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The U.S. listing gap☆

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ABSTRACT

Relative to other countries, the U.S. now has abnormally few listed firms. This "U.S. listing gap" is consistent with a decrease in the net benefit of a listing for U.S. firms. Since the listing peak in 1996, the propensity to be listed is lower for all firm size categories and industries, the new list rate is low, and the delist rate is high. The high delist rate accounts for 46% of the listing gap and the low new list rate for 54%. The high delist rate is explained by an unusually high rate of acquisitions of publicly listed firms.

1. Introduction

In 1996, the peak year for U.S. listings, the U.S. has 8,025 domestically incorporated companies listed on a U.S. stock exchange. By 2012, that number is only 4,102. Compared to other countries with similar institutions and economic development, the U.S. now has significantly fewer publicly listed firms. We call this the U.S. "listing gap." The listing gap is a recent phenomenon. Our international data start in 1990 and the gap only arises after 1999. By 2012, it exceeds 5,000 firms. After documenting this U.S. listing gap, we investigate possible explanations for it. To understand the gap, the evidence reveals that it is necessary to focus on new lists as well as delists. If the new list rate stayed at the U.S. historical average rate rather than decreasing, the U.S. would still have a listing gap. The reason is that after 1996, delists occur at a higher rate relative to the past, mostly as a result of an unusually high pace of merger activity among public firms.

The decrease in the number of listed firms in the U.S. is drawing considerable attention and new laws are in force because of this phenomenon.[1] However, without

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[1] The decline in U.S. listings is noted by other researchers, including Ciccotello (2014), Rosett and Smith (2014a,b), and Grullon, Larkin, and Michaely (2015), as well as in the media, e.g., "Wall Street's dead end,"

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understanding better why the U.S. has fewer listed firms, it is not clear that this phenomenon should be a source of concern. For instance, it could be that the optimal firm size is increasing because of technological changes, so that even though there are fewer firms, they are larger in size (see, for instance, Gao, Ritter, and Zhu, 2013). In this case, the drop in listed firms likely has nothing to do with the benefits and costs of being a public company and might even be a positive development for the economy. Alternatively, it could be that changes in these benefits and costs make it unattractive for firms, and especially so for smaller firms, to be public, in which case we might have too few public firms, possibly impeding economic growth. We show that the number of listed firms falls sharply in the U.S., but increases on average in other countries. Hence, to explain the listing gap, our paper shows that it is essential to explain why the number of listed firms falls in the U.S. in particular and why specifically since 1996.

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

Much of the literature on why fewer firms go public, or are listed, focuses on the idea that, for a variety of reasons, being listed is either costlier or less beneficial for smaller firms after the listing peak in 1996 than before (among others, see Weild and Kim, 2009; Djama, Martinez, and Serve, 2014; Gao, Ritter, and Zhu, 2013). We build a simple model in which the cost and benefit of being listed is a function of firm size. With this model, there is a fixed cost of listing and a variable cost. By contrast, the benefit of listing is zero for the smallest firms and increases with size. The idea is that a large share of the benefit is access to public markets, which is more valuable for larger firms. This, in turn, arises because it is harder for them to raise capital to finance themselves outside of public markets because the amounts they have to raise are extremely large and require access to a large pool of investors. That is, the net benefit of being listed (defined as the benefit minus the cost) is negative for small firms and positive for large ones.

Our simple model predicts that there is a size threshold above which firms choose to be listed and below which they do not. This threshold is likely to be industry-specific and is consistent with the fact that the propensity to be listed increases with firm size. Importantly, a proportional rise in the cost of being listed or a proportional decline in the benefit of being listed as a function of firm size increases the minimum firm size threshold for listed firms and decreases p for constant N. An increase in the minimum size threshold for being publicly listed means that the rate of initial public offering (IPO) activity drops since firms have to grow more for an IPO to be worthwhile. Such an increase can also lead to more merger activity among public firms as the firms that fall below the threshold either delist or merge.

If the net benefit of listing falls, our model predicts that (1) the propensity to be listed drops; (2) listed firms exit through mergers or going-private transactions; (3) fewer firms go public; and, (4) public firms become larger in size. We find support for these four predictions. Of course, the number of listed firms could be lower because there are fewer firms that could be listed, because of poor market conditions, because of the emergence of new organizational forms that are more efficient such as private firms with a private equity sponsor in the spirit of Jensen (1989), or because too many firms go public in the years before the listing peak that were too weak to survive as public firms. We test, but find no support, for these alternative explanations.

With international data on listings in hand, we show that the U.S. has fewer listed firms than expected using a model that predicts the number of listed firms across the world. This listing gap is inconsistent with explanations for a decrease in U.S. listings that are not U.S.-centric. For example, explanations that focus on technological change that affects firms regardless of their country of domicile do not match the evidence. Our findings point to a decrease in the net benefit of being listed *in the U.S.* rather than a decrease in the net benefit of being listed more generally.

For our tests, we use the Longitudinal Business Database (LBD) of the U.S. Census Bureau. The analysis shows that the number of firms eligible to be listed actually increases over time until 2008. This number falls after 2008, but it is 7.5% higher in 2012 than at the listing peak in 1996. The Census Bureau classifies firm size by the number of employees which allows us to gauge differences in listing propensity across size categories. We find that the number of firms increases for each size category. Since the number of firms (N) increases but the number of listed firms (L) falls after the listing peak, it has to be that the propensity to be listed (p) falls. We show this is the case.

Our simple model prompts us to investigate whether the decrease in the propensity to be listed is consistent with an increase in the cost of being listed and/or a decrease in the benefit of being listed. We find that since the listing peak both the pace of new lists is low *and* that of delists is high. The decrease in the rate of new lists and the increase in the rate of delists implies a negative net new list rate, which means the propensity to be listed falls. An important finding in our paper is that *both* the decrease in new lists *and* the increase in delists are required to understand the U.S. listing gap. Many of the arguments observers make for an increase in listing costs centers on the impact of the Sarbanes-Oxley Act of 2002 (SOX) on smaller firms. We show that half of the increase in the listing gap is already present by the time SOX becomes law. As a result, the evidence implies that a decrease in the benefit of

The New York Times (February 13, 2011), "Missing: Public companies – Why is the number of publicly traded companies in the US declining?" *CFO Magazine* (March 22, 2011), and "The endangered public company: The big engine that couldn't," *The Economist* (May 19, 2012).

being listed that precedes SOX plays an important role in the emergence of the U.S. listing gap.

