to investigate how missing new lists and excess delists affect the U.S. listing gap from 1997 to 2012. In Table 5, we estimate panel regressions of listings per capita on the anti-self-dealing index, the log of GDP per capita, GDP growth, a non-U.S. indicator variable, year fixed effects, and interactions of the non-U.S. indicator variable with year fixed effects (1990 is the excluded year). The year fixed effects provide estimates of the U.S. listing gap. Model (1) of Table 5 reproduces the estimates from Model (6) of Table 2, which were featured in Figure 3 as missing firm counts. This regression shows that the U.S. has a listing gap every year starting in 1999 through 2012. The coefficient on the year fixed effect for 2012 is -0.840, which represents the equivalent of 5,436 fewer actual listings (4,102) than predicted by the panel regression model (9,538).

Model (2) of Table 5 shows that if we replace actual listing counts with predicted listing counts using historical new list and delist rates, the listing gap no longer exists. From 1997 to 2000, the year fixed effects coefficients are positive but not significant. After 2000, they are positive and significant in most years through 2012 so that an excess of listed firms would actually have arisen. The coefficient in 2012 is 0.137 which represents the equivalent of a surplus of 1,360 listed firms relative to predicted. In Model (3), we apply the historical new list rate but use actual delist rates to predict the counts from 1997 to 2012. In 1999, the year fixed effect is still negative but is not significant. The coefficients for 2000 and for years thereafter are still negative and significant so that the U.S. still has a listing gap from 2000 to 2012. In 2012, the coefficient is -0.216 (equivalent to a deficit of only 1,879 listed firms) compared to the much larger implied deficit count (5,436) associated with the coefficient of -0.840 in Model (1). Finally, Model

(4) uses predicted listing counts based on actual new list rates and the historical delist rate. In this case, there is no listing gap until 2002. Like Model (3), the listing gap narrows but remains through 2012. The coefficient for 2012 is -0.534 (the equivalent of a deficit of 3,967 listed firms).

The panel regression framework allows us to assess the *relative* contribution of the missing new lists and the excess high delists toward closing the listing gap. In Model (1), the base case scenario that uses actual listing counts, the listing gap is significant from 1999 onwards. On average, from 1999 to 2012 there is a listing gap of 3,616 firms per year. By contrast, the average listing gap from Model (3), which uses predicted listing counts based on actual new list rates and the historical delist rate, is 1,679 firms per year. That is, missing new lists explain an average of 1,937 missing listings per year, or 54% of the missing listings overall. Similarly, excess delists explain 46% of the missing listings. With these regressions, using either the historical delist rate or the historical new list rate narrows the listing gap but does not eliminate it. Thus neither new lists nor delists alone can close the gap.

7. Why have there been so many delists since 1996?

We have shown that the U.S. has a listing gap, that the listing gap is explained by a decrease in the propensity to be listed, that the propensity to be listed falls because of too few new lists and too many delists compared to the historical U.S. rates before the listing peak. Had these historical rates persisted, the U.S. would not have a listing gap relative to other countries. Importantly, had there been no missing new lists, the U.S. would still have a listing gap because of the excess delists. There has been much research on the missing new lists (e.g., Gao, Ritter, and Zhu, 2013; Doidge, Karolyi, and Stulz, 2013), but not on the excess delists. In this section, we investigate whether the excess delists can be explained by market conditions or by the characteristics of listed firms at the time of the listing peak. If the excess delists are explained by poor economic conditions that lead to more delists or by the fact that there are too many weak new lists, the part of the listing gap due to the excess delists would have little or nothing to do with the costs or benefits of being listed.

7.1. Market conditions, new lists, and delists

One explanation for the negative net new list rate since the listing peak in 1996 is that market conditions are less favorable to new lists and more conducive to delisting implying that a common force may be at work for both phenomena. To examine whether market conditions can explain the decrease in the net new list rate, we estimate a vector-autoregression (VAR) model for new list and delist rates. It captures the joint dynamics of the new list and delist rates and their interactions and allows for exogenous forces from the capital market environment to play a role. We use the estimates from this model to simulate the path of the number of listings through to 2012 to assess whether market conditions explain the listing gap. For this analysis we construct a quarterly times series of new lists, delists, and listing counts from the CRSP dataset as well as capital market time-series variables that influence these listing patterns. We are motivated to pursue this analysis at a higher frequency based on prior work.[11]

Panel A in Table 6 shows the VAR model estimates over the period from 1975 to 2012. These models account for the joint dependence of new lists on past delists and of delists on past new lists. As discussed earlier, we would expect the delist rate to be higher if there are more new lists (Fama and French, 2004). Model (1) shows estimates from a VAR with only new lists and delists and hence serves as a benchmark later for an evaluation of the role of market conditions. We allow for four lags of each variable and an indicator variable for the first quarter each year (see Lowry, 2003).[12] The first two lags of the new list rate are significant and positive in the new list regression. The third lag is negative and significant at the 5% level and the fourth lag is not significant. In the delist regression, the most notable coefficient is for the fourth lag of the new list rate, which is positive and statistically significant. In other words, there is some evidence that a high new list rate leads to a higher delist rate some quarters later. Turning to the lags for the delist rate in the new list regression, the third lag is positive with a *t*-statistic of 1.60 and, in the delist regression, the first lag is positive and significant. The two series appear highly autoregressive. Overall,

[11] Lowry (2003) establishes the economic and statistical importance of aggregate capital demands of private firms, the adverse-selection costs of issuing equity, and the level of investor optimism as determinants of U.S. IPO volumes, which she measures as the number of IPOs relative to the existing number of listed companies.

[12] Using a Bayes–Schwarz criterion, we estimate a number of lag structures to the system and determine that four quarterly lags were enough to capture linear dependencies for the new list and delist rate series.

these feedback effects are important. *F*-tests show that jointly the four lags of the new list rate and delist rate (at the 1% level) are statistically significant for future delist rates.

In Panel B of Table 6, we report the impulse responses of a one-standard deviation shock to one variable for the lagged response to another variable. The own shocks for the new list and delist rates are economically large for the first three quarterly lags, but die down by the sixth quarter after the shock. Interestingly, we see on balance positive responses from shocks to new list rates to future delist rates and even from shocks to delist rates to future new list rates by the sixth quarter, though they are relatively small effects. The variance decomposition analysis in this panel of the table confirms that the fraction of the overall variation in either series that is explained by its dependence on the other series ranges between 6% and 15% in the long run (i.e., by the 12^{th} quarterly lag).

We then turn to VAR estimates where we add market condition variables as exogenous variables. Given the limited length of the sample period, we estimate a model where we add three variables. These include the IPO first-day return, the value-weighted market return, and average Tobin's *q*, all lagged by one quarter.[13] The estimates are in Model (2). Adding these variables increases the adjusted R^2s, but they were already quite high. There is only one difference in the sign or significance between the two sets of regressions for the lagged coefficients on the new list and delist rates themselves. In the new list rate regression, the third lag of the delist rate is now significant at the 10% level. And, as before, the coefficient on the Quarter 1 dummy is negative and significant for the new list rate. For the new list rate, Tobin's *q*, the IPO return and the value-weighted market returns all have positive and significant coefficients. For the delist rate, the coefficient for the value-weighted market returns is negative and significant.[14]

[13] IPO first-day returns are from Jay Ritter's website (http://bear.warrington.ufl.edu/ritter/ipodata.htm). The dataset includes monthly data for the number of IPOs and the average first-day return. We compute a quarterly average of the monthly observations where each observation is weighted by the number of IPOs that month. The value-weighted market return is from CRSP. Data for Tobin's *q* is from Compustat. For each firm we compute Tobin's *q* as total assets minus the book value of equity plus the market value of equity, divided by total assets. Following Lowry, we compute the average Tobin's *q* across U.S. firms that are at least three years old and have a book value of equity of at least $100,000 (in 1990 dollars).

[14] We explored a number of different specifications with the macroeconomic and capital market variables used by Lowry (2003). These included different proxies for capital demand, future growth opportunities, as well as market sentiment and with different numbers of lags. We also explored VAR specifications in which some of these capital market series were part of the joint dynamics with the new list and delist rates. Regardless of the specification shown, findings remain similar to those reported.

We next simulate the evolution of the number of listings based on Model (2). In these simulations, we use the estimated coefficients from the 1975 to 1996 sub-period and extrapolate the new list and delist counts and the resulting cumulative total firm count each year from 1997 to 2012. The simulation predicts 14,128 listings by 2012. In other words, accounting for the changing capital market environment after the listing peak in 1996 actually leads us to predict more, not fewer, listings. As a result, it is not the case that the number of listings is low because of poor capital market conditions.

7.2. The survival of new lists

Fama and French (2004) show that over the 1980s and the 1990s, new lists increasingly have lower profits and no history of positive profits. They also find the survival rate of new lists falls sharply. Their sample covers new lists from 1973 to 2001, a period that has little overlap with the period of negative net new list rates that started after the listing peak in 1996. Nevertheless, weaker new lists could explain the abnormally high delists. Therefore, we investigate the survival of new lists after the listing peak.

The first important fact we uncover is that during the pre-peak period, 63% of new lists survived at least five years compared to 60% from 1997 to 2007 (not tabulated but available from the authors).[15] Hence, the survival rate falls only slightly after the peak. However, for the IPO cohorts from 2001 to 2007, the survival rate is actually higher at 65%. This implies that the lower post-peak survival rate is explained by a low survival rate in the years immediately after the 1996 peak. For the new list cohorts from 1997 to 2000, the survival rate is only 51%.

To compare the delisting behavior of newly-listed firms to that of seasoned firms more formally, we proceed as follows. We first classify firms as "young" or "seasoned" listed firms, where young listed firms are those that became listed within the last five years. To examine whether delisting activity of young listed firms can help explain the overall higher delisting rate among all firms after 1996, we compare delisting rates for young listed firms and seasoned listed firms during the pre-peak period to the post-peak period.[16] During the pre-peak period, the rate of delists averages 7.4% for young listed firms and 7.9% for seasoned listed firms. A paired *t*-test cannot reject the hypothesis that the two rates are the

[15] We stop in 2007 as it is the last year in our sample when a new list could potentially survive at least five years.
[16] NASDAQ stocks were added to the CRSP database in 1972 and were all assigned a listing date of 1972. We therefore start assigning firms into "young" listed and "seasoned" listed categories starting in 1977.

same. After the peak, both rates are notably higher. The rate for young listed firms is 9.1% and that for seasoned listed firms is 9.7%, and again, the two rates are not significantly different.

When we examine reasons for delisting among young and seasoned listed firms, we find a sharp change between the pre-peak period and the post-peak period. From 1977 to 1996, 40.35% of the delistings of young listed firms are merger-related and 57.91% are for cause. After 1996, merger delists become more important for young listed firms. The percentage of young firms that delist because of a merger is 55.15% over that period, while only 41.16% of delists are for cause. By contrast, the percentage of delists due to mergers for seasoned listed firms does not change much from the pre-peak to the post-peak period (62.41% vs. 61.99%).[17] For young (seasoned) firms, the percentage of voluntary delists increases from 1.73% (1.68%) to 3.69% (4.05%) from the pre-peak to the post-peak period. While voluntary delists became more important, they remain a small fraction of all delists for both young and seasoned listed firms.

It follows that while the delist rate increases after the peak, it is not simply because the delist rate among young listed firms increases disproportionately. While the delist rate of young listed firms increases, the delist rate of seasoned listed firms increases by the same amount. For both young listed firms and seasoned listed firms, merger delists are the most frequent type of delists after the peak.

