Why does the U.S. have so few listed firms?

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ABSTRACT

The U.S. had 14% fewer exchange-listed firms in 2012 than in 1975. Since the number of U.S. listings peaked in 1996, the probability that a firm is listed has dropped in half. Relative to other countries, the U.S. has abnormally few listed firms given its level of development and the quality of its institutions. We call this the "U.S. listing gap" and investigate possible explanations for it. The probability that a firm is listed has dropped across all firm-size groups, though the drop is smaller for the largest firms, so that the listing gap is not due missing listings of small firms alone. 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. High delists account for roughly 46% of the listing gap and low new lists for 54%. The high delist rate is not explained by firms becoming private or going dark or by firms being delisted because of poor performance. Instead, it is explained by an unusually high rate of acquisitions of publicly-listed firms compared to previous U.S. history and to other countries.

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1. Introduction.

In a famous article, Jensen (1989) wrote that "The publicly held corporation has outlived its usefulness in many sectors of the economy" and he went on to predict the eclipse of the public corporation.[1] His view was that the conflict between owners and managers can make public corporations an inefficient form of organization. He argues that new private organizational forms promoted by private equity firms resolve this conflict and are more efficient for firms in which agency problems are severe. The evolution of listings in the U.S. is consistent with the view that public corporations are now less important. While the number of U.S. listed firms peaked in 1996, that number is now 39% lower than when Jensen wrote his article and, strikingly, the U.S. had 14% fewer public corporations at the end of our sample period in 2012 than in 1975. In this paper, we examine why U.S. listings have fallen so much.

Jensen's view stands in sharp contrast to the literature on financial development. This literature views the size of the stock market as a measure of financial development and provides evidence that greater financial development leads to greater economic growth (see Levine, 1997, for a review). Thus, evidence that the U.S. has fewer listed firms now than anytime during the last forty years is a source of concern as it implies lower potential economic growth. However, it may not be a concern for the U.S. if, as suggested by Jensen, the U.S. has evolved so that public corporations are replaced with more efficient organizational forms that lead to higher growth. Hence, understanding why the U.S. has so many fewer listed firms is critical to uncovering whether such a deficit should be a source of concern or is just a natural evolution as the economy moves towards more efficient forms of corporate organization.

The number of listed firms per capita is often used as a measure of financial development. A larger stock market is more vibrant and leads to higher economic growth because firms can raise funds more efficiently and investors can share risks more effectively. Since 1996, U.S. listings per capita have fallen. By this measure the U.S. is less financially developed now than it was in 1996, or even in 1975. In 1996, the U.S. had 30 listings per million habitants; by 2012, it had only 13, a 50% decline.

[1] 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.

Many studies focus on legal institutions as an important factor that affects stock market development (e.g., La Porta, Lopez-de-Silanes, Shleifer, and Vishny, 1997 and Djankov, La Porta, Lopez-de-Silanes, and Shleifer, 2008, hereafter LLSV and DLLS). Countries with stronger investor protection have a better developed stock market. We show that the U.S. has a "listing gap" relative to other countries with similar investor protection and wealth. This gap arises in the late 1990s and widens over time. It is statistically significant, economically large, and robust. We also find that the U.S. has a listing gap when compared to its own recent history and after controlling for changing capital market conditions.

The U.S. had 4,102 listed firms in 2012 compared to 8,025 in 1996.[2] We investigate why the U.S. now has so few listed firms. We focus on two types of explanations: composition-related and flow-related. Composition-related explanations make predictions about the evolution of the composition of the population of listed firms. We examine whether it has changed as predicted. To study flow-related explanations we examine the evolution of net listing flows. The net listing flow is the difference between new lists and delists.[3] For listing counts to fall, net flows have to be negative. We investigate why net flows became negative after the listing peak in 1996 and stayed negative from 1997 to 2012. We refer to this as the post-peak period in contrast to 1975 to 1996, which we call the pre-peak period.

We investigate four potential composition-related explanations. The first is that the decline in listings can be explained by a decrease in the total number of firms (public and private) or a decrease in firm creation (startups), so that there are fewer firms eligible to be listed. If the number of listed firms is a constant percentage of the total number of firms, listings decrease when the total number of firms falls. However, we find that the total number of firms increased. We also find that the percentage of listed firms is relatively constant during the pre-peak period but decreased sharply thereafter. Thus, the decrease in listings in the post-peak period is due to a lower propensity of firms to be listed rather than a decrease in the number of firms available to be listed. It is well-known that the startup rate has decreased in the U.S.

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[2] The decline in U.S. listings has been noted by others, including "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), "The Endangered Public Company: The Big Engine that Couldn't", *The Economist* (May 19, 2012), and "The State of the Public Corporation: Not So Much an Eclipse as an Evolution", *Journal of Applied Corporate Finance* (Fall 2014).

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

(Decker, Haltiwanger, Jarmin, and Miranda, 2014). However, the decline in startups cannot explain the low number of listed firms. We find that the relation between new lists and startups experienced a structural break after 1996. Had the relation between new lists and startups stayed the same after 1996, the U.S. would have had 9,000 more new lists in the post-peak period than it actually had.

We investigate next whether the drop in listings can be attributed to a changing composition of firms by industry. If the decrease is due to industry reallocation, we would expect some industries to have an increase in listings and others, a decrease. We reject this explanation. In fact, listings decreased in all but one of the 49 (Fama and French, 1997) industries after 1996.

The third composition-related explanation is that U.S. public markets became unattractive to smaller firms, as suggested by some studies (e.g., Weild and Kim, 2009; Gao, Ritter, and Zhu, 2013). We find that there were many fewer firms listed in 2012 that were comparable in size to the smallest firms listed in 1996. Listed firms became larger, but the increase in size occurred similarly across all size percentiles so that the entire size distribution for listed firms shifted to the right. Moreover, there is no evidence that the dispersion in firm size, or inequality, measured using a Gini coefficient increased since 1996.

After 1996 the number of listed firms fell across all size groups, though by a smaller amount for the largest firms. In contrast, the total number of firms in the economy increased for all size groups, so that the evolution of listed firms diverged from the evolution of firms in the economy. As a result, the percentage of firms that are listed decreased for all size groups and this decrease is not statistically distinguishable among size groups except for the very largest firms. The pervasiveness of the drop in the percentage of listed firms implies that the listing gap cannot simply be due to the disappearance of the smallest firms from the exchanges. The fact that this decrease was well on its way before the regulatory and legal changes in the early 2000s, including Regulation FD and the Sarbanes-Oxley Act, suggests that these changes cannot alone explain the listing gap.

Lastly, listing standards could have changed in a way that makes it harder for firms to list and remain listed. NASDAQ's listing standards changed in 1996, just before the number of listings in the U.S. started to fall. A natural concern is that the two events are related. However, the impact of the change was mixed. The new standards increased asset size requirements for listed firms but also allowed firms to go public

that would not have been able to do so under the previous standard. Moreover, the time series pattern of the number of listings on the New York Stock Exchange (NYSE), where listing standards were unchanged, is the same as that on NASDAQ.

We next analyze the determinants of the net flow of listings. To better understand why the U.S. has so few listed firms, we investigate the relative contribution of new lists and of delists to the overall decrease in listing counts. Each year from 1997 through 2012 the net list rate, the change in the number of listings relative to total listings the prior year, is negative. A negative net list rate can result from a low new list rate, a high delist rate, or both. Historically, the delist rate was lower than the new list rate in the U.S. After 1996, we find that the new list rate fell and the delist rate was high by historical standards. We also find that the U.S. new list rate was low and the delist rate was high compared to other countries.

Deviations from historical averages of both the U.S. new list rate and the delist rate are required to explain the listing gap. We predict the number of listings the U.S. would have had each year from 1997 to 2012 if the average new list and delist rates from 1975 to 1996 applied to those years. When we replace the actual listing counts with the predicted counts in our regressions we find that the listing gap relative to other countries disappears. However, if we use the historical new list rate and the actual delist rate to predict counts, the listing gap decreases but does not disappear. The same is true if we use the historical delist rate and the actual new list rate. Our estimates imply that missing new lists explain about 54% of the listing gap and abnormal delists explain about 46%. In other words, the low number of U.S. listings from a global perspective is not due to too few IPOs alone (see Doidge, Karolyi, and Stulz, 2013, for evidence of a U.S. IPO gap relative to the rest of the world). Rather, it is also due to too many delists.