We then investigate possible explanations for the increase in the delist rate. One explanation is that there are more distressed firms, and hence more delists, after the listing peak because of poor market conditions. We find that taking into account market conditions actually increases the size of the listing gap. Fama and French (2004) show that firms that go public in the late 1990s are weaker with lower profitability and slower growth in assets. As weaker firms go public, new list survival rates should fall and delists should increase. We show, however, that delists are no more highly concentrated among newly listed firms than seasoned firms after the listing peak.

The increase in delists is largely explained by an increase in the rate of acquisitions of public targets by public acquirers. As a result, there are fewer publicly listed firms and those that remain are larger. More generally, we also show that the size of listed firms increases after the listing peak. The smallest listed firms are now much larger than the smallest listed firms at the listing peak. This evidence is consistent with a decrease in the net benefit of being listed in our model such that the size threshold above which that benefit is positive increases.

2. The phenomenon

In this section, we document a dramatic difference in the evolution of listings in the U.S. and in other countries around the world over the past two decades. A different evolution for the U.S. is not by itself problematic, but documenting it is an important starting point for our analysis. We use data on the number of listed firms in each country from two sources: the World Bank's World Development Indicators (WDI) database and the World Federation of Exchanges (WFE) database. Each year, the WFE collects information from its member and affiliated exchanges on the number of domestically incorporated companies listed on each country's stock exchanges at the end of the year. It does not include investment companies, mutual funds, real estate investment trusts (REITs), or other collective investment vehicles. The WDI data are primarily from Standard & Poor's (S&P) Global Stock Market Factbooks and supplemental S&P data. To create a comprehensive data set, we merge the WDI and WFE databases (what we call the WDI/WFE data set). The Appendix provides further details.

We start with the evolution of listings in the U.S. since 1975. Fig. 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 shows the number of listings

Fig. 1. Listing counts for the U.S. and for 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, La Porta, Lopez-de-Silanes, and Shleifer (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.

Table 1
Listing counts, population, and listing counts per capita for select years.
This table reports the number of domestic, publicly listed firms in the U.S. and in non-U.S. countries for raw counts and for listing counts per capita (in terms of millions of inhabitants). Listing counts are from the WDI and WFE databases. Investment companies, mutual funds, REITs, and other collective investment vehicles are excluded. The set of non-U.S. countries comprises the 71 countries included in Djankov, La Porta, Lopez-de-Silanes, and Shleifer (2008). Countries are classified as developed based on the MSCI classification scheme as of 2014.

Year	Number of countries	Listing counts	Population (millions)	Listing count per capita
		Panel A: U.S.		
1975		4,775	216	22.1
1980		4,711	227	20.7
1985		5,650	238	23.8
1990		6,599	250	26.4
1995		7,487	266	28.1
1996		8,025	269	29.8
2000		6,917	282	24.5
2005		5,145	296	17.4
2012		4,102	314	13.1
% Change: 1996–2012		*−48.9%*	*16.5%*	*−56.1%*
	Panel B: non-U.S. developed countries: constant sample			
1975	13	11,261	471	23.9
1980	13	10,884	483	22.5
1985	13	9,696	492	19.7
1990	13	10,676	504	21.2
1995	13	11,206	514	21.8
1996	13	11,624	516	22.5
2000	13	13,364	523	25.6
2005	13	17,535	536	32.7
2012	13	17,210	551	31.2
% Change: 1996–2012		*48.1%*	*6.8%*	*38.6%*

for selected years. The number of listed firms in 1975 is 4,775. In 2012, it is 4,102, the lowest count across the four decades and 14% lower than in 1975. The peak number of listings is 8,025 in 1996. From 1975 to 1996 (the pre-peak period), the number of listed firms increases steadily from 4,775 to 8,025, a cumulative increase of 68%. Since the peak in 1996, listings fall each year from 1997 to 2012 (the post-peak period) and cumulatively decline by 3,923, or 49%, by 2012. Though we do not show the results in Fig. 1, the inverted U-shape we observe for the U.S. as a whole holds separately for the NYSE and Nasdaq. Listing standards change on Nasdaq in 1996, but the evidence on the impact of the rule change is mixed.[2] Listing standards on the NYSE do not change. Since we find no difference between NYSE and Nasdaq listing counts over time, we argue that changing listing standards do not explain the decline in listings since 1996.

We turn next to the number of listings in other countries. We show only results for the countries included in Djankov, La Porta, Lopez-de-Silanes, and Shleifer (DLLS, 2008) since these are the countries we can include in later regressions to estimate the listing gap. These countries account for 96% of listed firms during our sample period. In 1975, we have data for 16 non-U.S. countries. By the end of our sample period, we have data for 71 non-U.S. countries. Fig. 1 (right axis) shows the number of listings in non-U.S. countries follows a sharply different path than the number of listings in the U.S. In 1975, there are 12,361 listings outside the U.S. The vast majority of these listings (91%) are domiciled in developed countries (using the Morgan Stanley Capital International, MSCI, country classification scheme as of 2014). The number of non-U.S. listings peaks in 2011 at 39,543. From 1975 to 2012, the number of non-U.S. listings increases by 219% whereas the number of U.S. listings decreases by 14%. Since the U.S. peak in 1996, the number of non-U.S. listings increases by 28% while the number of U.S. listings falls by 49%. As a result of this evolution, there is a substantial increase in the number of non-U.S. listings relative to the number of U.S. listings. At the U.S. listing peak in 1996, there are 3.8 non-U.S. listings for every one U.S. listing. This ratio increases every year, almost tripling to 9.6-to-1 by 2012.

To assess how listings evolve in the U.S. in comparison to non-U.S. countries, we need to compare the U.S. to a constant set of countries over time. In Fig. 1 and Table 1, we show results for the 13 developed countries that have data each year from 1975 to 2012. The listing count for these countries, 11,261 in 1975, is almost the same at 11,624 in 1996. It then increases sharply until 2006 when it reaches a peak of 17,846 and stays relatively constant thereafter. In 2012, the count is 17,210 so that listings in these countries increase by 53% over our sample period. The evolution is similar when we include all non-U.S. developed countries. Therefore, the evolution of listings in other developed countries since 1996 is dramatically different from that of the U.S. While U.S. listings drop by about half since 1996, listings in the constant sample of developed countries increase by 48%.