7.3. Firm characteristics and the increase in delists after the listing peak

After the listing peak, there are fewer small firms and fewer young firms. To assess whether changes in the characteristics of listed firms can explain the change in the delisting pattern, we estimate multinomial logistic ("logit") regressions at the firm level across all years. The sample includes over 175,000 firm-year observations. Firms that do not delist in a given year constitute the base category and we consider three delisting outcomes, namely merger, for cause, and voluntary, which are treated as independent in the multinomial logit setting. We include the following lagged firm characteristics: size (Log(Assets), inflation adjusted), earnings over assets (Profitability), the percentage change in assets over the last year (Asset growth), and a dummy that indicates whether a firm became listed within the last five years (Young listed). We also include an indicator variable for the years after the listing peak in 1996

[17] This increased importance of mergers for young firms during the 1990s compared to earlier periods is also documented in Arikan and Stulz (2016).

(Post-peak dummy) and interactions of it with the lagged firm characteristics. If firm characteristics explain the pattern of delisting over our sample period, the post-peak dummy should not be significant. Finally, we include industry fixed effects. Given data requirements, we omit firms in the first two years after the IPO. Standard errors are clustered at the firm-level.

Table 7 provides the coefficient estimates of the multinomial logit regressions. Model (1) shows that the coefficient on the post-peak dummy is positive and significant for each delisting category. In Model (2), we add lagged firm characteristics. More profitable firms, young firms, and firms with lower asset growth are more likely to delist because of merger. Firm size is not significant. We find that smaller, less profitable firms, and firms with lower asset growth are more likely to delist for cause and voluntarily. We also find that young firms are more likely to delist for cause. In Model (3) we allow for interactions of these characteristics with the post-peak dummy. These interactions show that the characteristics of delisting firms change in the post-peak period. For example, smaller firms and younger firms are more likely to be acquired by merger in the post-peak period while the impact of other characteristics on the probability to be acquired is attenuated. Size becomes less of a factor in delistings for cause after the peak, but the probability of young firms being delisted is higher after the peak. No firm characteristics seem to be related to the increase in voluntary delistings after the peak.

The bottom line, however, is that the coefficient on the post-peak dummy is positive and significant for each type of delisting in each specification. This result is inconsistent with the hypothesis that changes in firm characteristics of listed firms can explain the increase in the probability of delisting after the peak.

7.4. Merger as alternative to delist for cause

An increase in delists classified as for cause by CRSP cannot explain the higher delist rate after the peak. We infer it must arise from an unusually high merger delist rate. An obvious concern is that firms can merge to avoid delisting for cause, so how many mergers are delist for cause in disguise?

Exchanges have formal initial and continuing listing requirements. However, a firm can meet the listing requirements in several different ways. Further, as Macey, O'Hara, and Pompilio (2008) show, firms that fail to meet listing requirements are not necessarily delisted for cause by the exchange. However, we know from listing criteria that exchanges pay attention to profitability, market

capitalization, assets, level of the stock price, recent stock returns, and the number of shareholders. Using a logit model in which a delist for cause takes a value of zero and a delist for merger a value of one, we predict whether a firm that delists does so for cause or because of a merger using the firm-level characteristics the exchanges are known to consider in making their decision to delist for cause. Using this model, we want to determine whether the number of false positive associations of merger delists increases after the peak. In other words, we ask whether the number of firms that delist because of a merger but were predicted to delist for cause based on their firm-level characteristics, increase after the peak.

In Panel A of Table 8 we show estimates of four different logit specifications. The sample includes 14,863 delisting observations (out of 17,303) for which we have complete data on the prior one-year total return, price on the day closest to the end of the delisting month, profitability, measured as earnings divided by assets, and size. We use the log of assets to measure size, but results are similar if we use a firm's market capitalization.[18] These models differ in their use of industry and year fixed effects. We show that conditional on delisting, the probability of a merger delist increases when prior returns are higher, the stock price is higher, profitability is higher, and Log(assets) is bigger. This is true for all the models we estimate and the coefficients are similar across the models. The coefficients on profitability are larger with industry fixed effects, but the other coefficients seem little affected.

We next use Model (3) to predict which delists are classified as mergers. This model includes year fixed effects to allow for the fact that delisting criteria changed over time but it does not include industry fixed effects because industry affiliation is not a criterion for delisting used by the exchanges. Predicted values from logit models are between zero and one and we need to choose a probability cutoff to assign predicted delists as either a merger or for cause. We use a cutoff of 0.491%.[19] Panel B shows the actual delisting classifications, the predicted classifications, and the difference between actual and predicted mergers. Overall the model accurately predicts delists for cause and mergers. Out of 14,863 delists, it

[18] Requiring data on the number of shareholders reduces the sample size by about 2,000 observations. It is not statistically significant when size is included in the regression. These results are not reported, but available from the authors.

[19] To choose the cutoff, we graph sensitivity versus one minus specificity against probability cutoffs. Sensitivity is the fraction of observed positive-outcome cases correctly classified; specificity is the fraction of observed negative-outcome cases that are correctly classified. The point at which the two curves cross is the optimal probability cutoff. See Hosmer and Lemeshow (2000).

classifies 14,513 correctly. Said differently, it incorrectly classifies only 2.35% of the delists. There were three waves of unusually high false classifications during 1977-1979, 1990-1992, and 2001-2004, but these are few and rarely do the error rates exceed 5% in a given year.

From 1997 to 2012, there were 4,786 mergers. Over that period, the model predicts 4,609 mergers. In other words, only 177 of these 4,786 mergers involve a firm that we predict would otherwise delist for cause. These potentially falsely-identified 177 mergers that could have been delists for cause are so few in number that they make no difference to our overall conclusions.

7.5. Do firms merge to go private?

In a famous article, Jensen (1989) wrote that "the publicly held corporation has outlived its usefulness in many sectors of the economy." He went on to predict the "eclipse" of the public corporation.[20] His view was that the conflict between owners and managers can make public corporations an inefficient form of organization. He argued that new private organizational forms promoted by private equity firms reduce this conflict and are more efficient for firms in which agency problems are severe. With this view, it could be that an increasing fraction of mergers are actually transactions where a firm chooses to go private. In other words, we would be understating the importance of the going private phenomenon and overstating the importance of mergers. In this section, we show that the evolution of listings cannot be explained by the success of acquisitions involving private equity firms. We use SDC to identify the ownership status of acquirers of U.S. public target firms. We start in 1981 as earlier data is sparse. Gao, Ritter, and Zhu (2013) conduct a related analysis on recent IPO firms and show the fraction of recent IPO firms acquired by private firms has not increased. Our analysis considers all firms and compares the experience of the U.S. to that of non-U.S. countries.

Panel A of Figure 6 shows that the percentage of public U.S. firms acquired by other public firms (as opposed to those by private firms) varies greatly over time. From 1981 to 1996, 68.6% of listed firms are acquired by public firms. This percentage falls only slightly after 1996 to 66.0% and the difference is not statistically significant. If we exclude the credit crisis and subsequent years, the average after 1996 is

[20] The quoted sentence is from the abstract of the SSRN version of the paper. The published version in the *Harvard Business Review* does not have an abstract.

70.0%. It does not appear that acquisitions by private firms occur at an unusually higher rate after the peak. Turning to acquisitions by private non-operating companies, these companies acquired an average of 12.2% of public firms each year from 1981 to 1996 and 12.9% afterwards. Figure 6 shows that the percentage of public firms acquired by private non-operating firms increases after 2002, but never reaches the peak levels from the 1980s. Finally, leveraged buy-outs (LBOs) – shown as a dashed line in the figure – account for 8.06% of the acquisitions from 1981 to 1996 and 6.84% afterwards.[21] It follows from this that there is little evidence that acquisitions corresponding to going-private transactions and acquisitions by private equity firms become more important after 1996.

Panel B of Figure 6 shows the equivalent results for publicly-listed targets in non-U.S. countries. This figure starts in 1990 because earlier data for non-U.S. countries in SDC is not reliably available. The percentage of public firms acquired by public acquirers in non-U.S. countries is actually lower than the same rate in the U.S. From 1997 to 2012, the rate across non-U.S. countries is 60.89%, five percentage points lower than that in the U.S. The percentage of acquisitions by private non-operating companies for non-U.S. countries is 11.51% after 1996, which is slightly lower than the percentage in the U.S. of 12.74%. It follows from these comparisons that there is little evidence that acquisitions by private equity firms are more important in the U.S. after 1996 than they are abroad.

8. The propensity to be listed among small and large firms.

Our simple theory predicts that an increase in the cost of listing or a decrease in the benefit of listing while keeping firm size constant has the effect of increasing the average size of listed firms. With this prediction, there should be fewer small listed firms. Alternatively, if the net benefit of being listed is unchanged, the size of listed firms could be lower because optimal firm size is higher. With this explanation for the increase in the size of listed firms, we would expect unlisted firms would be larger as well.

[21] We use industry information from SDC and the flag "Acquirer type" to identify private non-operating firms. We use the flag "LBO" to identify leveraged buy-outs.

We explore first whether there are fewer small firms as a percentage of listed firms but not fewer small firms as a percent of the population of firms. We return to our investigation using the Census LBD data. In Panel A of Figure 7, we show the number of listed firms with 100 to 499 employees (what we will call the "Small Size Category") as a percentage of the number of all listed firms. We also form an equivalent Small Size Category for all firms (including both public and private firms). To compute the percentages, we do not include firms with less than 100 employees because the number of these firms dwarfs that of all other firm size groups when we consider all firms. The figure shows that the percentage of firms in the Small Size Category among all firms is roughly constant over time. By contrast, the percentage of firms in the Small Size Category for listed firms has an inverted U-shape; it increases steadily from 1977 to 2000 and then falls so that by 2012 that percentage is the same as it was at the beginning of the 1980s. The percentage of such firms among listed firms falls from 38% in 2000 to 27% in 2012. The figure also shows that the percentage of large firms among all firms (again excluding the firms with less than 100 employees) does not change from 1977 to 2012. In contrast, the percentage of large firms among listed firms follows a U-shape.

We turn next to the evolution of the size of listed firms. In this analysis, we use more traditional measures of firm size reported in Compustat. We focus on total assets, measured in 1990 constant dollars, though the results are similar for total revenue, market capitalization, and number of employees. Panel B of Figure 7 shows the log of total assets for all Compustat firms at five size percentile thresholds (the four quintiles plus the median) each year from 1975 to 2012. Listed firms became steadily larger since the listing peak in 1996. However, the increase in size occurred across all size percentiles. In other words, the entire size distribution for listed firms shifted to the right.

As a result of increasing firm size, it follows that small listed firms in 2012 were much larger than small listed firms in 1996. In 1996, the 20^{th} percentile for total assets was $18.67 million (inflation-adjusted) and there were 1,360 listed firms with data in that quintile. By 2012, there were only 267 listed firms (or 7.93% of 3,366 listed firms in Compustat) with less than $18.67 million in assets. Another way to see this is that the 20^{th} percentile was $18.67 million in 1996 compared to $68.50 million in 2012. If we

use total revenue, market capitalization, or number of employees, we find that in 2012, only 10.32%, 10.48%, and 13.33% of listed firms were smaller than the respective 20th percentile cutoffs in 1996.

9. Conclusion.

The U.S. has experienced a dramatic decrease in the number of publicly-listed firms since the peak in listing counts in 1996. In this paper, we explore possible explanations for this decrease. We provide a simple model in which the benefit and cost of being listed increase with firm size. However, there is a fixed cost to being listed, but no fixed benefit of being listed. The benefit of being listed increases with firm size and faster than the cost, at least beyond some threshold. As a result, larger firms are listed and smaller firms are not. With this model, a decrease in the net benefit of being listed causes a decrease in the number of listed firms and an increase in the size of listed firms. Alternatively, the number of listed firms could be lower because there are fewer firms in the economy and these firms are larger because of technological changes. However, with this hypothesis, the increase in firm size should not be specific to listed firms. The size of unlisted firms should also increase. Moreover, the technological change hypothesis also predicts similar changes in non-U.S. countries. In contrast, a decrease in the net benefit of being listed due to changes specific in the U.S. would predict that the number of listed firms evolves differently in the U.S. than in non-U.S. countries and does not predict that the size of unlisted firms increases.