Firms can delist essentially for three reasons: they are acquired (hereafter "merger delists"), they are forced to delist ("delists for cause"), or they choose to delist ("voluntary delists"). We show that changing economic conditions do not explain the high delist rate. In fact, the credit crisis in the mid-2000s led to remarkably few delists for cause. Fama and French (2004) show that weaker firms, measured in terms of lower profitability and slower growth in assets, increasingly went public. As weaker firms go public, new list survival rates fall and we expect more delists. We find that, except for a brief period from 2001 to 2003, delistings are not concentrated among younger firms. Following the adoption of the Sarbanes-

Oxley Act, there was considerable discussion that the Act would lead more firms to go private. Though the number of firms that delist voluntarily increased after the Act, the number of voluntary delists is too small to explain the high number of delists. However, the U.S. had an unusually high number of merger delists after 1996. The number of mergers is high compared to both U.S. history and to other countries. The increase in mergers is not due to an increase in the number of firms about to be delisted for cause that were acquired instead. From 1997 to 2012, the U.S. had 8,327 delists, of which 4,957 were due to mergers, and lost a net number of 3,717 listings. If the U.S. merger rate over that period had been the same as the average from 1975 to 1996, the U.S. would have had 1,655 fewer delists. In the absence of those abnormal merger delists and assuming an unchanged number of delists for cause, the U.S. would have gained back almost 45% of the listings it lost.

We use the framework from the literature on financial development and the role of the stock market to show that the U.S. has a listing gap. This gap arises because of a decline in the new list rate and an increase in the delist rate, relative to the recent past in the U.S. and to other countries. Our paper is related to the literature on new lists and delists in the U.S. For the decrease in new lists, Gao, Ritter, and Zhu (2013) find little support for the regulatory-overreach hypothesis which posits that the regulatory and legal changes in the early 2000s, including Regulation FD and the Sarbanes-Oxley Act, made it less advantageous to be a public company. They develop the economies of scope hypothesis, which states "the advantages of selling out to a larger organization, which can speed a product to market and realize economies of scope, have increased relative to the benefits of operating as an independent firm" (p. 1663). They view the evidence as supportive of that hypothesis. Weild and Kim (2009) argue that market conditions for new public firms became worse in the late 1990s and early 2000s as small firms received less support and attention. Increased concentration among investment banks and decreases in bid-ask spreads made it less advantageous for investment banks to devote resources to young public firms. The U.S. listing gap cannot be explained by the economies of scope hypothesis as this hypothesis should apply across the globe. It also predicts a similar evolution for listed firms and total firms but we find a decline in listed firms and growth in total firms. Similarly, the fact that the percentage of firms listed falls across all size groups suggests that the listing gap cannot be due to missing listings of small firms alone.

The literature on delists focuses on the role of listing standards, the implications of delisting, and on firms that deregister their securities, which requires them to delist. This literature, reviewed by Djama, Martinez, and Serve (2013), largely ignores mergers as a driver of delists. In our analysis, we find that mergers play a critical role for the decrease in U.S. listings. Fama and French (2004) show that increasingly weaker firms listed in the 1980s and 1990s and that these firms had higher delist rates. They attribute the change in listing patterns to a decrease in the cost of capital. Their sample ends in 2001, so that their analysis has little evidence on firms that went public after the U.S. listing peak in 1996. Klein (2005) focuses on NASDAQ listings and shows that firms that went public under a market capitalization standard introduced in 1996 were more likely to delist. Macey, O'Hara, and Pompilio (2008) examine delistings from 1995 to 2005 and for a subset of firms that delisted from the NYSE in 2002, study the implications of delisting. The number of delists in their sample is much higher than ours and, perhaps for this reason, they reach the conclusion that the proportion of involuntary delists is almost 50%. The main reason for the difference is that their study includes all delistings as reported by the stock exchanges, whereas our sample is limited to U.S. corporations that stop being listed after having had their stock price reported on the Center for Research on Security Prices (CRSP) database. The literature on firms going dark finds an increase in deregistrations following the adoption of the Sarbanes-Oxley Act and that the increase occurred among smaller and more poorly performing firms. However, only a small number of these firms were listed on a major exchange; most traded on the OTC markets (Marosi and Massoud, 2007, Leuz, Triantis, and Wang, 2008). Mehran and Peristani (2009) and Bharath and Dittmar (2010) show that decreased stock liquidity and analyst following make it more likely that a firm will go private.

The paper is organized as follows. In Section 2, we document that the U.S. has a low number of listings compared to its past and compared to other developed countries. In Section 3, we estimate cross-country regressions to show that there is a growing listing gap for the U.S. In Section 4, we investigate composition-related explanations for the listing gap and in Section 5 we investigate flow-related explanations. In Section 6, we investigate the high delist rate of the U.S. after 1996. The paper concludes in Section 7.

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. 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, these databases collect information from their member and affiliated exchanges on the number of domestically incorporated companies listed on each country's stock exchanges at the end of the year. They do not include investment companies, mutual funds, real estate investment trusts (REITs), or other collective investment vehicles.[4] The WDI data, by contrast, is primarily sourced from Standard & Poor's Global Stock Market Factbooks and supplemental S&P data. 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 BME 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 over-the-counter (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

[4] 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.

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.

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 was 4,775. In 2012, the number was 4,102, the lowest count across the four decades and 14% lower than in 1975. The peak number of listings was 8,025 in 1996. From 1975 to 1996 (our so-called pre-peak period), the number of listed firms increased steadily from 4,775 to 8,025, a cumulative increase of 68%. Since the peak in 1996, listings fell each year from 1997 to 2012 (the post-peak period) and cumulatively declined by 3,923, or 49%, by 2012.

We turn next to the number of listings in other countries. The dataset used to produce this count includes 16 countries in 1975, increases to 56 by 1990, peaks at 116 in 2006, and declines to 111 in 2012.[5] Throughout the paper, we restrict the sample to the 71 non-U.S. countries included in DLLS (2008) that we can use in later regressions. 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 followed a sharply different path than those in the U.S. Table 1 shows that in 1975, there were 12,361 listings outside the U.S. and 91% of them were domiciled in developed countries (using the Morgan Stanley Capital International, MSCI, country classification scheme as of 2014). The number of non-U.S. listings peaked in 2011 at 39,543 where it has remained. From 1975 to 2012, the number of non-U.S. listings increased by 219% whereas the number of U.S. listings decreased by 14%. The increase in non-U.S. listings is due to an increase in listings within countries as well as 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 increased by 28% while

[5] To create the final dataset across countries, we use the following process. If the overlapping observations from the WDI and WFE datasets are close, we use the dataset with the longest series. Where possible we also combine the datasets to create the longest series possible. When there are large discrepancies, we resolve them and use the correct data. If we cannot resolve the discrepancies or if there are large gaps in the data, we drop those observations.

the number of U.S. listings fell by 49%. As a result of this evolution, there was 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 was 3.8-to-1. It increased every year since reaching 9.6-to-1 by 2012.

The figure also shows the evolution of listing counts for MSCI-classified developed countries. Because the number of developed countries with data on listing counts increased from 13 in 1975 to 23 in 2012 (see Table 1), we show total listing counts for all developed countries and for the 13 countries that were classified as developed in 1975. For the constant sample of 13 countries, the number of listed firms was 11,261 in 1975. This count was 11,624 in 1996, peaked in 2006 at 17,846 and stayed relatively constant thereafter. In 2012, the count was 17,210 so that listings in these countries increased by 52% over our sample period. The evolution is similar when we include all non-U.S. developed countries. Therefore, since 1996 the evolution of listings in other developed countries is dramatically different than that of the U.S. While U.S. listings dropped by about half since 1996, listings in other developed countries increased by 48%. Another way to see that U.S. listings have declined is that the ratio of listings in this sample of developed countries to U.S. listings was 2.4-to-1 in 1975. This ratio dropped until 1996, when it was 1.4-to-1. After 1996, it took off sharply increasing almost every year (and never falling by much) to reach 4.2-to-1 in 2012.

Table 1 shows that in 1975, our dataset has only three emerging countries (we include MSCI emerging and frontier countries as well as countries not classified by MSCI in this category). The number of emerging countries in our sample increases to 43 by 1996 and changes little afterwards. The number of listings in emerging countries increased from 1,100 in 1975 to 16,580 in 1996 and to 18,622 by 2012. While listings in the U.S. fell by half since 1996, listings in emerging countries increased by 12%. The ratio of non-U.S. listings in emerging countries to U.S. listings in 1996 was 2.1-to-1 and it grew to 4.5-to-1 by 2012.

We now turn to country-specific comparisons which are not sensitive to changes in the classification of countries or to the inclusion of additional countries. Our first comparison is to assess how listings evolved across the world since the U.S. reached its peak in 1996. For our comparison, we arbitrarily require countries to have at least 50 listings in 1996 and identify 54 countries that meet that requirement.

Figure 2 shows the percentage change in listing counts from 1996 to 2012. During that period the number of listings in the U.S. dropped by 49%. The number of listings increased in 32 countries and decreased in 22. Among the 22 countries with a decrease, only six had a greater decrease than the U.S. (Venezuela, Egypt, Colombia, Portugal, Lithuania, and the Czech Republic). Few other developed countries had 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. A frequently-used approach to adjust for country size is to compute the number of listings per capita (using general population data, also available from WDI). We compute the number of listings per one million inhabitants, which we call listings per capita. Table 1 shows listings per capita for the U.S. every five years, starting in 1975, but shows the number for the last year of our sample period, 2012, instead of 2010. It also includes 1996, the year U.S. listings peaked. With this measure, the evolution of the U.S. is even more dramatic because its population increased while listings fell. In 1975, the U.S. had 22.1 listings per capita. This number peaked in 1996 reaching around 30 and fell to 13.1 in 2012. The number of listings per capita in 2012 was 61% of what it was in 1975 and 43% of its peak value. The number of listings per capita fell by 56.1% during the post-peak period.