We now focus on the evolution of listings since the U.S. listing peak in 1996. Since we look at percentage changes in the number of listings, we eliminate countries that have almost no listings in 1996. We use the 54 countries that have at least 50 listings in 1996. Not surprisingly, the number of listings in 1996 varies widely across countries. The smallest number of listings belongs to Luxembourg at 54 and the largest belongs to the U.S. at 8,025. Fig. 2 shows the percentage change in listing counts from 1996 to 2012. During that period, the number of listings in the U.S. drops by 49%; it increases in 32 countries and decreases in 22. Among the 22 countries with a decrease, only six have a greater percentage decrease than the U.S. (Venezuela, Egypt, Colombia, Portugal, Lithuania, and the Czech Republic). This figure does not tell us anything about why the U.S. differs from most developed countries, but it does show that few other developed countries have a significant decrease in listings.

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

[2] In 1996, Nasdaq increased the asset size requirement for initial listings, but at the same time, made it possible for firms that could not list before to now do so. Klein and Mohanram (2005) show the changes in 1996 made it possible for firms to list based on a market capitalization criterion alone. According to their analysis, most of the Internet firms that went public after 1996 listed under this new market-capitalization-based standard. The study shows that these firms performed poorly and had a higher delisting rate for cause.

Fig. 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, La Porta, Lopez-de-Silanes, and Shleifer (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%.

the number of listings per one million inhabitants, or listings per capita. Table 1, Panel A shows listings per capita for selected years for the U.S. In 1975, listings per capita is 22.1; it peaks in 1996, reaching 29.8 and then falls to 13.1 in 2012. The number of listings per capita in 2012 is 59% of the count in 1975 and only 44% in its peak year. During the post-peak period it falls by 56%. With this measure, the evolution of U.S. listings is even more dramatic because population increases while listings fall. Panel B shows that listings per capita for the constant sample of developed countries increases steadily from 23.9 to 31.2 from 1975 to 2012, or by 38.6%.

3. Measuring the U.S. listing gap

A decrease in U.S. listings per capita compared to listings per capita in non-U.S. countries since 1996 could occur because non-U.S. countries have too few listings in 1996 or because the U.S. has too many. To assess whether the evolution of U.S. listings is abnormal, we require a

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 the log of 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, La Porta, Lopez-de-Silanes, and Shleifer (2008). In Panel A, 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. In Panels B and C, the *t*-statistics are adjusted for clustering by country. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively. FE denotes fixed effects.

	Panel A: cross-sectional regressions			*Panel B: panel regressions*		*Panel C: panel regressions*	
	1990	1996	2012	1990–1996	1997–2012	1990–2012	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Constant	−2.656***	−3.012***	−4.286***	−3.786***	−4.279***	−4.245***	−4.017***
	(−3.42)	(−4.17)	(−5.38)	(−4.30)	(−5.49)	(−5.48)	(−5.22)
Anti-self-dealing index	1.416***	0.974**	1.465***	0.853*	1.385***	1.259***	1.259***
	(2.97)	(2.19)	(2.93)	(1.72)	(3.06)	(2.88)	(2.86)
Log(GDP per capita)	0.516***	0.586***	0.657***	0.636***	0.616***	0.641***	0.641***
	(5.87)	(6.77)	(7.51)	(6.59)	(8.02)	(8.17)	(8.11)
GDP growth				0.039	-0.009	0.004	0.004
				(1.16)	(−0.62)	(0.20)	(0.20)
Non-U.S. dummy				0.175	0.725***	0.595***	0.363**
				(1.10)	(4.26)	(3.79)	(2.16)
Year FE				No	No	Yes	Yes
Year FE × non-U.S. dummy				No	No	No	Yes
N	51	67	72	422	1,146	1,568	1,568
Adjusted R^2	0.4847	0.4255	0.4551	0.4526	0.4853	0.4827	0.4756

model of the *expected* number of listings per capita. We use cross-country regression models similar to those in the literature to estimate the number of listings in the U.S. assuming that the relation between per capita listings in the U.S. and variables known to affect the number of listings is the same for the U.S. as for other countries. With this approach, a measure of abnormal listings per capita for the U.S. is the residual of the regression for the U.S.

We use an existing cross-country regression model known to explain the number of listed firms per capita across countries. Specifically, La Porta, Lopez-de-Silanes, Shleifer, and Vishny (1997) project the number of listed firms per capita on the log of gross domestic product (GDP), GDP growth, a rule of law index, and an index of investor protection, their anti-director rights index. They find that the rule of law and the anti-director rights indices have positive, significant coefficients so that countries that protect the rights of investors better have more listed firms per capita. DLLS (2008) estimate similar regressions using the log of the average number of listed firms per capita for 1999–2003. After controlling for the log of GDP per capita, they show that listings per capita are strongly positively related to their anti-self-dealing index, a measure of the extent to which related-party transactions are limited in a country. The adjusted R^2 is 0.47.

We estimate similar regressions that explain the number of listed firms per capita across the world. Following DLLS, we estimate a regression of the log of listings per capita on the anti-self-dealing index and on the log of GDP per capita. Models 1–3 of Table 2 estimate a cross-country regression for 1990, 1996, and 2012, respectively. We start with 1990 as it is the first year for which we have at least 50 countries. Consistent with DLLS, in Model 1, the anti-self-dealing index has a positive significant coefficient as does GDP per capita. Inferences in Models 2 and 3 for 1996 and 2012 are similar. 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.

In Model 4 we estimate a panel regression across countries and years for the pre-peak period (1990–1996), similar to the regressions in DLLS, except that we add an indicator variable for non-U.S. countries and include GDP growth as an additional variable to better capture changing economic conditions. The standard errors are clustered by country. As in Models 1–3, we find significant positive coefficients for the anti-self-dealing index and the log of GDP per capita. GDP growth is insignificant. If there is a systematic difference between listings per capita and the explanatory variables for non-U.S. countries and the U.S., the non-U.S. indicator variable would be significantly different from zero in Model 4. It is not. Therefore, there is no U.S. listing gap during the pre-peak period. When we estimate the same panel regression for the post-peak period (1997–2012) in Model 5, the results change: the indicator variable for non-U.S. countries is now significantly positive. That is, the U.S. has a listing gap relative to non-U.S. countries since these countries have significantly higher listings per capita given their institutions and economic development compared to the U.S. All inferences remain even if the standard errors are double clustered by country and year.