We provide evidence that supports the hypothesis of a decrease in the net benefit of being listed but that is inconsistent with the technological change hypothesis. Specifically, we show that the U.S. has a listing gap compared to non-U.S. countries as well as compared to its own past. We find that U.S. listed firms increase in size, but there is no comparable evolution among unlisted firms. We show that the evolution of U.S. listings cannot be explained by industry factors, changes in listing requirements, an increase in going private or going dark transactions, and regulatory reforms of the early 2000s. Further, we find that the decrease in the number of listed firms cannot be attributed to weaker new lists. In particular, we demonstrate that the increase in delists is due to an increase in mergers rather than an increase in delists for cause.

It is often argued that what makes the U.S. market economy distinct from most other market economies is the importance of the capital markets. As part of this importance of capital markets, the common view is that firms ineluctably become public as they succeed and that going public is a natural stage in the lifecycle of firms. This view of the U.S. market economy seems inconsistent with our evidence that the propensity to be listed in the U.S. is now less than half what it was at the peak and that the U.S. has fewer firms per capita than other countries when controlling for economic development and institutions. The evolution in the number of listed firms is not accompanied by a similar evolution in the capitalization of the U.S. stock market, though this capitalization fluctuates dramatically over time. Though there are now fewer listed firms, the typical listed firm is worth more at least partly because it is larger.

The decrease in the net benefit of being listed that is required in our simple model to explain the evidence we document could result from increased regulatory hurdles to being public. However, if this were the case, it would be puzzling since regulatory changes mostly occurred more than four years after the listing peak. Alternatively, it could be that the decrease in the net benefit of being listed is mostly related to developments in financial markets that make it easier for firms to thrive without being listed. In this case, it could well be that the decrease the net benefit of being listed is positive in that it is the consequence of easier and possibly more efficient access to capital. But, if this is the explanation for our results, the way financial economists think about the functioning and role of U.S. capital markets and the role of exchanges in these capital markets will have to change to reflect the new reality that an exchange listing may not be as important as it used to be.

References

Arikan, Asli, and René M. Stulz, 2016, Corporate acquisitions, diversification, and the firm's lifecycle, *Journal of Finance*, forthcoming.

Bharath, Sreedhar T., and Amy K. Dittmar, 2010, Why do firms use private equity to opt out of public markets?, *Review of Financial Studies* 23, 1771-1818.

Bushee, Brian J. and Gregory S. Miller, 2012, Investor relations, firm visibility, and investor following, *The Accounting Review* 87, 867–97.

Ciccotello, Conrad S., 2014, The state of the public corporation: Not so much an eclipse as an evolution, *Journal of Applied Corporate Finance* 26, 8-21.

Da Rin, Marco, Thomas Hellman, and Manju Puri, 2012, A survey of venture capital research, Chapter 8, in Handbook of the Economics of Finance, Constantinides, George, Harris, Milton, and Stulz, René, eds., North Holland Publishers, London, U.K.

Decker, Ryan, John Haltiwanger, Ron S. Jarmin, and Javier Miranda, 2014, The secular decline of business dynamism in the United States, Working paper, University of Maryland.

Djama, Constant, Isabelle Martinez, and Stéphanie Serve, 2013, What do we know about delistings? A survey of the literature, Working paper, Université de Toulouse.

Djankov, Simeon, Rafael La Porta, Florencio Lopez-de-Silanes, and Andrei Shleifer, 2008, The law and economics of self-dealing, *Journal of Financial Economics* 88, 430-465.

Doidge, Craig, G. Andrew Karolyi, and René M. Stulz, 2013, The U.S. left behind? Financial globalization and the rise of IPOs outside the US, *Journal of Financial Economics* 110, 546-573.

Ernst & Young, 2009, Shifting landscape – Are You ready? Global IPO trends report 2009. Ernst & Young Global Limited.

Fama, Eugene F., and Kenneth R. French, 1997, Industry costs of equity, *Journal of Financial Economics* 43, 153-193.

Fama, Eugene F., and Kenneth R. French, 2004, New lists: Fundamentals and survival rates, *Journal of Financial Economics* 73, 229-269.

Gao, Xiahoui, Jay R. Ritter, and Zhongyan Zhu, 2012, Where have all the IPOs gone? *Journal of Financial and Quantitative Analysis* 48, 1663-1692.

Grullon, Gustavo, Yelena Larkin, and Roni Michaely, 2015, The disappearance of public firms and the changing nature of U.S. industries, Working paper, Rice University.

IPO Task Force to the U.S. Treasury, 2011, Re-building the IPO On-Ramp: Putting emerging companies and the job market back on the road to growth. Available at National Venture Capital Association Web site, (http://nvcatoday.nvca.org).

Hosmer, David, and Stanley Lemeshow, 2000, Applied Logistic Regression (2nd ed). New York: Wiley.

Jensen, Michael C., 1989, Eclipse of the public corporation, *Harvard Business Review* 67, 61-74.

Karolyi, G. Andrew and Rose C. Liao, 2015, The economic consequences of investor relations: A global perspective, Working paper, Cornell University.

Klein, April, and Partha S. Mohanram, 2006, Economic consequences of differences in NASDAQ initial listing standards: The role of accounting profitability, Working paper, New York University.

La Porta, Rafael, Florencio Lopez-de-Silanes, Andrei Shleifer, and Robert Vishny, 1997, Legal determinants of external finance, *Journal of Finance* 52, 1131-1150.

Leuz, Christian, 2007, Was the Sarbanes–Oxley Act of 2002 really this costly? A discussion of evidence from event returns and going-private decisions, *Journal of Accounting and Economics* 44, 146-165.

Leuz, Christian, Alexander Triantis, and Tracy Yue Wang, 2008, Why do firms go dark? Causes and economic consequences of voluntary SEC deregistrations, *Journal of Accounting and Economics* 45, 181-208.

Levine, Ross, 1997, Financial development and economic growth: Views and agenda, *Journal of Economic Literature* 35, 688-726.

Lowry, Michelle, 2003, Why does IPO volume fluctuate so much? *Journal of Financial Economics* 67, 3-40.

Macey, Jonathan, Maureen O'Hara, and David Pompilio, 2008, The law and economics of the delisting process, *Journal of Law and Economics* 51, 683-713.

Marosi, András, and Nadia Massoud, 2007, Why do firms go dark?, *Journal of Financial and Quantitative Analysis* 42, 421-442.

Mehran, Hamid, and Stavros Peristiani, 2010, Financial visibility and the decision to go private, *Review of Financial Studies* 23, 519-547.

Pinelli, Maria, and John Muscat, 2007, *Global capital market trends.* Ernst & Young LLP.

Ritter, Jay, Andrea Signori, and Silvio Vismara, 2013, Economies of scope and IPO activity in Europe, *Handbook of Research on IPOs*, Mario Levis and Silvio Vismara, eds., Edward Elgar Publishing, London, U.K.

Rosett, Joshua, and Richard Smith, 2014a, Are public markets declining in importance? *Journal of Applied Finance* 24, 6-13.

Rosett Joshua, and Richard Smith, 2014b, Public equity markets: Special panel session from the 2013 FMA annual meeting, *Journal of Applied Finance* 24, 14-35.

Weild, David, and Edward Kim, 2009, A wake-up call for America. Grant Thornton Capital Markets Series, Grant Thornton International.

Weild, David and Edward Kim, 2010, Market structure is causing the IPO crisis – and more. Grant Thornton Capital Markets Series, Grant Thornton International.

Table 1. Listing counts, population, and listing counts per capita for select years.

This table reports the number of domestic, publicly-listed firms in the U.S. and in non-U.S. countries for raw counts and for listing counts per capita (in terms of millions of inhabitants). Listing counts are from the WDI and WFE databases. Investment companies, mutual funds, REITs, and other collective investment vehicles are excluded. The set of non-U.S. countries comprises the 71 countries included in Djankov et al. (2008). Countries are classified as developed based on the MSCI classification scheme as of 2014.

Year	Number of countries	Listing counts	Population (millions)	Listing count per capita
		U.S.		
1975		4,775	216	22.11
1980		4,711	227	20.73
1985		5,650	238	23.75
1990		6,599	250	26.44
1995		7,487	266	28.12
1996		8,025	269	29.79
2000		6,917	282	24.51
2005		5,145	296	17.41
2012		4,102	314	13.08
% change: 1996-2012		*-48.9%*	*16.5%*	*-56.1%*
		Non-U.S. countries		
1975	16	12,361	630	19.61
1980	19	12,634	705	17.93
1985	25	12,788	790	16.18
1990	50	20,534	2,584	7.95
1995	65	29,166	4,295	6.79
1996	66	30,374	4,357	7.05
2000	70	33,945	4,672	7.27
2005	71	37,457	4,952	7.56
2012	71	39,427	5,301	7.44
% change: 1996-2012		*28.3%*	*21.6%*	*5.4%*
		Non-U.S. developed countries: constant sample		
1975	13	11,261	471	23.89
1980	13	10,884	483	22.54
1985	13	9,696	492	19.71
1990	13	10,676	504	21.20
1995	13	11,206	514	21.80
1996	13	11,624	516	22.53
2000	13	13,364	523	25.57
2005	13	17,535	536	32.71
2012	13	17,210	551	31.23
% change: 1996-2012		*48.1%*	*6.8%*	*38.6%*

Table 2. Institutions, economic development, and listings per capita.

This table presents cross-country regressions and panel regressions estimated from 1990 to 2012. The dependent variable is a country's annual listing count per capita (in millions of inhabitants). Listed firms include domestic, publicly-listed firms from the WDI and WFE databases. Investment companies, mutual funds, REITs, and other collective investment vehicles are excluded. The sample comprises 72 countries included in Djankov et al. (2008). The cross-sectional regression *t*-statistics are based on robust standard errors. The number of countries is indicated as the number of observations for each column. The panel regression *t*-statistics are adjusted for clustering by country. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

	Panel A. Cross-sectional regressions			Panel B. Panel regressions		
	1990	1996	2012	1990-2012		
	(1)	(2)	(3)	(4)	(5)	(6)
Constant	-2.656***	-3.012***	-4.286***	-3.593***	-4.245***	-4.017***
	(-3.42)	(-4.17)	(-5.38)	(-5.39)	(-5.48)	(-5.22)
Anti-self-dealing index	1.416***	0.974**	1.465***	1.231***	1.259***	1.259***
	(2.97)	(2.19)	(2.93)	(2.82)	(2.88)	(2.86)
Log(GDP per capita)	0.516***	0.586***	0.657***	0.634***	0.641***	0.641***
	(5.87)	(6.77)	(7.51)	(8.16)	(8.17)	(8.11)
GDP growth				0.004	0.004	0.004
				(0.22)	(0.20)	(0.20)
Non-U.S. dummy					0.595***	0.363**
					(3.79)	(2.16)
Year FE				Yes	Yes	Yes
Year FE × Non-U.S. dummy				No	No	Yes
N	51	67	72	1,568	1,568	1,568
Adjusted R^2	0.4847	0.4255	0.4551	0.4805	0.4827	0.4756

Table 3. The total number of firms, listed firms, new lists, and startups.

This table reports the total number of firms in the U.S., including public and private firms, the number of listed firms, startups, and the startup rate. The total number of firms and startups are from the Longitudinal Business Database provided by the U.S. Census Bureau. Listed firms include domestic, publicly-listed firms in the U.S., from the WDI and WFE databases. Investment companies, mutual funds, REITs, and other collective investment vehicles are excluded. Startups are firms with age equal to zero. The startup rate equals the number of startups in a year divided by the total number of firms in the prior year.