As shown in Table 1, listings per capita for all non-U.S. countries (computed as the total number of listings divided by the total population) increased from 3.8 to 7.4 from 1975 through 2012. During that period, the number of countries in the sample increased from 16 to 71. For non-U.S. developed countries, the number of listings per capita was 21.5 in 1975 compared to 22.1 for the U.S. By 1996, the U.S. had 30 listings per capita while other developed countries were still at 24 per capita. After the U.S. peak, the number of listings per capita for developed countries reached 35 in 2006 (not shown) and held steady until at 33.4 in 2012. While U.S. listings per capita fell by 61% after 1996, those in other developed countries increased by 37%. The listings per capita ratio among emerging countries declined, but only by a small percentage between 1996 and 2012. Although the number of listings increased by 12%, population increased by 20% in these countries.

In summary, the U.S. experienced a sharp decrease in the number of listed firms since 1996. This decrease is of such a magnitude that the U.S. has fewer listed firms now than in 1975. This decrease stands in sharp contrast to increases in the rest of the world. In fact, since 1996, only six countries out of 61 experienced a greater percentage decrease in the number of listings than the U.S.

3. Measuring the U.S. listing gap.

Much research in finance views the number of listings per capita as a measure of financial development. In particular, LLSV (1997) use the number of listed firms per capita as a measure of a country's financial development and examine its determinants. In their data, the U.S. had 30.11 firms per capita in 1994. They find that countries that legally protect investors better have higher financial development. Using a country's legal origin as an exogenous measure of investor protection, they show that countries with laws of English origin have a much higher number of listings per capita than the countries with laws of French origin. Specifically, the average number of listings per capita for countries with laws of English origin was 35.5 (their Table II, for 1994). In contrast, it was 10.0 for countries of French origin. They estimate regressions of listed firms per capita on various determinants which include the log of GDP, GDP growth, a rule of law index, and an index of investor protection, the anti-director rights index. They find that the index for the rule of law and the anti-director index have positive significant coefficients. They also show that French origin countries have fewer listed firms per capita. DLLS (2008) use the average number of listed firms per million habitants for 1999-2003. After controlling for the log of GDP per capita, they find that listings per capita are strongly related to the anti-self-dealing index, a measure of the extent to which related-party transactions are limited in a country.

Given the existing literature, we can predict how many listings per capita the U.S. should have had given its institutions and economic development. 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 too few or too many listings given its institutions and economic development. Following DLLS, we estimate a regression of listings per capita on the anti-self-dealing index and on the log of GDP per capita. 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. 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 and so 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 capture better 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. 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 from the predicted listings for the U.S. in each year given its characteristics. Again, we re-estimate the regression specification with the common law indicator variable but do not report the results which are similar.

In 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. Using a different approach in Section 6, we show that the U.S. also would have had a listing gap when compared to its own recent history and even after controlling for changing for capital market conditions.

It follows from the analysis of this section that the U.S. has too few listings given the level of its economic development and given the quality of its legal institutions. In the remainder of this paper, we attempt to explain this listing gap.

4. The listing gap and the changing composition of the population of U.S. firms.

In this section, we evaluate explanations based on the changing composition of the population of U.S. firms. We investigate four such explanations in turn. First, we study whether the proportion of listed firms has fallen relative to all public and private firms in the U.S. and whether the decrease in the rate of firm creation can explain the decrease in new lists. Second, we address the possibility that the decrease in listings is explained by industry shifts. Third, we investigate whether U.S. public markets became unattractive to small firms. Fourth, we study whether changes in exchange listing standards have played an important role in the evolution of the number of listings in the U.S.

4.1. Has the number of firms that can potentially become publicly-listed fallen?

Only existing firms can choose to be listed. There is no publicly available database in the U.S. that provides characteristics of a comprehensive sample of unlisted firms over our sample period. The lack of such a database limits the analysis that can be conducted as ideally we would estimate whether the probability that an identical firm is listed in 1996 and in 2012. However, the Longitudinal Business Database (LBD) provided by the U.S. Census Bureau provides information the total number of firms (public and private firms) in the U.S. from 1977 until 2012. Suppose that the ratio of the number of listed firms to the total number of firms is constant. In this case, the number of listed firms would fall if the total number of firms falls. With this database, we examine whether the number of listed firms fell because the total number of firms fell.

Table 3 shows in columns (1) through (3) the total number of firms, the number of U.S. listed firms, and the percentage of the total number of firms that are listed, respectively. The U.S. had 3,417,883 firms in 1977. This number increased to 4,693,080 in 1996, the peak year for the number of listings. Since that year, the number of firms increased further to reach 5,030,962 in 2012. Though the rate of increase in the number of firms was higher from 1977 to 1996 than it was during the post-peak period, there is no

evidence that the number of firms fell in the post-peak period. In contrast, column (2) shows that the number of listed firms decreased each year during this period.

The percentage of firms that are listed in column (3) shows that changes in the total number of firms cannot explain the drop in the number of listed firms. From 1977 to 1996, the percentage increased from 0.138% to 0.171%. Since the peak in 1996 it fell steadily to 0.082% in 2012, so that in 2012 it was 52% lower than what it was in 1996. From 1977 to 2012, the smallest percentage of listed firms was in 2012. In other words, firms have never been less likely to be listed from 1977 to 2012 than in 2012. Had the percentage of listed firms to total firms been the same in 2012 as it was in 1996, the number of listed firms would have been 8,602 rather than 4,102 so that there would have been 578 more listed firms than at the peak in 1996.

We now consider whether the drop in startups can help understand the drop in new lists. Similar to Decker, Haltiwanger, Jarmin, and Miranda (2014), we define startups as firms with age equal to zero. Column (4) of Table 3 reports the number of startups. Startups decreased from 1977 to 1983, increased until 1988, and then were stable until 2003. Startups increased from 2004 to 2006, but fell sharply after 2006 and were lower during the last four years of the sample than any other year. If the number of startups is steady while the total number of firms increases, the startup rate falls, and that is what we see in column (5). The average annual startup rate was 12.24% from 1978 to 1996 compared to 9.74% in the post-peak period, a statistically significant decrease (the t-statistic from a two-sample, unequal variance t-test equals 6.11). Though the startup rate from 2008 to 2012 is lower than any prior year, the average post-peak startup rate was only marginally higher at 10.43% if we exclude these years. Based on these statistics it is plausible that the drop in startups could explain part of the drop in new lists. However, the startup rate fell steadily throughout our sample period so that the difference in averages between the pre-peak and post-peak periods just reflects a continuously falling startup rate. This makes it implausible that changes in the startup rate could explain why listings peak in 1996 and fall steadily afterwards.

In Table 4, we investigate the relation between startups and new lists. Unfortunately, WDI does not provide information on new lists so we use data from the CRSP Monthly Stock File to identify the number of U.S. listed domestic firms using the same criteria as the WDI and WFE datasets. Thus, in a

given year, we exclude records that are not U.S. common stocks (share codes 10 and 11), stocks not listed on the AMEX, NASDAQ, or NYSE (exchange codes 1, 2, and 3), and investment funds and trusts (SIC codes 6722, 6726, 6798, and 6799). From this dataset, we identify new lists each year.[6]

In the models estimated in Table 4, the dependent variable is the number of new lists divided by the total number of firms in the prior year, multiplied by 100. The explanatory variable is the number of startups divided by the total number of firms in the prior year ("Startup rate").[7] Model (1) shows results with startups lagged by one year, estimated over 1979 to 2012. The coefficient on startups is 0.002 and it is significant at the 1% level. The adjusted R^2 of the regression is 26.71%. The average rate of new lists as a percentage of all firms is 0.01% over our sample period. Using the estimated slope coefficient and the number of total firms in 1996, the regression predicts that a decrease in startups of 1% corresponds to a drop of 99 new lists in 1997. It follows that the slope coefficient in the regression together with the decrease in the startup rate explains about a third of the drop in new lists in 1997. Model (2) adds two lags of the startup rate to Model (1) in order to capture potential delays in the process of converting startups into listed firms. The coefficient on the first lag does not change much and it remains significant at the 10% level. The coefficient on the second lag is positive and that on the third is negative. Both are significant at the 10% level.

In Model (3) we allow the intercept and slope coefficient to shift with an indicator dummy variable that equals one after 1996. The constant for 1979 to 1996 is positive and significant while the slope coefficient is negative but not significant. In contrast, the constant for the post-peak period is negative and significant, while the slope coefficient is positive and significant.