Finally, we estimate panel regressions for the full period from 1990 through 2012, but this time with year fixed effects included (1990 is the omitted year) and with standard errors clustered by country.[3] We see in Model 6 that

[3] If we estimate these regressions with standard errors clustered by country and year, we cannot compute standard errors on the year fixed effects. See Cameron and Miller (2015, Section V.B) for details on the issues that arise. To get a sense of the extent to which double clustering matters, we estimate Model 6 but without the year fixed effects. The

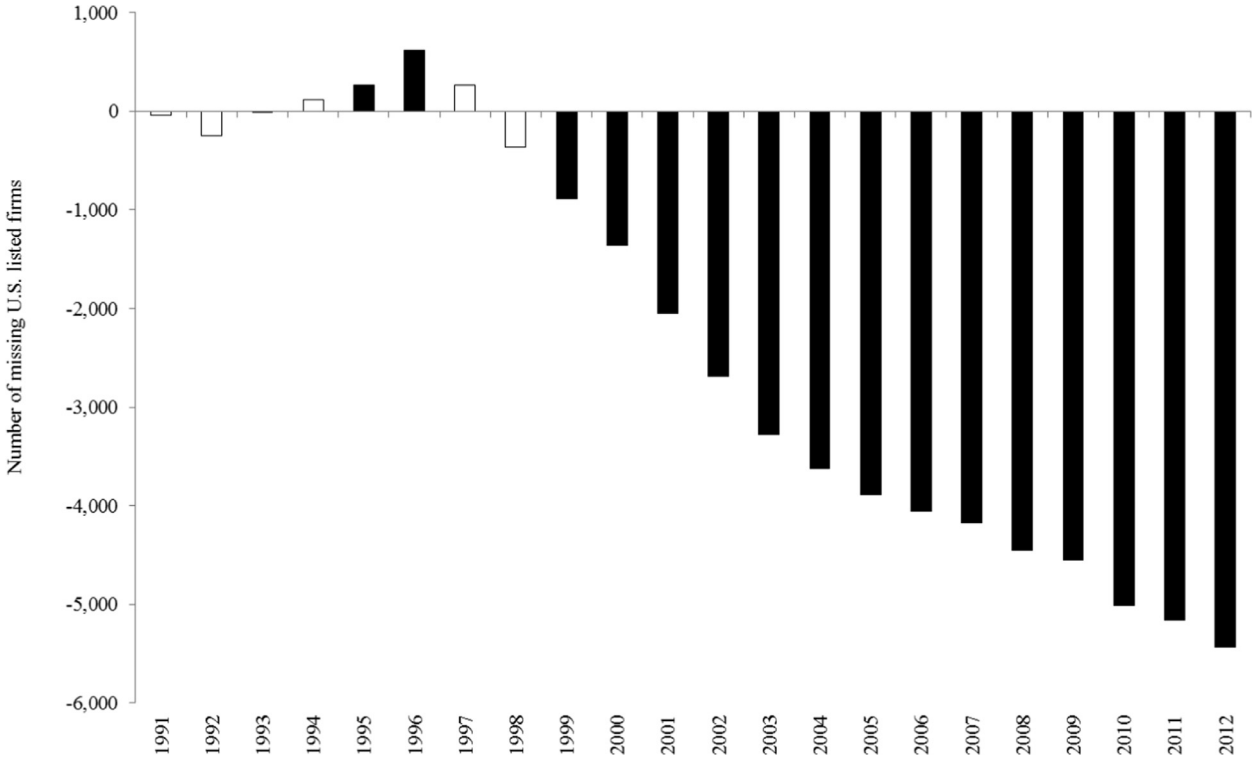

Fig. 3. The U.S. listing gap. This figure shows the U.S. listing gap, measured as the number of missing listed firms each year from 1991 to 2012. The listing gap is computed from the year fixed effects estimated in Model 7 of Table 2. The dependent variable in this regression is the log of a country's 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, La Porta, Lopez-de-Silanes, and Shleifer (2008). The panel regression *t*-statistics are adjusted for clustering by country. 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.

the non-U.S. indicator variable is again positive and significant. In Model 7, the year fixed effects are interacted with the non-U.S. indicator variable in order to compute the U.S. listing gap each year and to trace its evolution in the post-peak period. The coefficients for the anti-self-dealing index and GDP per capita remain significant while that for GDP growth is not. The adjusted R^2 is 48%.

The coefficients on the year fixed effects capture the U.S.-specific residuals. They allow us to assess how actual U.S. listings differ each year from predicted listings, measured relative to the rest of the world. Technically, the year fixed effects are measured relative to 1990 but we interpret them below in absolute terms. The reason is that there is no U.S. listing gap in the pre-peak period as shown in Model 4 and a cross-country regression for 1990 (not reported) shows the same.

We extract from the coefficients on the year fixed effects the size of the listing gap in terms of the number of missing listed firms and show the results in Fig. 3. The coefficients on the year fixed effects 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 9,538 listings instead of 4,102. The relation between listings and institutions and economic development that holds across the world predicts a much higher number of listings for the U.S. after 1999 than the observed number of listings. Interestingly, if we use Model 4 to obtain an alternative set of listing gap estimates, they turn out to be similar to those obtained from Model 7. Specifically, when we use the estimates for the pre-peak period shown in Model 4 to obtain estimates of the listing gap for the post-peak period (difference between the fitted values and the actual values of listings per capita), the listing gap evolves similarly and is of similar size to the listing gap based on Model 7 and shown in Fig. 3.

4. A simple model

In this section, we present a simple model of how the propensity to be listed is related to firm size. Much of the public policy discussion surrounding the decrease in IPOs and the decrease in the number of listed firms focuses on views that changes in the organization of markets, in

regression results (not reported) are similar regardless of whether we cluster by country or by country and year.

financial intermediation, or in laws and regulations, have decreased the net benefit of a listing for small firms (for instance, Pinelli and Muscat, 2007; Weild and Kim, 2010; Ernst and Young, 2009; or, the IPO Task Force Report to the U.S. Treasury, 2011). We first introduce our model and then use it to show how it can shed light on the implications of the issues discussed in relation to the decrease in IPOs and the number of listed firms.