Year	(1) Total number of firms	(2) Listed firms	(3) Listed firms / Total firms	(4) Startups	(5) Startup rate
1977	3,417,883	4,710	0.138%	564,918	.
1978	3,470,222	4,622	0.133%	503,991	14.75%
1979	3,598,112	4,563	0.127%	497,805	14.35%
1980	3,606,439	4,711	0.131%	451,477	12.55%
1981	3,566,586	5,067	0.142%	453,728	12.58%
1982	3,603,989	4,999	0.139%	448,937	12.59%
1983	3,688,165	5,573	0.151%	433,627	12.03%
1984	3,836,150	5,690	0.148%	503,081	13.64%
1985	3,975,677	5,650	0.142%	509,129	13.27%
1986	4,085,581	5,930	0.145%	522,154	13.13%
1987	4,179,749	6,221	0.149%	544,151	13.32%
1988	4,197,555	6,680	0.159%	489,348	11.71%
1989	4,211,726	6,727	0.160%	473,842	11.29%
1990	4,314,167	6,599	0.153%	480,710	11.41%
1991	4,367,856	6,513	0.149%	470,472	10.91%
1992	4,382,586	6,562	0.150%	464,108	10.63%
1993	4,453,834	6,912	0.155%	475,427	10.85%
1994	4,527,996	7,255	0.160%	497,288	11.17%
1995	4,617,006	7,487	0.162%	513,082	11.33%
1996	4,693,080	8,025	0.171%	514,967	11.15%
1997	4,753,947	7,905	0.166%	520,064	11.08%
1998	4,797,187	7,499	0.156%	515,042	10.83%
1999	4,825,244	7,229	0.150%	496,754	10.36%
2000	4,837,075	6,917	0.143%	481,858	9.99%
2001	4,921,704	6,177	0.126%	471,196	9.74%
2002	4,954,914	5,685	0.115%	503,376	10.23%
2003	5,007,771	5,295	0.106%	506,829	10.23%
2004	5,083,445	5,226	0.103%	526,470	10.51%
2005	5,184,869	5,145	0.099%	549,148	10.80%
2006	5,223,984	5,133	0.098%	561,721	10.83%
2007	5,284,371	5,109	0.097%	529,035	10.13%
2008	5,241,600	4,666	0.089%	490,906	9.29%
2009	5,068,343	4,401	0.087%	409,133	7.81%
2010	4,994,080	4,279	0.086%	388,063	7.66%
2011	4,953,866	4171	0.084%	401,207	8.03%
2012	5,030,962	4,102	0.082%	410,001	8.28%

Table 4. Listing counts, new lists, and delists.

In Panel A, data for listed firms, new lists, and delists are from CRSP. The counts include U.S. common stocks and firms listed on AMEX, NASDAQ, or NYSE. Investment funds and trusts are excluded. We count a new list as such in the year a record first enters the database and a delisting as such in the year in which a record drops out. We use CRSP delist codes to categorize delists as mergers, for cause, and voluntary. Panel B reports data for 41 non-U.S. countries from Datastream. The non-U.S. new list (delist) rate equals the sum all new lists (delists) across 41 countries divided by the total number of listings in those countries in the prior year.

Panel A. U.S. listings, new lists, and delistings

	Counts			Counts by delisting type			Rates				
	Listed firms	New lists	Delists	Mergers	Cause	Voluntary	New list rate	Delist rate	Merger rate	Cause rate	Voluntary rate
1975	4,775	130	176	90	86	0	2.70%	3.65%	1.87%	1.78%	0.00%
1976	4,796	189	176	111	64	1	3.96%	3.69%	2.32%	1.34%	0.02%
1977	4,710	151	240	171	67	2	3.15%	5.00%	3.57%	1.40%	0.04%
1978	4,622	199	296	219	75	2	4.23%	6.28%	4.65%	1.59%	0.04%
1979	4,563	217	287	224	62	1	4.69%	6.21%	4.85%	1.34%	0.02%
1980	4,711	438	288	184	104	0	9.60%	6.31%	4.03%	2.28%	0.00%
1981	5,067	627	266	170	95	1	13.31%	5.65%	3.61%	2.02%	0.02%
1982	4,999	295	353	189	163	1	5.82%	6.97%	3.73%	3.22%	0.02%
1983	5,573	895	328	182	143	3	17.90%	6.56%	3.64%	2.86%	0.06%
1984	5,690	567	454	236	203	15	10.17%	8.15%	4.23%	3.64%	0.27%
1985	5,650	513	537	262	263	12	9.02%	9.44%	4.60%	4.62%	0.21%
1986	5,930	898	627	301	316	10	15.89%	11.10%	5.33%	5.59%	0.18%
1987	6,221	753	480	268	203	9	12.70%	8.09%	4.52%	3.42%	0.15%
1988	5,954	383	658	368	276	14	6.16%	10.58%	5.92%	4.44%	0.23%
1989	5,767	359	557	261	280	16	6.03%	9.36%	4.38%	4.70%	0.27%
1990	5,631	356	507	193	307	7	6.17%	8.79%	3.35%	5.32%	0.12%
1991	5,668	484	449	114	322	13	8.60%	7.97%	2.02%	5.72%	0.23%
1992	5,795	621	481	130	330	21	10.96%	8.49%	2.29%	5.82%	0.37%
1993	6,329	850	327	168	150	9	14.67%	5.64%	2.90%	2.59%	0.16%
1994	6,628	722	413	245	159	9	11.41%	6.53%	3.87%	2.51%	0.14%
1995	6,856	753	529	316	202	11	11.36%	7.98%	4.77%	3.05%	0.17%
1996	7,322	987	547	390	151	6	14.40%	7.98%	5.69%	2.20%	0.09%
1997	7,313	687	692	470	218	4	9.38%	9.45%	6.42%	2.98%	0.05%
1998	6,873	492	919	544	370	5	6.73%	12.57%	7.44%	5.06%	0.07%
1999	6,540	603	895	554	334	7	8.77%	13.02%	8.06%	4.86%	0.10%
2000	6,247	537	842	560	274	8	8.21%	12.87%	8.56%	4.19%	0.12%
2001	5,550	152	834	413	396	25	2.43%	13.35%	6.61%	6.34%	0.40%
2002	5,131	139	543	228	287	28	2.50%	9.78%	4.11%	5.17%	0.50%
2003	4,808	158	477	231	222	24	3.08%	9.30%	4.50%	4.33%	0.47%
2004	4,752	265	355	243	95	17	5.51%	7.38%	5.05%	1.98%	0.35%
2005	4,687	274	365	224	110	31	5.77%	7.68%	4.71%	2.31%	0.65%
2006	4,620	267	347	259	81	7	5.70%	7.40%	5.53%	1.73%	0.15%
2007	4,529	305	429	336	86	7	6.60%	9.29%	7.27%	1.86%	0.15%
2008	4,263	106	393	218	149	26	2.34%	8.68%	4.81%	3.29%	0.57%
2009	4,007	103	355	122	182	51	2.42%	8.33%	2.86%	4.27%	1.20%
2010	3,878	167	320	193	109	18	4.17%	7.99%	4.82%	2.72%	0.45%
2011	3,724	128	293	186	99	8	3.30%	7.56%	4.80%	2.55%	0.21%
2012	3,605	152	268	176	87	5	4.08%	7.20%	4.73%	2.34%	0.13%
1975-2012		15,922	17,303	9,749	7,120	434	7.47%	8.22%	4.64%	3.35%	0.22%
1975-1996		11,387	8,976	4,792	4,021	163	9.22%	7.29%	3.92%	3.25%	0.13%
1997-2012		4,535	8,327	4,957	3,099	271	5.06%	9.49%	5.64%	3.50%	0.35%
t-statistic							3.68	3.10	3.59	0.52	2.68

Table 4, continued.

Panel B. Non-U.S. listings, new lists, and delistings

	Counts			Rates	
	Listed firms	New lists	Delists	New list rate	Delist rate
1990	9,939	1,257	283	11.62%	2.62%
1991	12,946	914	388	9.20%	3.90%
1992	13,443	799	364	6.17%	2.81%
1993	14,414	1,265	294	9.41%	2.19%
1994	15,628	1,482	315	10.28%	2.19%
1995	16,229	1,053	452	6.74%	2.89%
1996	17,714	2,034	549	12.53%	3.38%
1997	18,820	1,709	603	9.65%	3.40%
1998	19,363	1,322	779	7.02%	4.14%
1999	19,931	1,406	910	7.26%	4.70%
2000	21,116	2,143	958	10.75%	4.81%
2001	21,447	1,307	994	6.19%	4.71%
2002	21,442	1,098	1,103	5.12%	5.14%
2003	21,368	887	961	4.14%	4.48%
2004	22,043	1,431	756	6.70%	3.54%
2005	22,655	1,426	814	6.47%	3.69%
2006	23,250	1,409	814	6.22%	3.59%
2007	23,890	1,619	979	6.96%	4.21%
2008	23,687	793	996	3.32%	4.17%
2009	23,439	786	1,034	3.32%	4.37%
2010	23,711	1,230	964	5.25%	4.11%
2011	24,076	1,215	850	5.12%	3.58%
2012	23,993	777	860	3.23%	3.57%
1990-2012		29,362	17,020	7.07%	3.75%
1990-1996		8,804	2,645	9.42%	2.85%
1997-2012		20,558	14,375	6.04%	4.14%
t-statistic				2.92	3.90

Table 5. Closing the listing gap.

This table presents panel regressions estimated over 1990 to 2012. The dependent variable is a country's annual listing count per capita. Listed firms include domestic, publicly-listed firms from the WDI and WFE databases. Investment companies, mutual funds, REITs, and other collective investment vehicles are excluded. The sample comprises 72 countries included in Djankov et al. (2008). Model (1) reproduces the estimates of Model (6), from Table 2. In Model (2), we apply historical new list and delist rates from CRSP to adjust the WDI listing counts for the U.S. for 1997 to 2012. In Model (3) (Model (4)), we apply the historical (actual) new list rate and the actual (historical) delist rate. *t*-statistics are adjusted for clustering by country. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