When we use the coefficients for 1979 to 1996 from model (3) to predict new lists over the post-peak period using the actual startup rate in that period, we obtain 13,581 new lists between 1997 and 2012 in contrast to the actual number of 4,535 new lists during that period. Hence, using the relation between

[6] Section 5.1. provides additional details on our approach for identifying new lists using CRSP.

[7] This reduced-form model, of course, ignores how fundamental economic factors may impact both the startup rate as well as the new listing rate. Though we have only a small number of annual observations, we also estimated models that include lagged market index returns, average first day IPO returns, and Tobin's q and inferences are similar. Because our goal here is simply to evaluate whether the joint dynamics in these two series have shifted over these three decades in a significant way we focus on the simpler models that do not include these variables.

startups and new lists prevalent before 1997, the U.S. would have had over 9,000 more new lists than it did despite the fall in the startup rate. In fact, with that relation, there would be no listing gap. It follows from these results that the change in the startup rate cannot explain the drop in new lists.

4.2. Is the listing gap due to industry shifts?

We investigate next whether the drop in listings can be attributed to a changing composition of industries. If that is the case, we would expect some industries to experience an increase in listings and others a decrease. Such industry reallocation could result in a decrease in the number of listed firms. To examine this possibility, we consider the evolution of the number of listed firms across industries since the peak of U.S. listings in 1996. For this analysis, we need to identify the industry of a listed firm and this information is not provided in the WDI dataset. We use the CRSP dataset discussed earlier to identify U.S. listed firms and their SIC codes. We then assign SIC codes to the Fama-French 49 industries. In our dataset, 1,451 firm-years out of 211,259 have an SIC code but no Fama-French industry classification. We ignore these firms.

Figure 4 shows that, although the evolution of listings differs across industries, all but one experienced a decrease in the number of listings since 1996. The Financial Trading and Electrical Equipment industries had the most dramatic drops. In 1996, the Financial Trading industry had 693 firms. By 2012, it had only 119, representing a drop of 83% in the number of listings. The Electrical Equipment industry had the second largest drop. In 1996, this industry had 247 listed firms; in 2012, it had 99. In percentage terms, this industry lost 79% of its listings. For industry reallocation to explain the drop in listings, some industries should have had an increase in the number of listings. However, as Figure 4 shows, there is just one industry that did not experience a decrease in the number of listings. The Non-Metallic and Industrial Metal Mining industry had 25 listed firms in 1996 and in 2012.

These results are inconsistent with an industry reallocation explanation for the decrease in the number of listings. However, the wide range of percentage decreases across industries means that it is possible that industry-specific factors help explain the extent of the overall decrease. One theory advanced to explain the drop in new lists also predicts that the decrease in listings might differ across industries. Specifically, Gao, Ritter, and Zhu (2013) propose that an increase in economies of scope means that new

firms have to grow rapidly to succeed and doing so may be easier by being acquired. We would expect this theory to be particularly relevant for industries such as Pharmaceutical Products, in that marketing a new product worldwide to maximize its value requires building out marketing and distribution channels that an established firm would already have in place. Although the percentage decrease in listings in this industry is not inconsequential (32.07%) it had the 8th smallest drop out of 49 industries. Moreover, Figure 4 shows that many well-established industries have extremely large drops in listings. For instance, the percentage drop in listings in the Textile industry was 73.68% and it was 71.57% in the Restaurant and Hotels industry. Large changes in economies of scope seem unlikely in such well-established industries and hence would appear incapable of explaining the drop in listings in such industries.

4.3. Is the listing gap due to a shift in the distribution of firms by size?

A number of potential explanations for the listing gap focus on firm size. For example, some explanations for the drop in the number of IPOs in the U.S. advance the hypothesis that capital markets have evolved in such a way that it has become harder for small firms to be listed. One explanation focuses on the evolution of the market's infrastructure, namely, that lower bid-ask spreads make it less advantageous for brokers and investment banks to provide services such as market-making or to produce analyst reports for small firms. Other explanations suggest that the regulatory costs of being public increased relatively more for small firms. 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). Alternatively, Gao, Ritter, and Zhu (2013) advance the economies of scope hypothesis: small firms have become less profitable, whether public or private, and are better off selling out rather than operating as an independent firm. As a result, we would expect small firms to be acquired and firms to become larger, whether they are private or public. In other words, with the economies of scope hypothesis, all firms should become larger, not just publicly-traded firms.

Data for private firms is limited and we can measure firm size only by the number of employees. Based on this measure, the Longitudinal Business Database provided by the U.S. Census Bureau

classifies firms into size groups. We employ eight such groups.[8] To get data on the number of employees for listed firms we merge our dataset of listed firms from CRSP with Compustat. We then compute the percentage of total firms (private and public) in each size group that are listed. Panel A of Figure 5 shows these percentages for each size group over our sample period. It is immediately clear from the figure that the percentage of listed firms falls for all size groups throughout our sample period.

In 1996, 563 firms in Compustat had more than 10,000 employees, the largest size group. In contrast, there were 1,156 firms with less than 100 employees, the smallest size group. In 2012, there were more listed firms in the largest size group, 542, than there were in the smallest size group, 409. For firms in the largest size group, the percentage of listed firms fell from 48.36% to 42.71%, or by 11.70%, during the post-peak period. The decrease in the percentage of firms listed was much sharper for firms with less than 10,000 employees. For instance, the percentage of listed firms fell 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 groups in the drop in the percentage of listed firms.

Importantly, while the number of listed firms fell for all size groups, the total number of firms increased for all size groups. Moreover, the evolution of the number of listed firms and of the total number of firms across size groups is strikingly different. For the largest size group, the total number of firms increased by 9.02% whereas the number of listed firms fell by 3.73%. In contrast, for firms with 100 to 249 employees, the total number of firms increased by 10.79% and the number of listed firms fell by 55.71%. For total firms, the smallest and the largest size groups experienced the least growth while firms with 500 to 999 employees had the highest growth. In contrast, for listed firms, the rate of decline is highest for the smallest firms, but it is not significantly different from the other size groups except for the largest size group.

In summary, there was a strikingly different evolution for listed firms compared to total firms. The results imply that it has become less advantageous for firms to be listed unless they are among the largest

[8] 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.

firms. However, it has not become less advantageous for firms that are not the largest to operate if they are not listed as the number of such firms has increased. This diverging evolution, the decline in listed firms and the growth in total firms, is hard to square with the economies of scope hypothesis which predicts a similar evolution across private and public firms.

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 dollars, though the results are similar for total revenue, market capitalization, and number of employees. Panel B of Figure 5 shows the log of total assets for all Compustat firms at five size percentiles (the four quintile thresholds 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 and the rate of increase was the same. In other words, the entire size distribution for listed firms shifted to the right.

As a result of firm size increasing, it follows naturally that small firms in 2012 are much larger than small firms in 1996. In 1996, the 20th 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 20th 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.

While there were fewer firms listed in 2012 that are similar in size to the smallest listed firms in 1996, the distribution of the relative size of listed firms has not changed much since 1996. In particular, looking at assets, the percentage growth in the size from 1996 to 2012 is similar for the 20th and the 80th percentiles (266.90% versus 254.08%). One way to show that the relative size distribution has not changed much is to use the Gini coefficient. [9] The Gini coefficient would have a value close to one – a

[9] The Gini coefficient is a common measure of inequality, typically used to compute dispersion in income or wealth in a given country. It is usually defined mathematically based on the Lorenz curve, which plots the proportion of the total market capitalization (along the y-axis) that is cumulatively earned by the bottom x% of the population of firms. The line at 45 degrees thus represents perfect equality of incomes. The Lorenz curve lies below the 45-degree line if proportionally the small cap firms by count constitute less than their share of the total market capitalization of the marketplace as a whole. The Gini coefficient can then be thought of as the ratio of the area that lies between the

measure of perfect inequality – if the U.S. had one large firm and all other firms were inconsequential. It would have a value of zero if each firm were exactly the same size. An increase in inequality among firms would be consistent with an evolution where the market becomes dominated by large firms.

Panel C of Figure 5 shows the Gini coefficients across firms by total assets, as well as for total revenues, market capitalization, and number of employees. Again, we focus our discussion on total assets though results are similar for the other size measures. From 1975 to 2012, the Gini coefficient ranged between 0.857 and 0.916. In 1975, the Gini coefficient was 0.857. At the peak of U.S. listing counts in 1996 it was 0.907, with most of the increase taking place in the early 1980s. After 1996 it increased to 0.913 in 2001 and 2002 and then fell to 0.899 in 2012. There is no evidence that U.S. markets have become more unequal and in fact, U.S. markets were slightly less unequal in 2012 than in 1996.