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

Many of these costs have a fixed component. Minimal regulatory and reporting requirements exist for any public company irrespective of its size. The cost of complying with these requirements is generally considered to increase only moderately with firm size. Large firms are typically less subject to competitive forces, less likely to face unwanted takeover attempts, and better able to resist pressures from analysts and activist investors. The cost of communicating with investors has a fixed component. For instance, the cost of preparing a press release or organizing an earnings call does not depend on the number of shareholders (for example, Karolyi and Liao, 2016). The impact of listing on agency costs is harder to determine as small firms typically tend to retain concentrated ownership. It is therefore possible that costs of entrenchment are higher for larger firms, but in general firms become larger because they are successful and manage to find ways to address these costs. Therefore, we expect the cost of being listed to increase only moderately with firm size. This is shown in Fig. 4, where we propose a simple cost function of being listed in which the cost curve is positive for any firm regardless of size but increases slowly with size. The cost of being listed as a function of firm size, C, starts positive because of the initial fixed cost.

The literature discusses numerous benefits of exchange listings (see, among others, Da Rin, Hellman, and Puri, 2013). Some of these benefits include the ability to tap public markets to raise funds, the ability to use shares to pay for acquisitions, price discovery, gains from bonding to a legal, regulatory, or exchange regime, liquidity for the stock that permits pre-IPO shareholders to sell shares, monitoring by capital markets, and the greater ability to pay employees in shares and options.

We expect these benefits to increase with firm size beyond some threshold. Small firms have lower funding requirements in dollar terms, so that they can satisfy

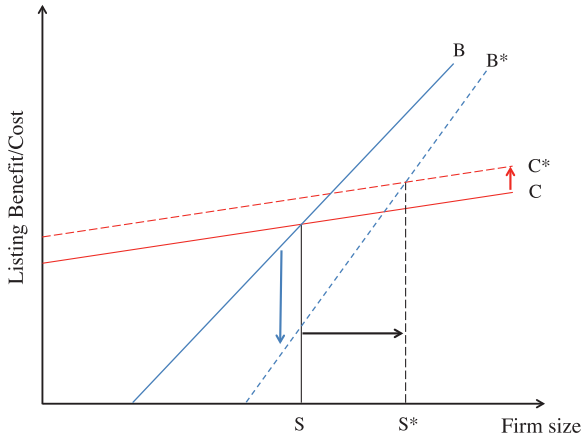

Fig. 4. The costs and benefits of listing. This figure shows the costs and benefits of being listed as a function of firm size. The cost curve (C) is positive for any firm regardless of size. The cost of being listed starts positive because of the initial fixed cost. The benefit curve (B) slopes upward but starts below the cost curve. The difference between the benefit curve and the cost curve is the net benefit of being listed. When the net benefit is negative, a firm does not list. The figure also shows the impact on the listing size threshold of an increase in the cost curve from C to C* and a decrease in the benefit curve from B to B*. With these changes, the size threshold beyond which firms choose to be listed increases from S to S*.

these requirements with fewer investors. Being publicly traded may not make it easier for these firms to find investors since, if a firm is small, the liquidity of its stock will generally be low and monitoring by capital markets will be weak. As the firm becomes larger, its common stock will be more liquid and monitoring will be more active. As a result, the firm's common stock is more easily accepted as an acquisition currency and in compensation contracts. As the firm becomes larger, it is often not able to undertake acquisitions without using common stock either to raise financing or to pay for the acquisition. We expect the benefit of being listed is rather small for the smallest firms, but increases with firm size, as shown by the benefit curve B in Fig. 4. Some of the benefits of being listed are higher for firms that have greater funding needs since such firms will use public markets more intensely to raise funds. For example, the curve is steeper for firms with greater growth opportunities as they will have higher financing requirements. Given our discussion, the benefit curve B in Fig. 4 starts below the cost curve, but it increases faster with size than the cost curve, so that it crosses the cost curve for size S.

The difference between the benefit curve and the cost curve is the net benefit of being listed. When that net benefit is negative, a firm does not list. Hence, firms to the left of the intersection point S of the two functions choose to be private and those to the right of it choose to be public. The figure makes it possible to evaluate how changes in the market, legal, and regulatory environments might impact the propensity to be listed.

Suppose first that listed firms have to satisfy increased regulatory requirements regardless of their size so that the cost of being listed increases without an equivalent or greater increase in the benefit. Such a change raises the cost curve for all sizes. Consequently, the propensity to be

listed falls and the size of the typical listed firm increases. Next, suppose that there is a shift in monitoring by public markets due to a regulatory change, so that smaller firms disproportionately receive less attention. Such a shift decreases the benefit of being listed for all firms, pushing the benefits curve downward. But it is especially so for smaller ones, thus tilting the benefits curve to make it steeper. Again, the propensity to be listed falls. Consider finally a scenario in which it is easier for firms to raise funds without being listed. The development of the Internet and the growth of the private equity industry are examples of changes that lower search costs to find equity capital without being listed. In this case, the benefit curve falls, but more so for smaller firms, at least to the extent that a firm that needs a large amount of capital does not benefit as much from the decrease in the cost of finding investors without being listed. The propensity to be listed falls in this case as well.

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

The various explanations for a decrease in the propensity to be listed amount to arguing that the cost curve increases, the benefit curve falls, and especially so for smaller firms on both counts. With such arguments, we expect smaller firms to drop off the exchanges. These arguments predict a decrease in the propensity to be listed for small firms. Note that our model does not imply a uniform decrease across industries or across types of firms. This is because listing is intrinsically more valuable for firms in industries with better growth opportunities. What we expect, however, is that the distribution of listed firms changes so that it is more heavily weighted towards larger firms. Importantly, with these arguments, though listed firms increase in size, there is no reason for unlisted firms to become larger in size. In contrast, a common technological factor that makes it optimal for firms to become larger implies that both private and public firms become larger. The next step is to test these specific propositions.

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

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

There is no publicly available database that provides characteristics of a comprehensive sample of unlisted firms in the U.S. over our sample period. The lack of such a database limits the analysis that can be conducted as ideally we would estimate the probability that an identical firm is listed in the peak listing year of 1996 and in 2012, the year with the largest listing gap. The Longitudinal Business Database (LBD) of the U.S. Census Bureau provides information on the total number of firms (public and private firms) in the U.S. from 1977 until 2012. An extremely large number of these firms are so small that none are likely candidates for listing. Data for private firms are limited but we can reliably measure firm size by the number of employees. Few listed firms have less than 20 employees and, for now, we use this as a cutoff to define the set of firms that can be listed. We call these "tiny firms."