	(1)	(2)	(3)	(4)
Constant	-4.017***	-4.017***	-4.017***	-4.017***
	(-5.22)	(-5.22)	(-5.22)	(-5.22)
Anti-self-dealing index	1.259***	1.259***	1.259***	1.259***
	(2.86)	(2.86)	(2.86)	(2.86)
Log(GDP per capita)	0.641***	0.641***	0.641***	0.641***
	(8.11)	(8.11)	(8.11)	(8.11)
GDP growth	0.004	0.004	0.004	0.004
	(0.20)	(0.20)	(0.20)	(0.20)
Non-U.S. dummy	0.363**	0.363**	0.363**	0.363**
	(2.16)	(2.16)	(2.16)	(2.16)
1991	-0.004	-0.004	-0.004	-0.004
	(-0.11)	(-0.11)	(-0.11)	(-0.11)
1992	-0.033	-0.033	-0.033	-0.033
	(-1.03)	(-1.03)	(-1.03)	(-1.03)
1993	0.003	0.003	0.003	0.003
	(0.20)	(0.20)	(0.20)	(0.20)
1994	0.020	0.020	0.020	0.020
	(0.48)	(0.48)	(0.48)	(0.48)
1995	0.039**	0.039**	0.039**	0.039**
	(2.49)	(2.49)	(2.49)	(2.49)
1996	0.084**	0.084**	0.084**	0.084**
	(2.25)	(2.25)	(2.25)	(2.25)
1997	0.037	0.072	0.050	0.073
	(0.74)	(1.41)	(0.99)	(1.44)
1998	-0.044	0.062	-0.013	0.038
	(-0.88)	(1.23)	(-0.26)	(0.77)
1999	-0.112*	0.050	-0.083	0.022
	(-1.93)	(0.85)	(-1.42)	(0.38)
2000	-0.176***	0.049	-0.140***	0.011
	(-4.01)	(1.11)	(-3.18)	(0.26)
2001	-0.284***	0.074***	-0.176***	-0.033
	(-12.66)	(3.30)	(-7.87)	(-1.46)
2002	-0.384***	0.075***	-0.199***	-0.099***
	(-32.00)	(6.29)	(-16.61)	(-8.27)
2003	-0.478***	0.072***	-0.223***	-0.165***
	(-22.65)	(3.39)	(-10.57)	(-7.83)
2004	-0.523***	0.059	-0.236***	-0.215***
	(-13.22)	(1.50)	(-5.98)	(-5.43)
2005	-0.560***	0.057*	-0.243***	-0.252***
	(-17.29)	(1.75)	(-7.49)	(-7.77)
2006	-0.579***	0.059**	-0.241***	-0.284***
	(-25.27)	(2.59)	(-10.53)	(-12.41)
2007	-0.594***	0.068***	-0.252***	-0.301***
	(-31.56)	(3.62)	(-13.40)	(-16.02)
2008	-0.666***	0.106**	-0.228***	-0.334***
	(-14.17)	(2.24)	(-4.86)	(-7.10)
2009	-0.707***	0.142	-0.202**	-0.366***
	(-7.47)	(1.50)	(-2.13)	(-3.87)
2010	-0.772***	0.125***	-0.226***	-0.435***
	(-41.34)	(6.68)	(-12.12)	(-23.29)
2011	-0.802***	0.139***	-0.214***	-0.480***
	(-53.06)	(9.23)	(-14.17)	(-31.75)
2012	-0.840***	0.137***	-0.216***	-0.534***
	(-36.32)	(5.92)	(-9.33)	(-23.10)
Year FE × Non-U.S. dummy	Yes	Yes	Yes	Yes
N	1,568	1,568	1,568	1,568
Adjusted R^2	0.4756	0.4782	0.4767	0.4766

Table 6. Vector Auto-Regression (VAR) models of new list and delist activity in the U.S.

VAR models are estimated for the new list and delist rates by quarter in the U.S. New list (delist) rates are computed as the number of new lists (delists) in quarter t divided by the number of listed firms in t-1. Data for listing counts, new lists, and delists are from CRSP. The counts include U.S. common stocks (share codes 10 and 11) and firms listed on AMEX, NASDAQ, or NYSE (exchange codes 1, 2, and 3). Investment funds and trusts (SIC codes 6722, 6726, 2798, and 6799) are excluded. We count a new list as such in the year a record first enters the database and we count a delisting as such in the year in which a record drops out. The model is $y_t = C + \sum_{s=1}^{L} B_s y_{t-s} + AZ_{t-1}\, u_t$, where $E(u_t u_t') = \Sigma$ where y_t is a 2×1 vector of the new list rate and delist rate, and C and B_s are 2×1 and 2×2 matrices of parameters, L is the lag length for the VAR, and u_t is a column vector of forecast errors of the best linear predictor of y_t given all the past y's. A is R×1 matrix of parameters for a series of R exogenous variables, Z. The (i,j)-th component of B_s measures the direct effect that a change in the return on the jth variable would have on the ith variable in s quarters. We estimate this system in two specifications: Model 1 without any exogenous variables, and Model 2, with exogenous variables included.

Panel A. VAR estimation results

		(1)				(2)			
		New list rate		*Delist rate*		*New list rate*		*Delist rate*	
	Lag	Coefficient	*t*-statistic	Coefficient	*t*-statistic	Coefficient	*t*-statistic	Coefficient	*t*-statistic
New list rate	-1	0.7473	6.69***	-0.0286	-0.59	0.5603	5.07***	-0.0023	-0.04
	-2	0.2502	1.84*	0.0237	0.40	0.3838	2.94***	-0.0397	-0.63
	-3	-0.3399	-2.42**	-0.1020	-1.66*	-0.2332	-1.81*	-0.0770	-1.23
	-4	0.0856	0.77	0.1600	3.30***	-0.0468	-0.45	0.1438	2.86***
Delist rate	-1	-0.2271	-0.96	0.5775	5.56***	-0.0962	-0.45	0.5313	5.09***
	-2	0.2518	0.90	0.0696	0.57	0.0489	0.19	0.1350	1.10
	-3	0.4461	1.60	0.0247	0.20	0.4714	1.88*	0.0432	0.36
	-4	-0.2297	-0.95	0.1496	1.41	-0.3858	-1.73*	0.1151	1.06
Constant		0.0017	0.56	0.0022	1.67*	-0.0038	-1.06	0.0023	1.33
Q1 dummy						-0.0042	-2.47**	-0.0009	-1.07
Value-weighted market return						0.0250	2.53**	-0.0119	-2.48**
IPO return						0.0001	2.16**	0.0000	0.05
Tobin's q						0.0064	1.99*	0.0008	0.51
N		88		88		88		88	
Adjusted R^2		0.6510		0.6620		0.7280		0.6760	
		New list rate		Delist rate		New list rate		Delist rate	
F-statistics	New list rate	33.34 (0.00)		3.48 (0.01)		25.92 (0.00)		2.42 (0.06)	
	Delist rate	1.65 (0.17)		33.20 (0.00)		1.22 (0.29)		26.58 (0.00)	

Table 6, continued.

		Panel B. Impulse responses and variance decompositions			
		Model (1)		Model (2)	
		Impulse responses of the i-th variable in s periods to a unit shock in the j-th variable			
Response of:	*Shock to:*	*New list rate*	*Delist rate*	*New list rate*	*Delist rate*
New list rate	s = 1	0.68%	0.00%	0.58%	0.01%
	s = 2	0.50%	-0.07%	0.32%	-0.03%
	s = 3	0.55%	-0.01%	0.40%	-0.02%
	s = 6	0.10%	0.13%	0.06%	0.05%
	s = 12	0.06%	0.07%	0.01%	-0.01%
Delist rate	s = 1	-0.00%	0.29%	0.00%	0.28%
	s = 2	-0.02%	0.17%	0.01%	0.15%
	s = 3	-0.01%	0.12%	-0.02%	0.12%
	s = 6	0.02%	0.09%	0.06%	0.09%
	s = 12	0.05%	0.06%	0.01%	0.05%
		Variance decomposition by variable of N-quarter ahead forecasts (in percent)			
		New list rate	*Delist rate*	*New list rate*	*Delist rate*
New list rate	N = 1	100.00	0.00	100.00	0.15
	N = 2	99.37	0.36	99.85	0.13
	N = 3	99.54	0.40	99.84	0.46
	N = 6	95.67	4.61	97.76	3.49
	N = 12	91.07	14.03	97.66	5.92
Delist rate	N = 1	0.00	99.99	0.00	99.86
	N = 2	0.63	98.64	0.17	99.87
	N = 3	0.46	99.57	0.16	99.54
	N = 6	4.33	95.39	2.24	96.51
	N = 12	8.29	85.97	2.34	94.08

Table 7. Multinomial logits for delisting types.

This table presents multinomial logit regressions estimated over the period from 1975 to 2012. The dependent variable equals zero if a firm did not delist. It equals one for delistings because of merger, two for cause, and three for voluntary. Data for listed firms and delists are from CRSP. The counts include U.S. common stocks (share codes 10 and 11) and firms listed on AMEX, NASDAQ, or NYSE (exchange codes 1, 2, and 3). Investment funds and trusts (SIC codes 6722, 6726, 2798, and 6799) are excluded. We count a delisting as such in the year in which a record drops out. We use CRSP delist codes to categorize delists as mergers (codes 200-399) and for cause (codes 400 and above except 570 and 573). The Post-peak dummy equals one from 1997 to 2012. The Young listed dummy equals one for firms that became listed within the last five years. Firm characteristics are lagged by one year. *t*-statistics are based on standard errors clustered at the firm-level. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

	(1)			(2)			(3)		
	Merged	Cause	Voluntary	Merged	Cause	Voluntary	Merged	Cause	Voluntary
Constant	-3.203***	-3.714***	-7.210***	-3.207***	-1.914***	-5.233***	-3.259***	-1.847***	-5.052***
	(-44.07)	(-39.00)	(-17.61)	(-40.78)	(-19.57)	(-12.29)	(-39.08)	(-17.19)	(-10.86)
Post-peak	0.414***	0.286***	0.977***	0.432***	0.446***	1.284***	0.533***	0.241***	0.985***
	(18.16)	(10.10)	(8.86)	(18.52)	(14.28)	(11.33)	(8.51)	(2.89)	(3.29)
Log(Assets)				-0.005	-0.434***	-0.484***	0.006	-0.468***	-0.549***
				(-0.79)	(-42.08)	(-14.43)	(0.77)	(-31.22)	(-9.18)
Post-peak × Log(Assets)							-0.026**	0.083***	0.099
							(-2.47)	(4.19)	(1.41)
Young firm				0.156***	0.096***	0.017	0.068	-0.002	0.223
				(5.41)	(2.81)	(0.14)	(1.49)	(-0.04)	(1.10)
Post-peak × Young							0.164***	0.136**	-0.317
							(2.82)	(1.99)	(-1.27)
Profitability				0.004***	-0.014***	-0.005***	0.008***	-0.018***	-0.002
				(5.17)	(-30.30)	(-3.57)	(5.69)	(-24.89)	(-0.58)
Post-peak × Profitability							-0.006***	0.005***	-0.004
							(-3.53)	(5.93)	(-1.12)
Asset growth				-0.002***	-0.002***	-0.003*	-0.003***	-0.002***	-0.004
				(-6.56)	(-5.62)	(-1.85)	(-5.55)	(-3.76)	(-1.31)
Post-peak × Asset growth							0.001**	0.000	0.002
							(2.35)	(0.41)	(0.68)
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
N	174,963			174,963			174,963		
Pseudo R^2	0.063			0.079			0.080		

Table 8. Predicting merger delists.

Panel A presents logit regressions estimated over the period from 1975 to 2012. The dependent variable equals one if a firm delisted because of a merger and zero if it delisted for cause. Data for listed firms and delists are from CRSP. The counts include U.S. common stocks (share codes 10 and 11) and firms listed on AMEX, NASDAQ, or NYSE (exchange codes 1, 2, and 3). Investment funds and trusts (SIC codes 6722, 6726, 2798, and 6799) are excluded. We count a delisting as such in the year in which a record drops out. We use CRSP delist codes to categorize delists as mergers (codes 200-399) and for cause (codes 400 and above except 570 and 573). *t*-statistics are based on robust standard errors. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively. Panel B shows the actual counts for delists because of mergers and for cause and compares them to those predicted by the Model (3) in Panel A. For each delisting, we compute the predicted probability of being a merger based on the estimated coefficients and the realized values for each variable. Probabilities above 0.491 are predicted to be mergers.

	Panel A. Logits.			
	(1)	(2)	(3)	(4)
Constant	-1.755***	-3.045***	-2.631***	-3.891***
	(-24.06)	(-4.45)	(-7.41)	(-4.94)
Delisting price	1.707***	1.760***	1.910***	1.950***
	(18.54)	(18.15)	(18.68)	(18.42)
1 year total return	0.152***	0.153***	0.144***	0.142***
	(11.06)	(10.73)	(10.28)	(9.86)
Profitability	0.438***	0.827***	0.539***	0.846***
	(4.89)	(6.88)	(5.49)	(6.80)
Log(assets)	0.299***	0.382***	0.281***	0.396***
	(17.87)	(20.42)	(14.42)	(18.16)
Year FE	No	No	Yes	Yes
Industry FE	No	Yes	No	Yes
N	14,863	14,863	14,863	14,863
Pseudo R^2	0.577	0.599	0.587	0.607

Table 8, continued.