There is clear evidence that the smallest firms that were listed in 1996 were much less likely to be listed in 2012. Consequently, our results provide support to the theories that argue markets have become less inviting for the smallest firms. The increase in the size of listed firms starts well before the regulatory changes made at the beginning of the 2000s such as Regulation Fair Disclosure in 2000 or the passage of the Sarbanes-Oxley Act in 2002. From 1996 to 2001, the 20th percentile of asset size increased by 71%. It follows that the regulatory changes cannot explain the change in asset size even though they may have contributed to it. Further, our evidence shows that the decrease in listings of the smallest firms can explain at most only part of the listing gap. This is because the percentage of listed firms falls for all size groups and the size of the percentage decline is statistically indistinguishable among the size groups except for the largest size group.

4.4. Is the listing gap due to changes in listing standards?

A change in listing standards affects the population of firms that can be listed. Exchanges have standards for new listings as well as maintenance standards for listed firms. Tougher standards do not necessarily imply that fewer firms will be listed as tougher standards could make a listing more valuable. However, if tougher standards imply fewer listings, they could explain their decline. Exchanges altered

45 degree line of equality and the Lorenz curve relative to that of the whole bottom triangle. The larger the area, the closer is the ratio to one and the greater is the inequality.

listing standards following the passage of Sarbanes-Oxley in 2002 to include additional corporate governance requirements (see, for instance, Aggarwal and Williamson, 2006). These changes were approved by the SEC in November 2003 and became fully effective in 2004. They require firms to have: (a) a majority of independent directors on the board; (b) to have some board committees be composed exclusively of independent directors; or, (c) to ensure that decisions by such committees be made by a majority of independent directors. These changes took place after the decline in listings was well under way. Specifically, 48% of the decrease in listings occurred before 2002.

From 1996 to 2002, there was no toughening in the initial or maintenance listing standards. Listing standards did change in 1996 for NASDAQ. However, the impact was mixed. NASDAQ increased the asset size requirement, but at the same time, made it possible for firms that could not list before to now do so. As discussed by Klein and Mohanram (2005), the changes in 1996 made it possible for firms to list based on market capitalization alone. According to the analysis in that study, most of the internet firms that went public after 1996 listed under this market capitalization standard. The study shows that these firms performed poorly and had a higher delisting rate for cause. If anything, this study finds that changes in listing standards were likely to have inflated the number of new lists in the late 1990s.

We use CRSP data to examine (not reported) differences in the evolution of the number of listings on the NYSE and on NASDAQ. There were 1,417 firms listed on the NYSE in 1975. The number of listings decreased to 1,298 by 1988 and then increased sharply. The number of listings peaked in 1997 at 1,828 and then decreased steadily to 1,290 by 2012. Thus, the NYSE had fewer listings in 2012 than in 1975 and 29% fewer listings compared to 1997. Listings on NASDAQ followed a similar pattern but more dramatically: 2,566 listings in 1975, 5,105 at the peak in 1996, and a steady decrease to 2,095 by 2012. The number of listings on NASDAQ in 2012 was the lowest during the sample period and 58% lower than in 1996. Like the NYSE, NASDAQ also had fewer listings in 2012 than in 1975.

It follows from this analysis that the decrease in listings is not exchange-specific. Both the NYSE and NASDAQ experienced an inverted u-shaped evolution in the number of listings. Exchange-specific listing standards may have accelerated or slowed down this evolution but the change in NASDAQ's listing standards in 1996 cannot explain why listings started to fall in 1997. The change in listing standards

should have led to an increase in listings in the short run. But the number of new lists fell 30% or more from 1996 to 1997 and from 1997 to 1998.

5. The evolution of new lists and delists.

Our next set of explanations for the U.S. listing gap are based on the flows of new listings and delistings and how they have evolved over time. The only way the number of listings can fall is if the number of delists exceeds the number of new lists. In this section, we examine the evolution of new lists and delists for the U.S. and then compare it to the evolution for other countries. This exercise presents new data challenges as the WDI/WFE databases do not disclose information on new lists and delists. We conclude the section by showing that it is *both* the abnormally high delists *and* the abnormally low new lists since 1996 that are needed to explain the U.S. listing gap. That is, the listing gap cannot be explained by focusing on just new lists or on just delists.

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

The WDI and WFE datasets report the total number of listed firms but do not report new lists and delists separately. To analyze new lists and delists for the U.S., we use the CRSP database again as discussed in Section 4.2. 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 of the database.[10] 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.

Table 5, Panel A shows the number of new lists and the number of 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 strikingly different. On average, there were 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

[10] 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 the listing counts. If in a subsequent year, CRSP assigns a different SIC code to a record that we do not exclude, 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., a 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 could arise if a security is initially included in the 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.

were no extended periods with more delists than new lists and net new lists were positive on average. During the post-peak period, the number of delists regularly exceeds the number of new lists every year so that net new lists are negative.

New lists peaked at 987 in 1996 and fell sharply to 152 by 2001. The number of new lists in the 2000s was lower than in every year since 1980. Delists peaked in 1998 but remained high through 2001 and then started to decline. The drop in delists is also significant, but delists dropped less than new lists, which explains why the net change in lists was negative. It is interesting to note that there was a surge of delists following the surge in new lists of the 1990s. As young firms tend to have a higher delist rate (Fama and French, 2004), this may not be surprising. What is surprising is that after this surge of delists the historical pattern of new lists exceeding delists did not re-establish itself.

The recent past is exceptional during our sample period, but it is also exceptional over the whole history of the public equity universe captured by the CRSP database. Compared to 1997 to 2012 when the number of delists exceeded the number new lists each year, the period from 1926 to 1996 saw delists exceed new lists in only 17 out of those 70 years (data available from the authors). The largest number of consecutive years for which delists exceeded new lists is four: from 1931 to 1934 during the Great Depression. Before NASDAQ was added to CRSP in 1972, years with more delists than new lists were extremely rare: only six out of 46 years. After NASDAQ was added to CRSP, years with more delists than new lists were much more frequent. From 1972 to 1996, there were 11 such years out of 24 and six of these occurred immediately after NASDAQ was added to the CRSP database.

CRSP also provides 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"). For instance, a firm might delist because it wants to stop being subject to some or all of the SEC's disclosure requirements, an objective it could achieve by becoming a private firm or partially achieve by delisting and having a low number of shareholders. A number of the critiques of the Sarbanes-Oxley Act of 2002 argued that the legislation led to delistings because firms did not want to be subject to the incremental compliance

provisions, which do not apply to private firms.[11] 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 have been profitable for several years, if its market capitalization becomes too small or if the stock price is too low. Third, a firm could be delisted because it is acquired by another firm ("merger"). In that case, the firm could 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 570 and 573 which we categorize as voluntary delists.

Table 5, Panel A shows that the most likely reason a firm delisted during our sample period is because of a merger (9,749), the second most likely is for cause (7,120), and the third is that it chose to voluntarily delist (434). There were more delists for cause than for merger in eight out of 38 years during our sample period and only two of these years were after the listing peak in 1996. From 1975 to 1996, 45% of delists were 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.

Rather than focusing on the number of delists, we can look at delists as a percentage of the number of listed firms in the prior year. These delist rate percentages are shown yearly and for selected subperiods in Table 5. For the pre-peak period, the average delist rate was more than two percentage points lower than it was during the post-peak period (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. Their study differs from ours in that they have a much larger number of delists than we do and they have a much larger number of

[11] See Leuz (2007) for an extensive review of the empirical evidence on the impact of Sarbanes-Oxley Act. 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 Masoud (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.

delists for cause. The total number of delists in their sample period 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 et al. 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 for reasons based on records that we exclude from our sample.

Throughout the sample period there were few voluntary delists. There were 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 deregisters, which would be counted as a voluntary delisting. We return to this concern at the end of Section 6.

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

We next examine whether the new list and delist rates in the U.S. after 1996 were unusual relative to the equivalent rates in the rest of the world. Since the WDI and WFE datasets provide annual information on listing counts but not on new lists and delists, we use Datastream International and Worldscope to get new lists and delists for other countries. 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 non-U.S. listings, records that are not common stocks (or the main record for a firm's traded equity), investment funds and

trusts to make the data as comparable as possible to our other datasets, the dataset 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.[12] 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.

Table 5, Panel B shows that the evolution of the new list and delist rates for non-U.S. countries. Since the peak number of the U.S. listings was in 1996, we compare the post-peak period to the pre-period at least from 1990 to 1996. To compute the non-U.S. new list (delist) rates we sum all new lists (delists) across the 41 countries and divide by the total number of listings in those countries in the prior year.

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

In our analysis of the U.S. delists in Section 5.1, we find that the typical delist is a merger delist. We also find that merger delists were more likely after 1996 than before. Because Datastream does not

[12] 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).

provide delisting codes it is not possible for us to identify which firms delisted because of a merger. To assess the importance of merger delists for non-U.S. countries, we use the SDC database. For each year since 1990, we count the number of public targets acquired in the U.S. and in non-U.S. countries. For comparability, we continue to focus on the same 41 non-U.S. countries although the results are similar if we include all non-U.S. countries.