To obtain annual counts of the number of U.S. listed domestic firms, we use the Center for Research in Security Prices (CRSP) and Compustat databases because information on firm characteristics such as size and industry is not available from the WDI/WFE data set. We use CRSP to identify firms listed on Amex, Nasdaq, or NYSE. We include U.S. common stocks (share codes 10 and 11) and exclude investment funds and trusts (Standard Industrial Classification (SIC) codes 6722, 6726, 6798, and 6799). We merge this list with Compustat to obtain information on the number of employees and SIC codes. Thus, the final listing counts include firms in the CRSP/Compustat database that can be assigned to an employee size group.

We seek to examine whether the number of listed firms (L) falls because of a decrease in the propensity to be listed (p) or in the number of firms that can be listed (N). Table 3 shows in column 1 the total number of firms from the LBD each year. The U.S. has 3,431,993 firms in 1977. This number increases to 4,696,762 in 1996, the peak year for the number of listings. During the post-peak period, the number of firms keeps increasing to reach a peak of 5,297,530 in 2007. After 2007, the count of all firms falls, but in 2012 it is still higher than at the listing peak. Column 2 excludes tiny firms and thus shows the number of firms that can be listed (N). The counts in column 2 are 3.0–4.6 million lower than the corresponding counts in column 1, but otherwise follow a similar pattern. The number of firms is 7.5% higher in 2012 than at the listing peak in 1996 and is 72.4% higher than in 1977. The per capita number of firms (excluding tiny firms) in column 3 is 1,546 per one million inhabitants in 1977, 2,026 at the listing peak, and 1,870 at the end of the sample. The number of firms per capita is always above 2,026 until 2009, when it falls below 2,000 to reach a trough of 1,833 per million inhabitants in 2011.

Columns 4 through 6 show the corresponding data for listed firms in CRSP/Compustat. The number of listed firms is 4,170 in 1977, reaches a peak of 7,030 in 1997 (note that the peak year is 1996 in the WDI data set), and falls subsequently to 3,566 in 2012. The number of listed tiny firms is 69 in 1977 and 100 in 2012. However, the number exceeds 300 in a few years in the 1980s. The number of listings per capita is a small fraction of the total number of all LBD firms per capita. Excluding the tiny firms, the U.S. has 18.93 listed firms per capita in 1977, this number reaches a peak of 25.84 in 1996, and then falls to 11.36 in 2012. In column 7, we show the propensity to be listed (p), excluding tiny firms. The propensity to be listed is 1.204% in 1977. It increases in some years and decreases in others until 1990 when it reaches a low of 0.929%. It then increases each year and reaches a peak of 1.226% in 1996. After the peak, it falls in all years but one (2010) to reach a low of

Table 3
Firm counts and listing propensity.
This table reports the total number of firms in the U.S., including public and private firms, the number of listed firms, counts per capita, and listing propensity from 1977 to 2012. The total number of firms is from the Longitudinal Business Database provided by the U.S. Census Bureau. Listed firms include domestic, publicly listed firms in the U.S. that are in the CRSP/Compustat database that we can assign to an employee size group. Investment companies, mutual funds, REITs, and other collective investment vehicles are excluded. Excluding tiny is the number of firms excluding firms with less than 20 employees. To compute counts per capita, population is in millions. Listing propensity is the number of listed firms (ex-tiny) divided by the number of firms (ex-tiny).

	Total number of firms			Number of listed firms			
Year	(1) Total	(2) Excluding tiny firms	(3) Per capita ex-tiny firms	(4) Total	(5) Excluding tiny firms	(6) Per capita ex-tiny firms	(7) Listing propensity
1977	3,431,993	340,504	1,546	4,170	4,101	18.93	1.204%
1978	3,472,178	364,458	1,637	4,171	4,076	18.74	1.118%
1979	3,599,655	399,457	1,775	4,159	4,018	18.48	1.006%
1980	3,608,867	409,749	1,803	4,311	4,066	18.97	0.992%
1981	3,567,835	394,071	1,717	4,595	4,261	20.02	1.081%
1982	3,623,643	401,798	1,734	4,594	4,242	19.83	1.056%
1983	3,690,746	397,770	1,701	5,070	4,670	21.69	1.174%
1984	3,838,560	413,275	1,752	5,136	4,733	21.78	1.145%
1985	3,977,843	442,829	1,861	5,099	4,705	21.43	1.062%
1986	4,088,335	462,563	1,926	5,305	4,923	22.09	1.064%
1987	4,202,187	480,444	1,983	5,542	5,121	22.87	1.066%
1988	4,200,051	482,974	1,975	5,333	4,940	21.81	1.023%
1989	4,215,254	494,702	2,004	5,205	4,800	21.09	0.970%
1990	4,317,293	510,949	2,047	5,117	4,748	20.50	0.929%
1991	4,380,973	513,470	2,030	5,211	4,861	20.60	0.947%
1992	4,403,760	508,467	1,982	5,374	5,096	20.95	1.002%
1993	4,456,476	506,864	1,950	5,901	5,619	22.70	1.109%
1994	4,531,367	516,147	1,962	6,207	5,945	23.59	1.152%
1995	4,620,313	531,722	1,997	6,456	6,202	24.25	1.166%
1996	4,696,762	545,926	2,026	6,962	6,691	25.84	1.226%
1997	4,769,310	560,983	2,057	7,030	6,792	25.78	1.211%
1998	4,800,912	567,326	2,057	6,691	6,486	24.26	1.143%
1999	4,829,039	577,507	2,070	6,424	6,273	23.02	1.086%
2000	4,840,630	592,884	2,101	6,182	6,028	21.91	1.017%
2001	4,925,051	607,165	2,131	5,522	5,382	19.38	0.886%
2002	4,969,589	607,814	2,113	5,112	4,980	17.77	0.819%
2003	5,010,023	604,854	2,085	4,793	4,669	16.52	0.772%
2004	5,085,754	615,197	2,101	4,739	4,621	16.18	0.751%
2005	5,187,358	619,742	2,097	4,672	4,556	15.81	0.735%
2006	5,230,015	627,478	2,103	4,604	4,480	15.43	0.714%
2007	5,297,530	638,710	2,120	4,507	4,349	14.96	0.681%
2008	5,245,672	629,269	2,069	4,243	4,086	13.95	0.649%
2009	5,070,821	607,840	1,981	3,990	3,880	13.01	0.638%
2010	4,997,122	580,008	1,875	3,858	3,766	12.47	0.649%
2011	4,956,805	571,194	1,833	3,705	3,611	11.89	0.632%
2012	5,043,102	587,080	1,870	3,566	3,466	11.36	0.590%

0.590% in 2012. Hence, from the peak to the trough, the propensity to be listed falls by 52%.