Panel B. Predicting merger delists

		Actual		Predicted		Absolute difference
Year	Total delists	For cause	Mergers	For cause	Mergers	Mergers
1975	89	32	57	32	57	0
1976	103	28	75	26	77	2
1977	135	23	112	16	119	7
1978	200	47	153	41	159	6
1979	215	39	176	32	183	7
1980	213	65	148	61	152	4
1981	224	71	153	68	156	3
1982	251	107	144	105	146	2
1983	252	101	151	102	150	1
1984	353	150	203	155	198	5
1985	419	200	219	203	216	3
1986	495	248	247	252	243	4
1987	384	164	220	166	218	2
1988	529	218	311	223	306	5
1989	437	215	222	223	214	8
1990	401	246	155	264	137	18
1991	347	256	91	281	66	25
1992	378	287	91	305	73	18
1993	242	132	110	136	106	4
1994	367	152	215	160	207	8
1995	502	193	309	199	303	6
1996	522	143	379	144	378	1
1997	650	208	442	218	432	10
1998	868	358	510	379	489	21
1999	839	322	517	340	499	18
2000	791	265	526	289	502	24
2001	789	391	398	442	347	51
2002	509	284	225	302	207	18
2003	446	217	229	236	210	19
2004	333	93	240	83	250	10
2005	330	109	221	113	217	4
2006	334	77	257	78	256	1
2007	414	83	331	78	336	5
2008	364	147	217	159	205	12
2009	302	180	122	193	109	13
2010	299	107	192	105	194	2
2011	278	93	185	93	185	0
2012	259	85	174	88	171	3
Total	14,863	6,136	8,727	6,390	8,473	350

Figure 1. Listing counts for the U.S. for and non-U.S. countries.

This figure shows the number of domestic, publicly-listed firms in the U.S. and in non-U.S. countries from 1975 to 2012. Listing counts are from the WDI and WFE databases. Investment companies, mutual funds, REITs,and other collective investment vehicles are excluded. The set of non-U.S. countries comprises the 71 countries included in Djankov et al. (2008). Countries are classified as developed based on the MSCI classification scheme as of 2014. There are 13 non-U.S. developed countries in the constant sample.

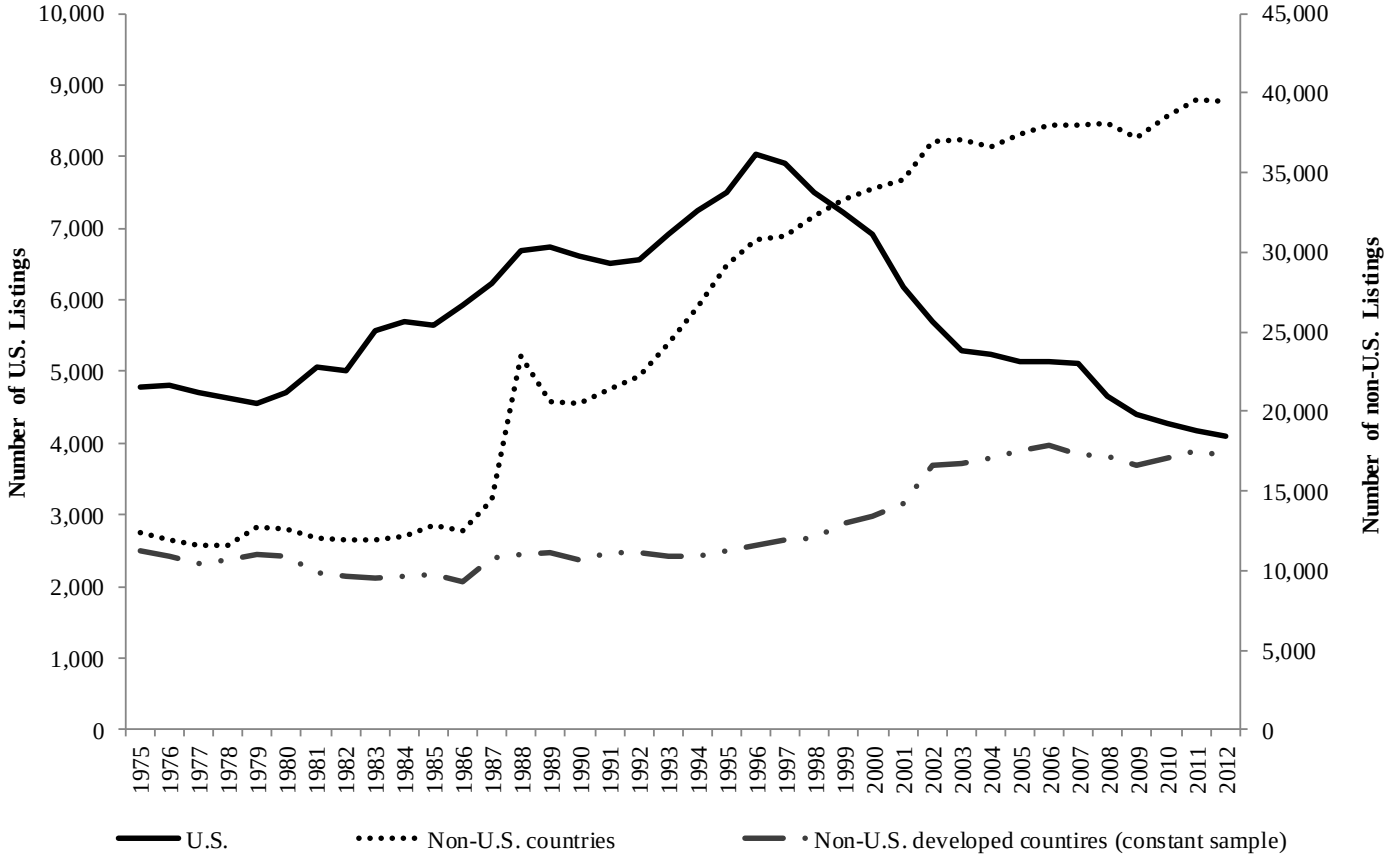


Figure 2. Percent change in listing counts: 1996 to 2012.
This figure shows the percentage change in the number of domestic, publicly-listed firms from 1996 to 2012. Listing counts are from the WDI and WFE databases. Investment companies, mutual funds, REITs, and other collective investment vehicles are excluded. The initial sample comprises 72 countries included in Djankov et al. (2008). The sample includes the 54 countries with at least 50 listed firms in 1996. For example, the U.S. had a listing count of 8,025 firms in 1996 and 4,102 in 2012, a 49% decline. The figure caps the percentage change at 100%. Nine countries have increases in excess of 100%.

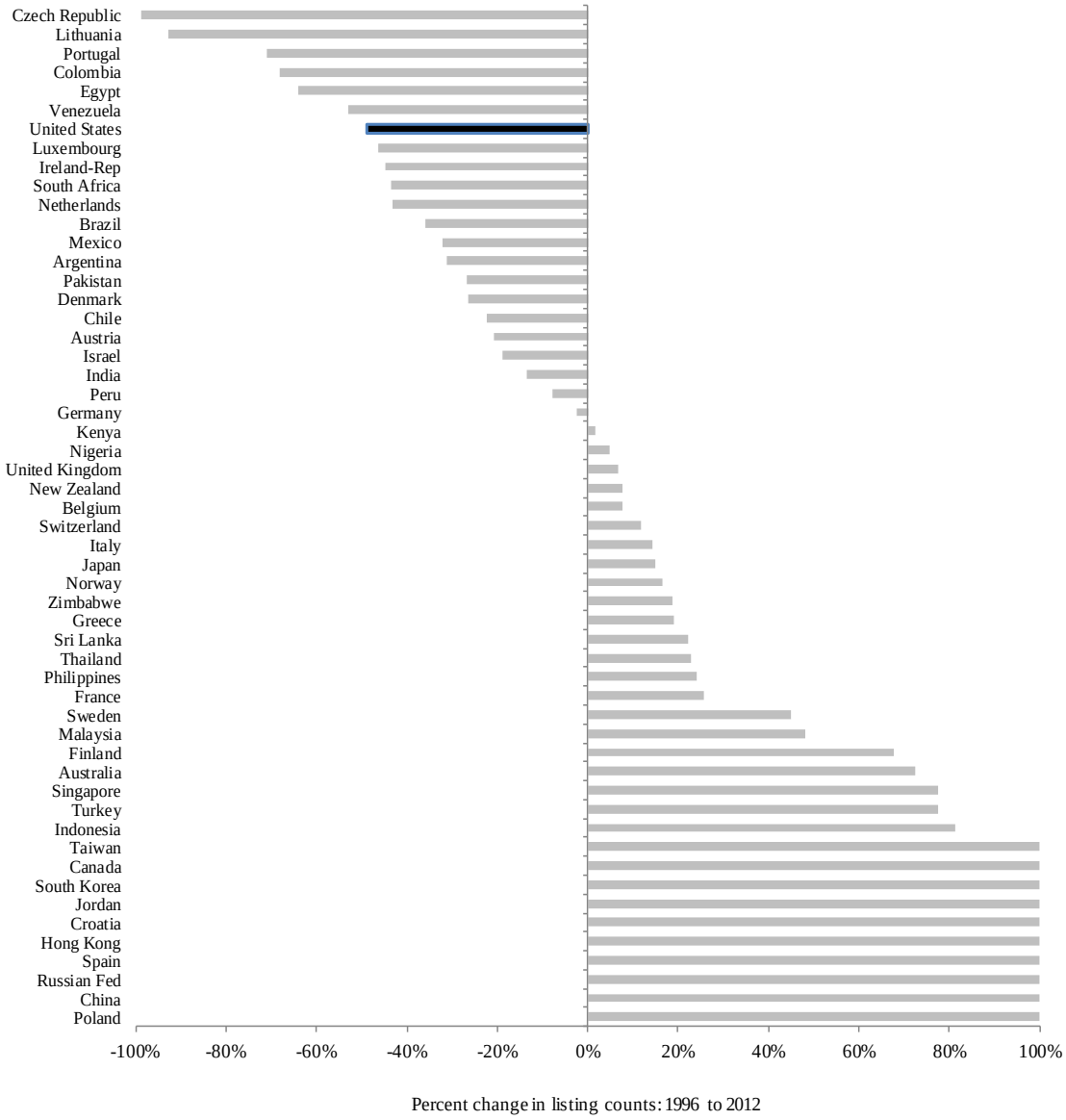


Figure 3. The U.S. listing gap.

This figure shows the U.S. listing gap, measured as the number of missing listed firms each year. The listing gap is computed from the year fixed effects estimated in Model (6) of Table 2. The dependent variable in this regression is a country's annual listing count per capita (in millions of inhabitants). The explanatory variables include the anti-self-dealing index, Log(GDP per capita), GDP growth, a non-U.S. dummy, year fixed effects, and interactions of the non-U.S. indicator with the year fixed effects. Listing counts are the number of domestic, publicly-listed firms from the WDI and WFE databases. Investment companies, mutual funds, REITs, and other collective investment vehicles are excluded. The sample comprises 72 countries included in Djankov et al. (2008). The panel regression *t*-statistics are adjusted for clustering by country. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively. A black bar indicates that the coefficient on a given year fixed effect is statistically significant at the 5% level or better. A white bar indicates the coefficient is not statistically significant.