We find that from 1990 to 2012, 7,858 non-U.S. public targets were acquired, of which 6,367 were completed during 1997 to 2012. In contrast, the U.S. recorded 6,452 and 4,997 acquisitions over these periods. However, throughout the post-peak period, these non-U.S. countries had 4.98 times more listings than the U.S. on average. Hence, if these countries had 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 merger delists in the rest of the world was proportionally much lower than it was in the U.S. Another way to see this is that if the U.S. had the same merger delisting rate as these countries from 1997 to 2012, it would have had 3,729 fewer delists over that period.

5.3. 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. The gap arises because the new list rate dropped sharply after 1996 in the U.S. while the delist rate increased. In this section, we investigate whether the changing pattern of new list and delist rates in the U.S. can explain the listing gap. In other words, if the U.S. new list and delist rates from 1975 to 1996 applied to 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 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.[13] Recall from Table 5 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,

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

and listing counts that the U.S. would have had if the historical rates applied to this period. For example, the U.S. had 8,025 listings in 1996. Applying the historical rates to this base gives 740 predicted new lists, 585 delists, and 8,180 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, which is 6,795 more than it actually had. The reason the number of listed firms is higher is that the historical net list rate in the U.S. was positive and we applied that rate to 1997 to 2012, when the actual net list rate was negative. To isolate the impact of the decrease in the new listing rate, we apply the historical new list rate to 1997 to 2012, but instead use the actual delisting rates. 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. We apply the historical delisting rate to the period from 1997 to 2012 but use the actual new listing rates. In this case, the U.S. would have had 5,570 listings in 2012. The impact of the increase in the delisting rate is lower than that of the decrease in the new listing rate, in part, because the higher delist rate applies to fewer firms.

We use these predicted listing counts to test whether the U.S. listing gap disappears if there had not been missing new lists and/or too many delists from 1997 to 2012. In Table 6, 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 6 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 6 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 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 actually develops. 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 after 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 deficit count (5,436) associated with the coefficient of -0.840 in model (1). 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 regression framework allows us to assess the *relative* contribution of the missing new lists and the abnormally 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 the 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. Only when we use both the historical delist and new list rates is there is no longer a listing gap and further an excess count arises in most years.

6. Why have there been so many delistings since 1996?

We showed in the previous section that the listing gap cannot be explained by missing new lists alone. As discussed in the introduction, a number of studies examine the missing new lists but there is only limited evidence on the excess delists. Consequently, in this section, we focus on alternative explanations for the excess delists. We examine first whether the evolution of new lists and delists together can be explained by commonly changing economic conditions. We also investigate whether the high delist rate is due to the poor survival of the new lists, a phenomenon first explored by Fama and French (2004). We assess whether the high delist rate due to mergers can be explained by weak firms that

choose to be acquired instead of being delisted for cause. Finally, we evaluate the relative importance of private and public acquirers for merger delists.

6.1. Economic conditions, new lists, and delists

One explanation for the negative net list rate since the listing peak in 1996 is that market conditions were 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 list rate, we estimate a vector-autoregression (VAR) model for new list and delist rates. It captures not only the joint dynamics of the new list and delist rates and their interactions, but it also 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 capital market conditions explain the listing gap. For this analysis we construct a new 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.[14]

Table 7, Panel A 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; it purposefully excludes the influence of capital market variables. We allow for four lags of each variable and an indicator variable for the first quarter (see Lowry, 2003).[15] 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 lag four 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 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

[14] 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.

[15] 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.

so that the series is highly autoregressive. Overall, 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, 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 capital market 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.[16] The estimates are in model (2). Adding these variables increases the adjusted R^2's, 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 increases, 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.[17]

[16] 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).

[17] 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

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 so low because of poor capital market conditions.

Further evidence that capital market conditions cannot explain why the U.S. has so few listed firms is obtained by investigating the drop in listings during the credit crisis. As seen in Table 5, the number of delists is 393 in 2008 and 355 in 2009. In 2008, 55.47% of delists are merger delists. In contrast, in 2009, 51.27% of delists are delists for cause. However, from 1997 to 2012, there are eight years with more delists than in 2009. It follows that the credit crisis did not lead to an abnormal number of delists that somehow could play an important role in explaining why there are so few listed firms.

6.2. The survival of new lists

Fama and French (2004) show that over the 1980s and the 1990s, new lists increasingly had lower profits and no history of positive profits. They find that as a result of this evolution, the survival rate of new lists fell sharply. Their sample covers new lists from 1973 to 2001. Consequently, their sample has little overlap with the period of negative net list rates that started after the listing peak in 1996. Nevertheless, it could be that weaker new lists explain the abnormally high delists. We find 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).[18] Hence, the survival rate fell, but 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 for the years immediately after the 1996 peak. For the new list cohorts from 1997 to 2000, the survival rate is only 51%.

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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, the basic dependence between the new list and delist rates remains similar to those reported in the table.

[18] We stop in 2007 as it is the last year in our sample when a new list could potentially survive at least five years.

To compare the delisting behavior of newly-listed firms to that of seasoned firms, we proceed as follows. We first classify firms as "young" listed 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.[19] 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 different. After the peak, both rates have higher averages. 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 the reason 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 delists of young listed firms are merger-related and 57.91% are for cause. After 1996, merger delists became more important for young listed firms. The percentage of young firms delisted because of a merger was 55.15% over that period, while only 41.16% of delists were for cause. In contrast, the percentage of delists due to mergers for seasoned listed firms did not change much from the pre-peak to the post-peak period, 62.41% vs. 61.99%. This increased importance of mergers for young firms during the 1990s compared to earlier periods is documented in Arikan and Stulz (2014). For young (seasoned) firms, the percentage of voluntary delists increased 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 increased after the peak, it is not simply because the delist rate among young listed firms increased in a disproportionate manner. While the delist rate of young listed firms did increase, the delist rate of seasoned listed firms increased by the same amount. For both young listed firms and seasoned listed firms, merger delists were the most frequent type of delists after the peak. We focus on this type of delisting next.

[19] 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.

6.3. Merger as alternative to delist for cause

The higher delist rate after the listing peak cannot be explained by delistings classified as for cause by CRSP. We infer then that it must arise from an unusually high merger delist rate. An obvious concern is that there could have been a higher merger rate because firms about to be delisted for cause chose to be acquired instead. That is, a growing number of mergers may have been masking as delists for cause.

To examine this possibility, we estimate a logit model to predict whether a firm that delists is doing so because of a merger or for cause. 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, the 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. What we would like to determine is whether, using this model, the number of false positive associations of merger delists increased after the peak. In other words, did firms that delisted because of a merger but that were predicted to delist for cause based on their firm-level characteristics increase in number after the peak?

In Table 8, Panel A we show estimates of four different logit models. 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.[20] These models differ in their use of industry and year fixed effects though inferences are the same in each model. 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

[20] 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. The results are not reported.

bigger. This is true for all the models we estimate and the coefficients are similar across the models. The coefficients on profitability are larger when we have industry fixed effects, but the other coefficients seem little affected by industry fixed effects.

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. Therefore, we need to choose a probability cutoff to assign delists as mergers or for cause. We use a cutoff of 0.491%.[21] 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 classifies 14,513 correctly. Said differently, it incorrectly classifies only 2.35% of the delistings. 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 have been delisted for cause. These potentially falsely-identified 177 mergers that could have been delists for cause are so few in numbers to make no difference in our overall conclusions.

6.4. Who acquires firms that delist because of mergers?

The acquirers of young and seasoned publicly-listed firms could be public firms or private firms. If the acquirer is a public firm, the firm's assets continue to be owned by public shareholders. If it is less valuable to have corporate assets owned by publicly-listed firms, we would expect an increase in acquisitions from private firms. An additional consideration is that firms going private can go private through an acquisition by a shell company private firm. 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

[21] To choose the cutoff, we graph sensitivity versus one minus specificity against probability cutoffs. Sensitivity is the fraction of observed positive-outcome cases that are 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).

(2013) conduct a related analysis focused on recent IPO firms and show that the fraction of recent IPO firms acquired by private firms has not increased. Our analysis concerns all firms and compares the U.S. to foreign countries.

Figure 6, Panel A shows that the percentage of public U.S. firms acquired by other public firms (as opposed to by private firms) varies greatly over time. From 1981 to 1996, 68.6% of listed firms were acquired by public firms. This percentage falls only slightly after 1996 to 66.0% and the difference is not statistically significant. If we exclude credit crisis and subsequent years, the average after 1996 is 70.0%. It does not appear that acquisitions by private firms were unusual after the peak.

Jensen (1986), as cited in the introduction, argues that the private equity form of organization would emerge as the dominant form. However, acquisitions by private non-operating firms 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 increased after 2002, but did not reach the peak levels from the 1980s. Finally, leveraged buy-outs (LBOs) – shown as a dashed line in the figure - accounted for 8.06% of the acquisitions from 1981 to 1996 and 6.84% afterwards.[22] It follows from this that there is no evidence that acquisitions corresponding to going-private transactions and acquisitions by private equity firms became more important after 1996. Therefore, it does not appear therefore that these acquisitions played a special role in the decrease in the number of listed firms compared to acquisitions by public firms.