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

The LBD classifies firms into size groups based on employee counts. We use nine such groups. The nine size groups are: (1) less than 20 employees (this group aggregates three groups reported separately by the LBD, 1–4, 5–9, 10–19,); (2) between 20 and 99 employees (aggregates two groups, 20–49 and 50–99); (3) between 100 and 249 employees; (4) between 250 and 499 employees; (5) between 500 and 999 employees; (6) between 1,000 and 2,499 employees; (7) between 2,500 and 4,999 employees; (8) between 5,000 and 9,999 employees; and, (9) over 10,000 employees. We again use the CRSP/Compustat databases to assign listed firms to employee size groups.

Fig. 5, Panel A, shows the propensity to be listed for each size group. It is immediately clear from the figure that the propensity to be listed falls for all size groups throughout our sample period. Importantly, the propensity to be listed falls both because there are fewer listed firms (a decrease of the numerator) and because there are more firms (an increase in the denominator) for all size groups. Consider that, in 1996, 617 firms in Compustat have more than 10,000 employees, the largest LBD size group. In contrast, there are 1,356 firms with less than 100 employees (combining the two smallest size groups used in the figure). In 2012, there are more listed firms in the largest size group (616) than there are in the two smallest size groups (431). For the largest size group, the propensity to be listed falls from 53.01 to 48.54% during the post-peak period, a

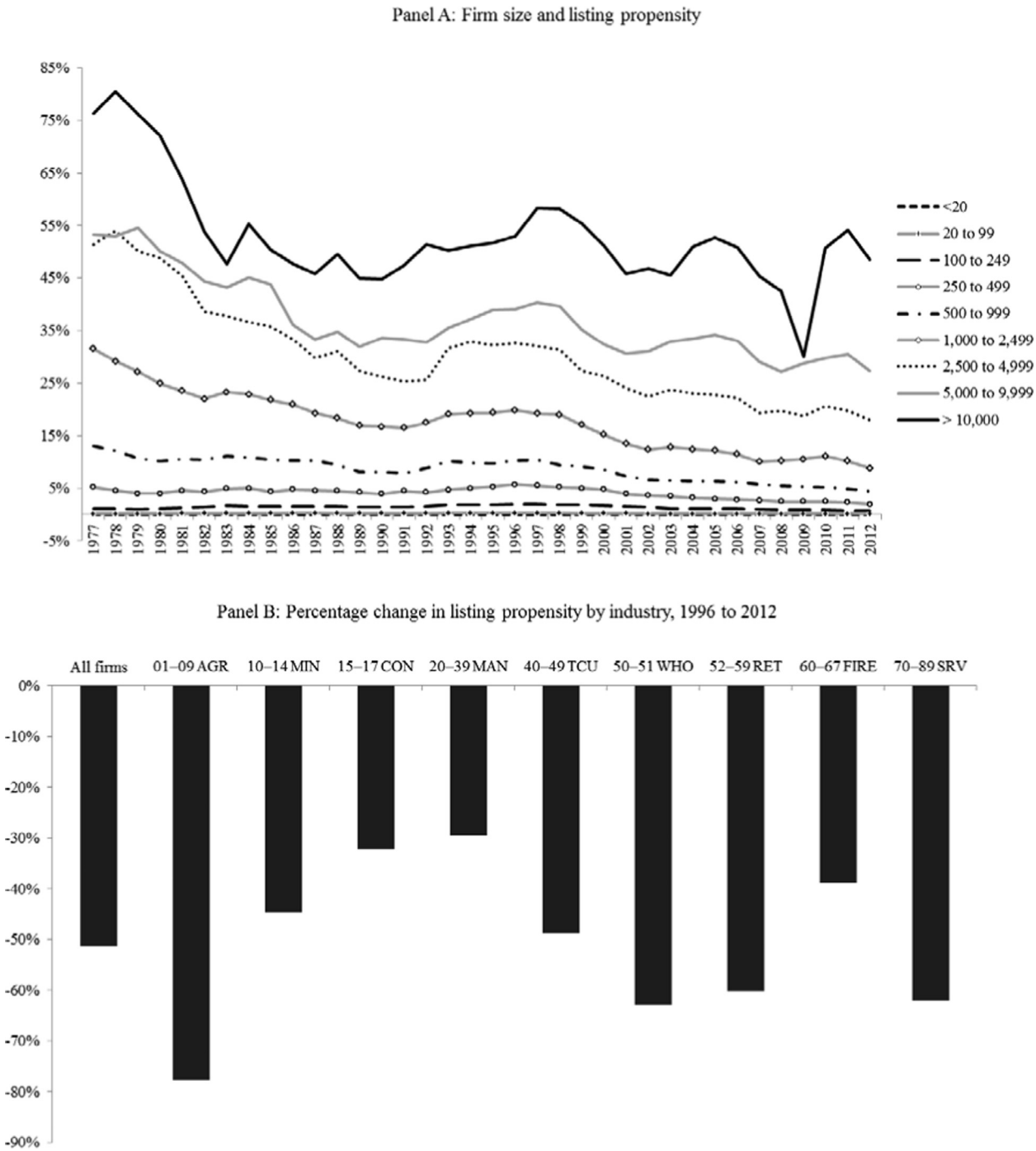

Fig. 5. Firm size, industry, and listing propensity. Panel A shows percentage of firms that are listed in each employee size group (listed firms/total firms, where total firms includes public and private firms) from 1977 to 2012. The total number of firms is from the Longitudinal Business Database provided by the U.S. Census Bureau. Listed firms are from CRSP/Compustat 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) that we can assign to an employee size group. Investment funds and trusts (SIC codes 6722, 6726, 6798, and 6799) are excluded. Panel B shows the percentage change in listing propensity by industry from 1996 to 2012, excluding tiny firms (firms with less than 20 employees). Industry groups are defined as: 01–09 Agriculture, Forestry, Fishing (denoted AGR); 10–14 Mining (MIN); 15–17 Construction (CON); 20–39 Manufacturing (MAN); 40–49 Transportation and Public Utilities (TCU); 50–51 Wholesale Trade (WHO); 52–59 Retail Trade (RET); 60–67 Finance, Insurance, Real Estate (FIRE); 70–89 Services (SRV).

decrease of 8.42%. The decrease is much sharper for firms in smaller size groups. For example, the propensity to be listed falls by 64.86% for firms with 100 to 249 employees and by 55.53% for firms with 1,000–2,499 employees. Except for the largest size group, there is no statistically significant difference across the eight remaining size groups in the drop in the propensity to be listed.