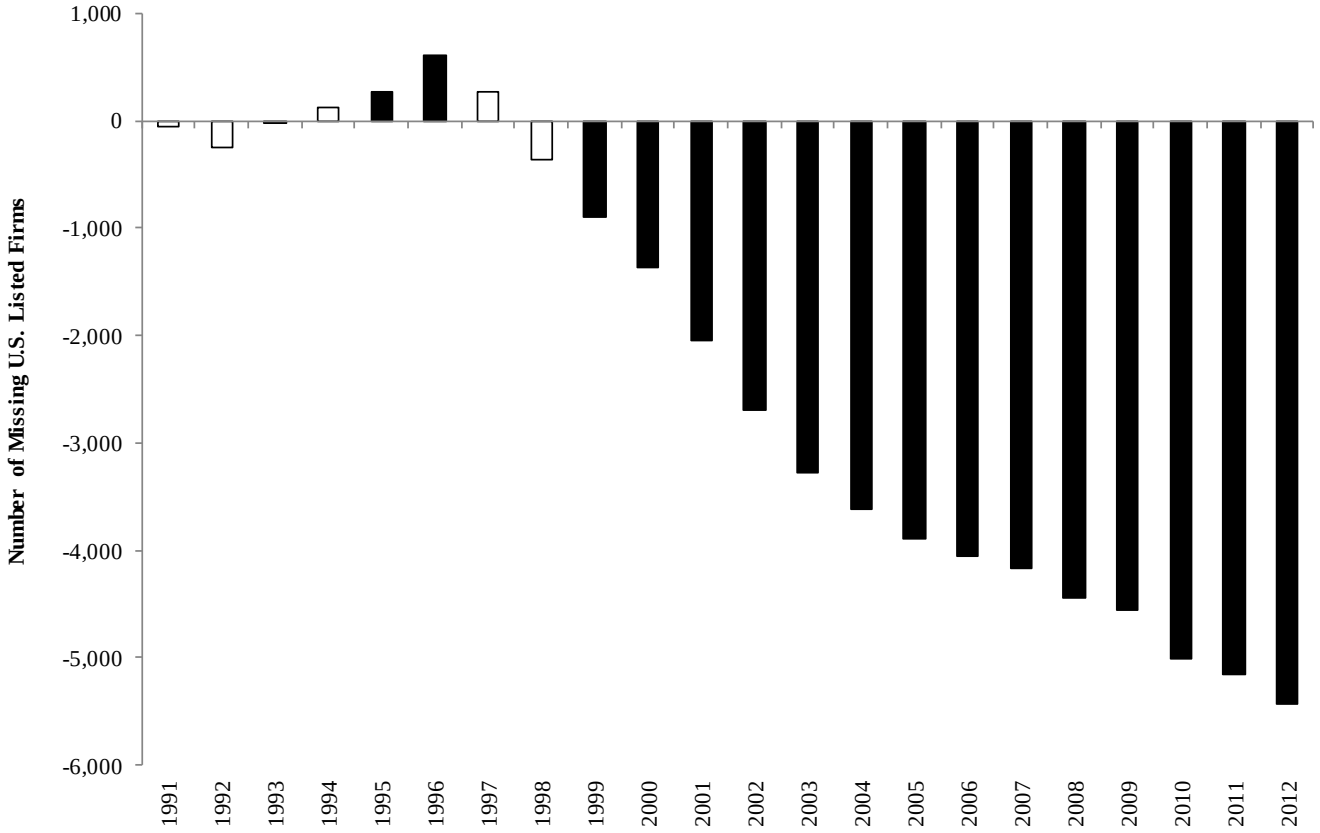


Figure 4. The costs and benefits of listing.

This figure shows the costs and benefits of being listed as a function of firm size. The cost curve (C) is positive for any firm regardless of size. The cost of being listed starts positive because of the initial fixed cost. The benefit curve (B) slopes upward but starts below the cost curve. The difference between the benefit curve and the cost curve is the net benefit of being listed. When the net benefit is negative, a firm does not list. The figure also shows the impact on the listing size threshold of an increase in the cost curve from C to C* and a decrease in the benefit curve from B to B*. With these changes, the size threshold beyond which firms choose to be listed increases from S to S*.

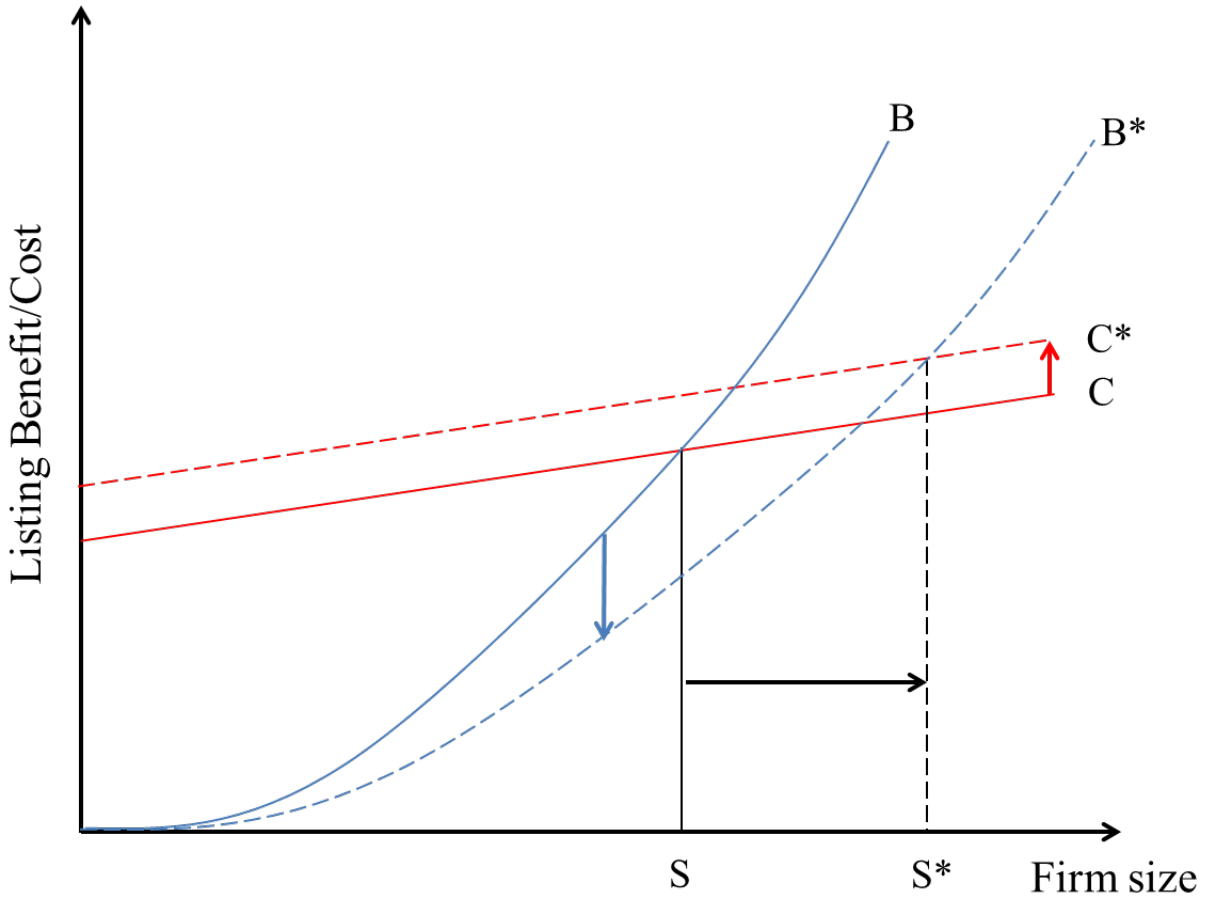


Figure 5. Firm size and the propensity to be listed.

This figure shows the percentage of total firms (public and private), in each employee size group that are listed. The total number of firms is from the Longitudinal Business Database provided by the U.S. Census Bureau. Listed firms are from Compustat and CRSP and include U.S. common stocks (share codes 10 and 11) and firms listed on AMEX, NASDAQ, or NYSE (exchange codes 1, 2, and 3). Investment funds and trusts (SIC codes 6722, 6726, 2798, and 6799) are excluded.

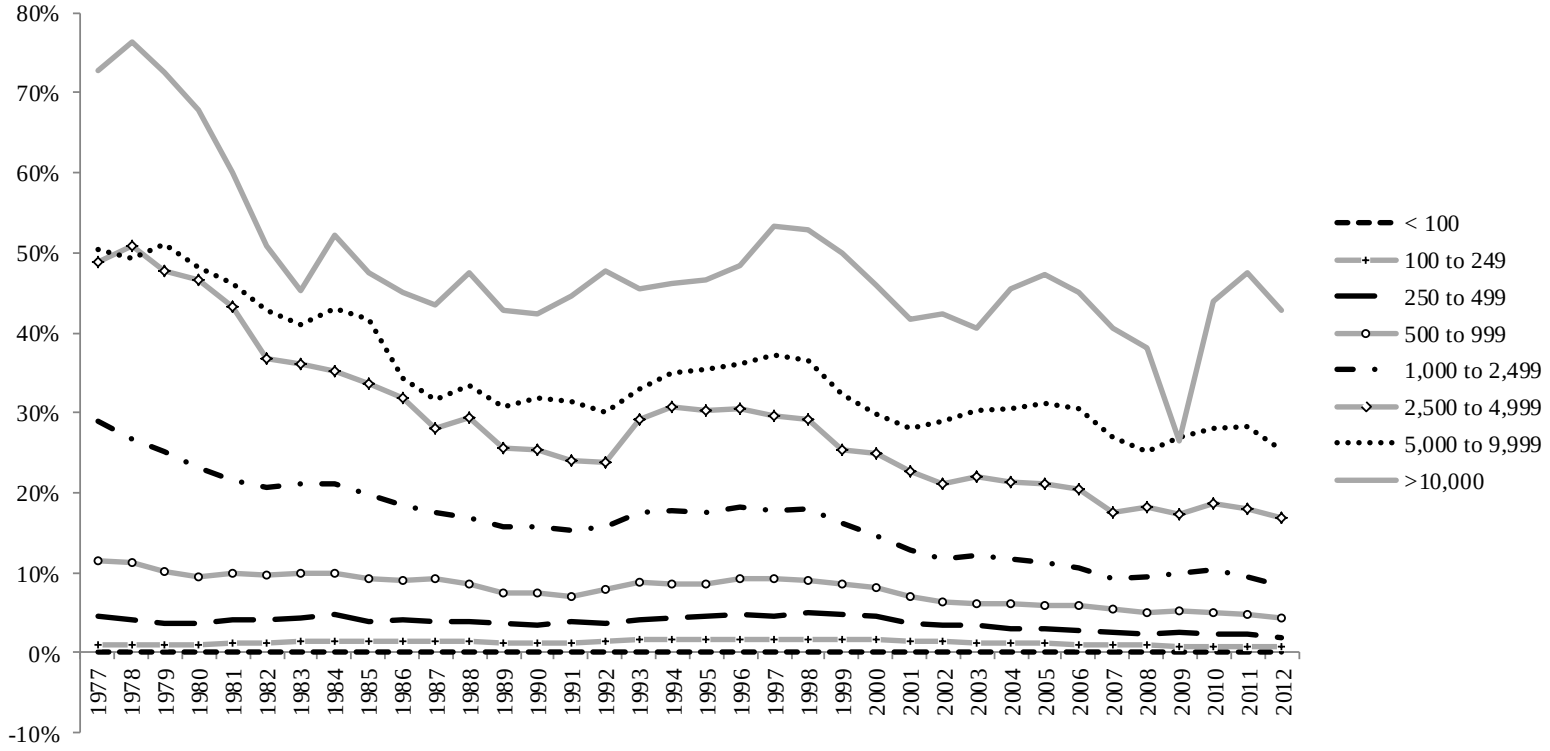
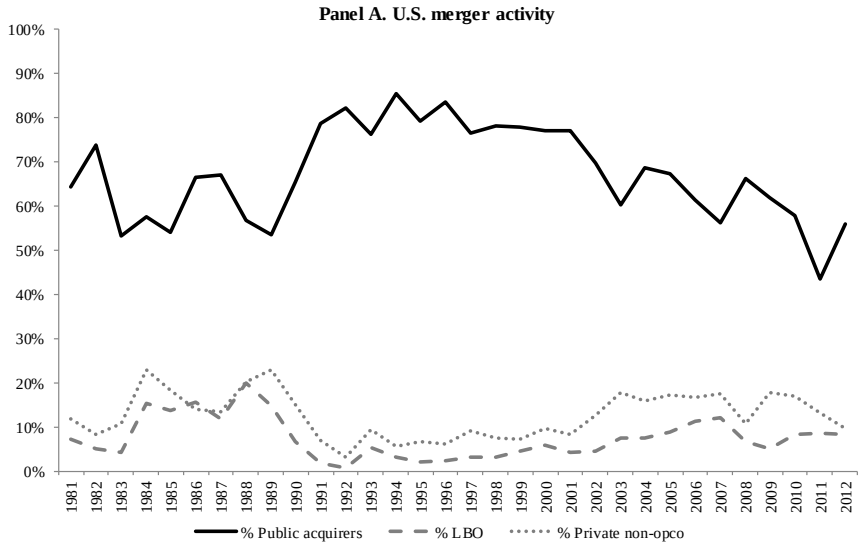