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 is not reliably available. The percentage of public firms acquired by public acquirers in non-U.S. countries was actually lower than the same rate in the U.S. From 1997 to 2012, the rate across non-U.S. countries was 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 was 11.51% after 1996, which is slightly lower than the percentage in the U.S. of 12.74%. It follows from these

[22] 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.

comparisons that there is little evidence that acquisitions by private equity firms were more important in the U.S. after 1996 than they were abroad.

7. Conclusion.

The U.S. has experienced a dramatic decrease in the number of publicly-listed firms. We show that as a result of this decrease, the U.S. has a listing gap compared to other countries and that this gap has become large, exceeding 5,000 firms. We not only quantify the magnitude of this listing gap, we also investigate various explanations for it. The listing gap does not arise because there are fewer firms or startups. Nor does it arise because the smallest firms are no longer listed on the exchanges. In fact, we find that the percentage of firms that are listed fell for all size groups. Lastly, because U.S. has a distinctly different evolution from the rest of the world, the explanation has to be focused on changes in the U.S.

Before the listing peak in 1996, the net list rate in the U.S. was positive. After 1996, it was negative because the delist rate increased and the new list rate fell. We show that if the new list and delist rates from the pre-peak period applied after 1996, there would be no gap. Similarly, the net list rate in non-U.S. countries was positive after 1996 so that there would be no gap if the U.S. had new list and delist rates similar to these countries.

The listing gap cannot be explained by just the decrease in the new list rate. We show that the U.S. would still have a listing gap if the new list rate not fallen. To explain the gap, one has to explain both the fall in the new list rate *and* the increase in the delist rate. We show that the delist rate increased because of an increase in merger activity involving publicly-listed targets. After 1996, the percentage of firms delisted for cause did not increase, but the percentage of firms delisted because of a merger increased. Much has been made of the increase in firms going dark or going private after the Sarbanes-Oxley Act. However, the percentage of firms delisting voluntarily is too small to explain the listing gap or even to contribute meaningfully to closing the gap.

More than two decades ago, Jensen (1989) predicted the demise of the public corporation because the type of organization favored by private equity firms would displace public corporations. The type of organization favored by these firms is one in which management is heavily incentivized both by high

ownership of equity and by high leverage. Because of the role of private equity firms and the high ownership of managers, there would be no agency conflict between managers and shareholders. While the number of public firms decreased in a way that is consistent with Jensen's predictions, the role of private equity cannot explain the decrease in the number of public firms. During the post-peak period, the average percentage of public firm acquisitions involving private equity was the same as it was in the pre-peak period and lower than it was in the 1980s. Another paradigm is needed to explain the eclipse of the public corporation in the U.S.

References

Aggarwal, Reena, and Rohan Williamson, 2006, Did new regulations target the relevant corporate governance attributes?, Working paper, Georgetown University.

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.

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 US 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.

Eugene F Fama, 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.

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.

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.

La Porta, Rafael, Florencio Lopez-de-Silanes, Andrei Shleifer, and Robert Vishny, 1998, Law and finance, *Journal of Political Economy* 106, 1113-1155.

La Porta, Rafael, Florencio Lopez-de-Silanes, and Andrei Shleifer, 2006, What works in securities laws? *Journal of Finance* 61, 1-32.

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, Andras, 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, and Ivo Welch, 2002, A review of IPO activity, pricing, and allocations, *Journal of Finance* 57, 1795-1828.

Ritter, Jay, 2012, U.S. Senate Testimony, Testimony before the Senate Committee on Banking, Housing and Urban Affairs, March 6, 2012.

Stulz, René M., 1999, Globalization, Corporate Finance, and the Cost of Capital, *Journal of Applied Corporate Finance* 12, 1999, 8-25.

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 in raw counts and in 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 or emerging 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	3,231	3.83
1980	19	12,634	3,510	3.60
1985	25	12,788	3,807	3.36
1990	50	20,534	4,127	4.98
1995	65	29,166	4,420	6.60
1996	66	30,374	4,476	6.87
2000	70	33,945	4,696	7.23
2005	71	37,457	4,952	7.56
2012	71	39,427	5,301	7.44
% change: 1996-2012		*28.3%*	*18.4%*	*8.3%*
		Non-U.S. developed countries		
1975	13	11,261	523	21.54
1980	15	11,098	537	20.66
1985	19	10,868	549	19.81
1990	22	12,266	562	21.84
1995	23	13,671	576	23.75
1996	23	14,154	578	24.48
2000	23	16,411	587	27.95
2005	23	20,935	603	34.73
2012	23	20,805	622	33.45
% change: 1996-2012		*47.0%*	*7.6%*	*36.6%*
		Emerging countries		
1975	3	1,100	2,708	0.41
1980	4	1,536	2,973	0.52
1985	6	1,920	3,259	0.59
1990	28	8,268	3,565	2.32
1995	42	15,495	3,844	4.03
1996	43	16,580	3,898	4.25
2000	47	17,534	4,109	4.27
2005	48	16,522	4,349	3.80
2012	48	18,622	4,679	3.98
% change: 1996-2012		*12.3%*	*20.0%*	*-6.4%*

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	Total number of firms	Listed firms	Listed firms / Total firms	Startups	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. New lists and startups.

This table presents regressions where the dependent variable equals number of new lists over the total number of public and private firms multiplied by 100. New lists are from 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. The total number of firms and startups are from the Longitudinal Business Database provided by the U.S. Census Bureau. The main explanatory variable is the startup rate, defined as startups divided by the total number of firms multiplied by 100. Startups are defined as firms with age equal to zero. The Post-peak dummy equals one from 1997 to 2012. Models (1) and (3) are estimated over 1979 to 2012 and model (2) is estimated over 1981 to 2012. *t*-statistics are computed with Newey-West standard errors with one lag. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively

	(1)	(2)	(3)
Constant	-0.01286*	-0.01972***	0.02682**
	(-1.78)	(-3.09)	(2.28)
Startup rate (lag 1)	0.00209***	0.00204*	-0.00099
	(3.13)	(1.82)	(-1.04)
Startups rate (lag 2)		0.00287*	
		(1.86)	
Startups rate (lag 3)		-0.00212*	
		(-1.82)	
Post-peak dummy			-0.04257***
			(-3.00)
Post-peak dummy × Startup rate (lag 1)			0.00316**
			(2.49)
N			
Adjusted R^2	34	32	34

Table 5. 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-statistics							3.68	3.10	3.59	0.52	2.68

Table 5, 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-statistics				2.92	3.90

Table 6. 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 7. 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

		Model 1				Model 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 7, 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 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	14863	14863	14863	14863
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 U.S. 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.