Figure 6. Acquisitions of U.S. public firms by acquirer type.
Panel A shows the percentage of U.S. public firms acquired by public firms and by private firms from 1981 to 2012. Data on acquisitions is from SDC. We include acquisitions in which the acquirer owns 100% after the transaction. A U.S. target is classified as public if the SDC flag "Target status" equals public and the target's stock exchange is one of AMEX, NASDAQ, or NYSE. Investment funds and trusts are excluded. Acquirers are classified as public if the SDC flag "Acquirer status" equals public and information on the acquirer's stock exchange is provided. A deal is classified as an LBO based on the "LBO" flag in SDC. Private acquirers are classified as a non-operating company based on the SDC flag "Acquirer type" and industry information. Panel B is similar but starts in 1990 for acquisitions of non-U.S. targets.



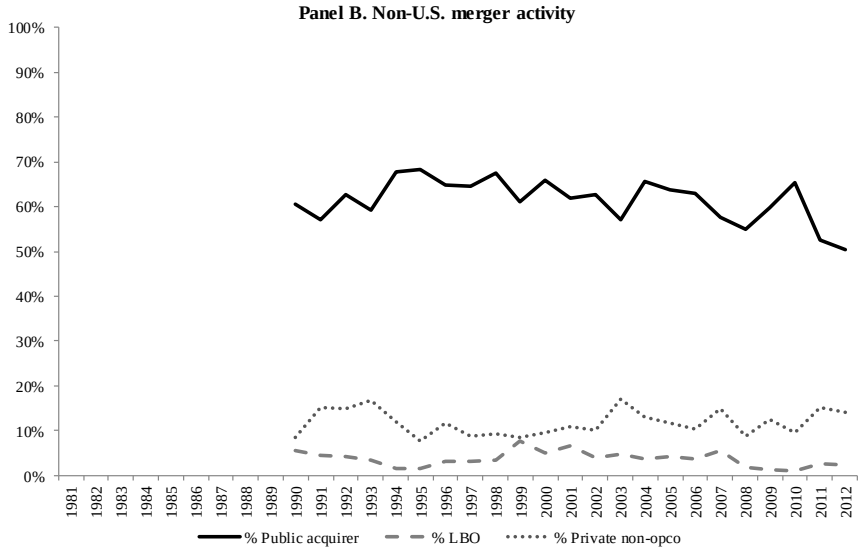
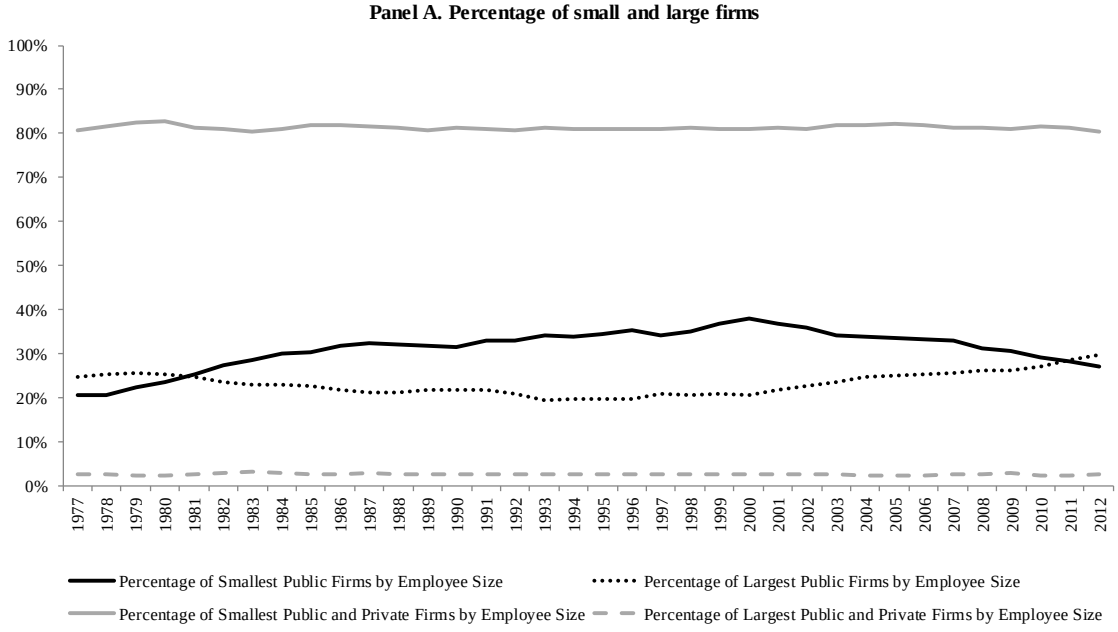
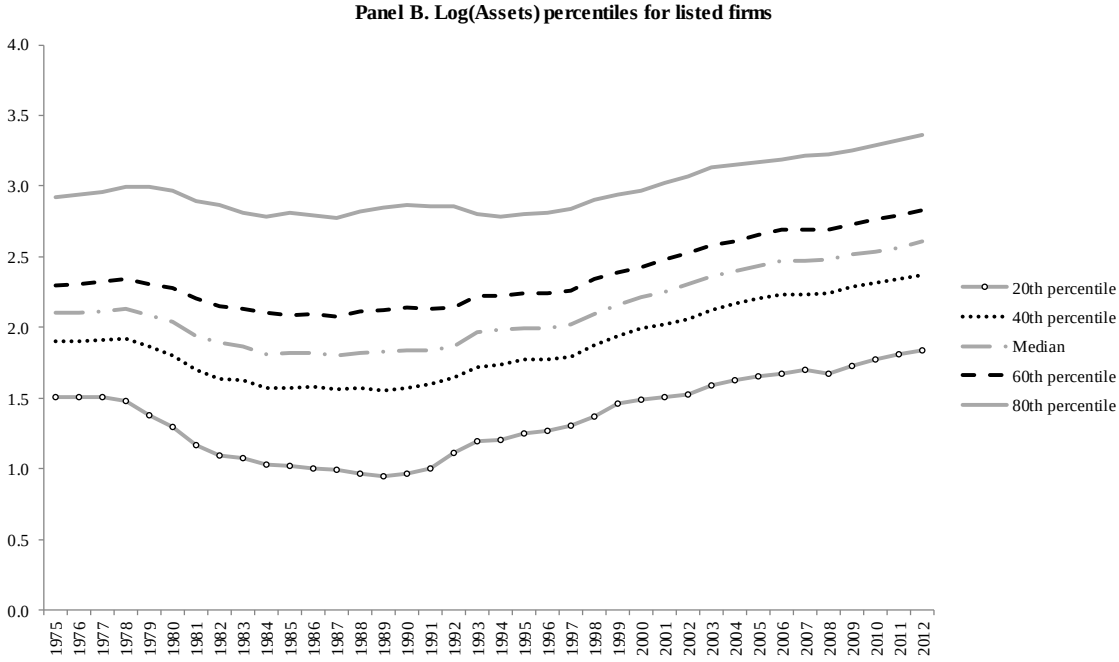


Figure 7. The size of U.S. firms.

Panel A shows the percentage of small (100 to 499 employees) and large firms (5,000 or more employees) that are listed and the percentage of total firms in the economy. The total number of firms is from the Longitudinal Business Database provided by the U.S. Census Bureau. Listed firms are from Compustat and CRSP and include U.S. common stocks (share codes 10 and 11) and firms listed on AMEX, NASDAQ, or NYSE (exchange codes 1, 2, and 3). Investment funds and trusts (SIC codes 6722, 6726, 2798, and 6799) are excluded. For listed firms, Panel B shows the evolution of the log assets (in 1990 dollars) for the 20th, 40th, 50th, 60th, and 80th percentiles.





Appendix.

The WDI/WFE data set

WDI data start in 1988 with information for 50 countries and for 111 countries by 2012. WFE data starts in 1975 with information for 22 countries. The number of countries it covers increases to 90 by 1998 and then declines to 48 by 2012. To create a comprehensive dataset, we merge the WDI and WFE databases (the WDI/WFE dataset). For the country-years that overlap, the listing counts are typically close. Over the period from 1988 to 2012, 69% of listing counts from these databases are within a 10% margin of error of each other and 81% are within a 25% margin. For country-year observations in which the counts differ by 10% or more, we manually checked the data to resolve the differences. Many large discrepancies are explained by errors or inconsistencies in one of the databases and around years when stock exchanges merged or amalgamated listings (say, from regional exchanges into a single national exchange like Spain's Bolsas y Mercados Españoles in 2002). In addition, some large discrepancies are due to double or triple counting across exchanges in the WFE data and when the WFE counts include OTC listings or listings on unregulated markets (e.g., Frankfurt's open, unregulated Freiverkehr market). We resolve the majority of these discrepancies by searching on stock exchange websites for historical factbooks, annual reports, and other listing-related information. For the U.S., the WFE data does not include NASDAQ listings until 1991. We use CRSP to construct listing counts from 1975 through 1988 and use the WDI and WFE counts in subsequent years.

Determining new lists and delists outside the U.S.

We start by downloading all public equity records in Datastream for each country for which we have data for the regressions reported in Table 2, including those in the Worldscope stock lists as well as in Datastream's research file of stock lists and dead lists. We merge these lists and drop the duplicate records.

There are a number of challenges with this data. In contrast to CRSP which keeps historical information, Datastream keeps only the most recent information for each record. Moreover, specific share

codes like those in CRSP are not available. Though we screen the records to drop records that are not common stocks (or the main record for a firm's traded equity) and that are investment funds and trusts to make the data as comparable as possible to our other datasets, the final counts of new lists and delists we produce is likely to be less accurate. To mitigate this problem as much as possible, we focus on the 41 countries that are in Datastream and for which the listing counts correspond to those in the WDI/WFE dataset.[22] In addition, Datastream's coverage for many countries is less complete prior to the early 1990s. Therefore, we start our analysis in 1990 instead of 1975. Finally, unlike CRSP, Datastream does not provide delisting codes. We can determine the number of firms that delist each year but not why they delisted. To determine the number of publicly-traded firms delisted due to mergers, we obtain data from the Securities Data Company's (SDC) Mergers and Acquisitions database. For each country, we download all completed mergers and acquisitions in which the acquirer owns 100% of the target's shares upon completion.

[22] For each country we compute the absolute difference between the Datastream and WDI/WFE listing counts each year. We keep countries for which the average percentage difference from 1990 to 2012 is 25% or less. Out of the 65 non-U.S. countries in this dataset, 41 meet this criterion (24 developed and 17 emerging countries).