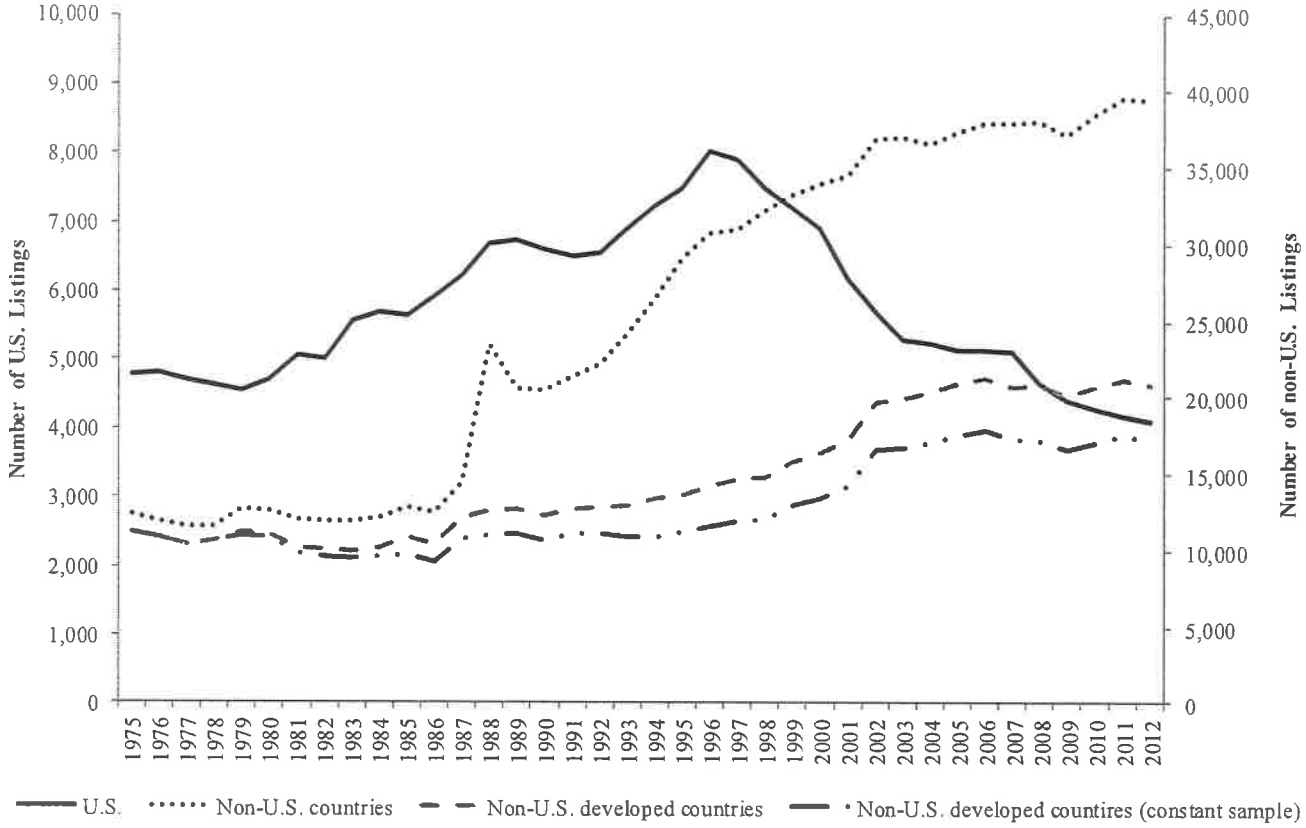

Figure 2. Percent change in listing counts: 1996 to 2012.
This figure shows the percentage change in the number of domestic, publicly-listed firms from 1996 to 2012. Listing counts are from the WDI and WFE databases. Investment companies, mutual funds, REITs, and other collective investment vehicles 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.

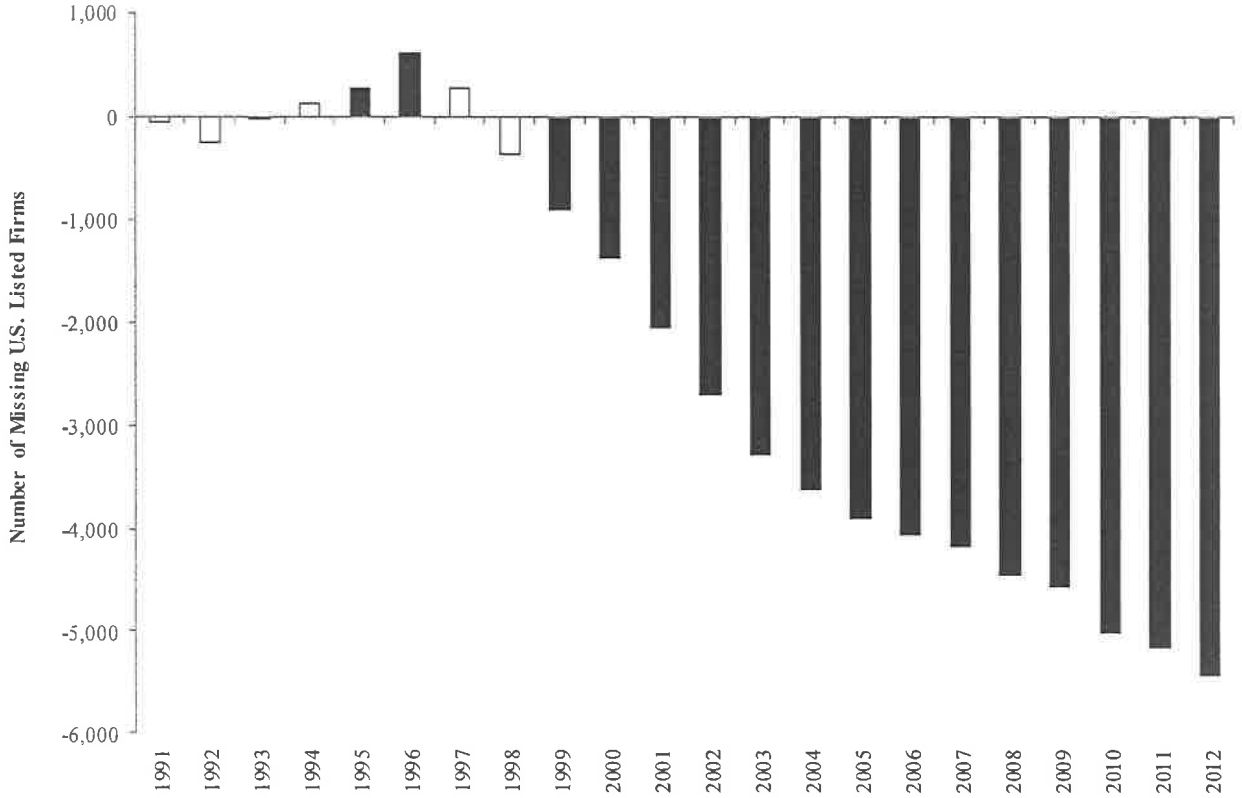

Figure 4. Percentage listing count changes in Fama-French 49 industries: 1996 to 2012.
This figure shows the percentage change in the number of domestic, publicly-listed firms in each Fama-French 49 industry from 1996 to 2012. Listed firms are from CRSP and include U.S. common stocks (share codes 10 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. A firm is assigned to a Fama-French 49 industry based on its 4-digit SIC code.

Figure 5. The size distribution of U.S. listed firms.

Panel A 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. Panel B shows the evolution of the log assets (in 1990 dollars) for the 20th, 40th, 50th, 60th, and 80th percentiles. Panel C shows the Gini coefficient across listed firms by market capitalization, total assets, total revenues, and number of employees. It is close to one (perfect inequality) if there is one firm and all other firms are inconsequential. It equals zero if each firm is the same size.

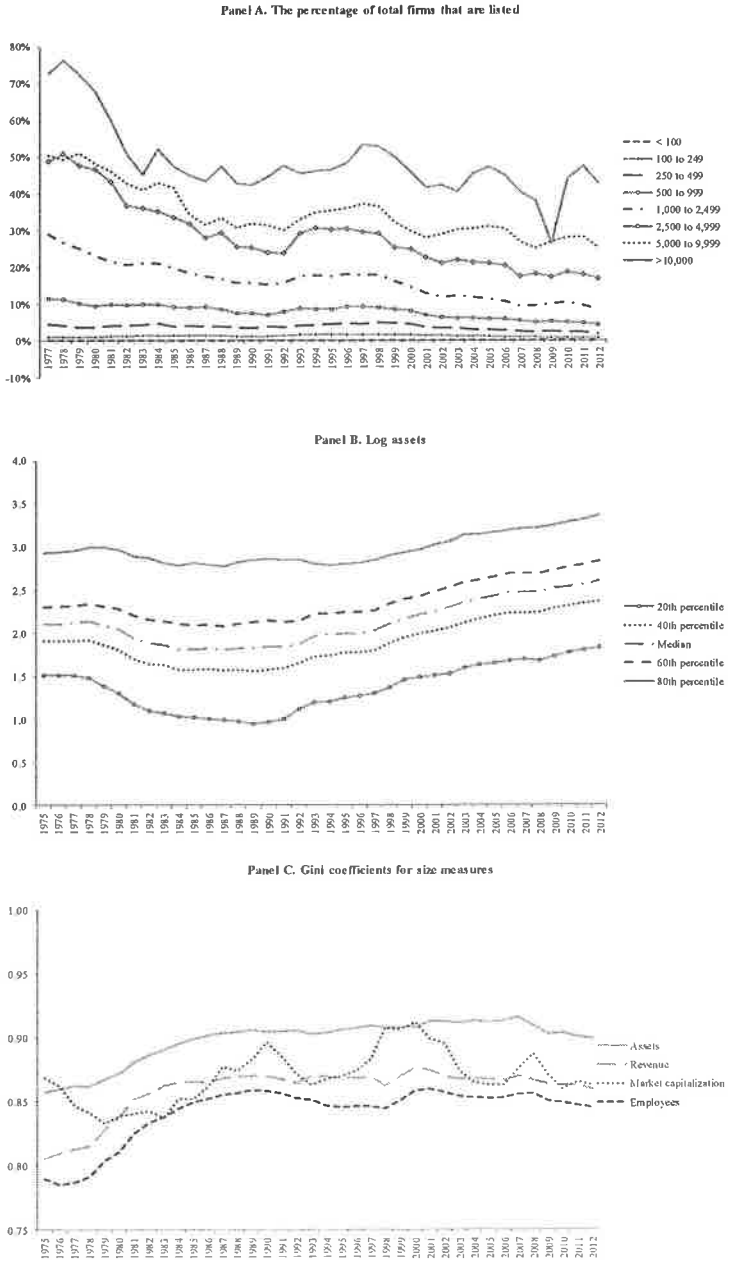

Figure 6. Acquisitions of public firms by acquirer type.
Panel A shows the percentage of U.S. public firms acquired by public firms and by private firms from 1981 to 2012. Data on acquisitions is from SDC. We include acquisitions in which the acquirer owns 100% after the transaction. A U.S. target is 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 operating companies or non-operating companies 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.