While the propensity to be listed falls for all size groups, it could be that it increases for some industries and not for others, so that we would have to pay attention to industry effects to understand the decrease in the propensity to list. Panel B of Fig. 5 shows the percentage change in the propensity to be listed across one-digit SIC codes (which is the only industry information that is publicly available from the LBD) from 1996 to 2012. To compute this propensity, we ignore tiny firms. The propensity to be listed falls for all industries. It decreases the least in the manufacturing industry and the most in agriculture. However, even in manufacturing the percentage decline is large as the propensity falls by 29.5% (35.5% if we include all firms).

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

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

The propensity to be listed can fall because the number of listed firms falls or because the total number of firms increases. We already know that the number of listed firms falls and the total number of firms increases. For the number of listed firms to fall, there has to be more delists than new lists. In this section, we examine the evolution of the pace of new lists and of delists for the U.S. and compare it to their evolution for other countries.

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

To analyze new lists and delists for the U.S., we use listed firms from the CRSP database. We count a new list as such in the year a record first enters the database and we count a delisting as occurring in the year in which a record drops out of the database.[4] 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. The listing counts in Table 4 do not require data on the number of employees from Compustat and are higher than those in Table 3.

Panel A of Table 4 shows the number of new lists and delists from 1975 to 2012. It is immediately clear that there is considerable time-series variation in these numbers. However, the patterns for more recent years are noticeably different. On average, there are 518 new lists and 408 delists per year during the pre-peak period compared to 283 and 520 during the post-peak period. Before 1996, there are no extended periods with more delists than new lists and net new lists are positive on average. During the post-peak period, the number of delists exceeds the number of new lists every year so that net new lists are always negative. To understand how exceptional this period is, it is useful to note that from 1926 to 1996, there are only 17 years where net new lists are negative, that 11 of these years occur after Nasdaq is added to CRSP, and that the longest period of consecutive negative net new lists is four years (from 1931 to 1934).

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

CRSP also provides delisting codes which allow us to categorize the reasons firms delist. First, firms can choose to delist because they no longer find it valuable to be listed ("voluntary"). In our model in Section 4, an increase in the cost of being listed could lead a firm to choose to delist because it is no longer advantageous for it to be a public firm. A number of critics argue that SOX represents an increase in the cost of being listed, especially for the smaller firms, and that it led to voluntary delists. See Leuz (2007) for a review of the evidence. Second, a firm can be delisted by the exchange because it no longer meets the continuing listing requirements ("for cause"). For instance, delisting for cause may arise if the firm has not been profitable for several years, if its market capitalization becomes too small, or if the stock price is too low. Third, a firm can be delisted because it is acquired by another firm ("merger"). The firm can be acquired by a listed firm or by a private firm. We follow Fama and French (2004) in categorizing CRSP delist codes 200–399 as mergers and codes 400 and above as delists for cause except for codes 570 and 573, which we categorize as voluntary delists.

Panel A of Table 4 shows that the most likely reason a firm delists during our sample period is because of a merger (9,749), the second most likely is for cause (7,120), and the third is that it chooses to voluntarily delist (434). There are more delists for cause than for merger in eight out of 38 years during our sample period and only two of

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

these years are after the listing peak in 1996. From 1975 to 1996, 45% of delists are for cause compared to 37% from 1997 to 2012. Though the proportion of delists for cause is lower in the post-peak period, there is evidence of a surge in delists for cause from 1997 to 2003 due perhaps to the preceding surge in new lists.

The delist rate (delists in year t divided by listing count in $t-1$) in percent is shown yearly in Panel A of Table 4 as well. For the pre-peak period, the average delist rate is more than two percentage points lower than 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 increases significantly from 3.95 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% versus 3.50%).

Throughout the sample period there are few voluntary delists. There are 163 voluntary delists from 1975 to 1996 and 271 from 1997 to 2012, accounting for 1.82% and 3.25% of delists during these periods. Both before and after 1996, voluntary delists are not important for understanding the evolution of the number of listings in the U.S. An important caveat is necessary, however. Suppose that manage-

Table 4
Listing counts, new lists, and delists.
In Panel A, data for listed firms, new lists, and delists are from CRSP. The sample period is from 1975 to 2012. 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. The new list (delist) rate equals the number of new lists (delists) in year t divided by the listing count in year $t-1$. Panel B reports data for 41 non-U.S. countries from Datastream from 1990 to 2012. The non-U.S. new list (delist) rate equals the sum all new lists (delists) across 41 countries divided by the total number of listings in those countries in the prior year.

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

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

continued on next page.

Table 4
Continued.

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

ment decides to take the firm private and to do so by creating a private shell company that acquires the public company. Such a transaction is counted as a merger and not as a voluntary delisting. Yet, this is equivalent to a transaction in which the public company acquires the shares of most investors and then delists and deregisters, i.e., it is a de facto voluntary delisting. We return to this potential concern at the end of Section 7.

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

We next examine whether the new list and delist rates in the U.S. after 1996 are unusual relative to the equivalent rates in the rest of the world. Since the WDI/WFE databases provide annual information on listing counts but not on new lists and delists, we use Thomson Reuters' Datastream and Worldscope databases to estimate the numbers of new lists and delists for other countries. The Appendix details the construction of the data set. The resulting sample has 41 countries.

Panel B of Table 4 shows the evolution of the new list and delist rates for non-U.S. countries for the pre-peak period of 1990–1996 and the post-peak period of 1997–2012. The pre-peak period is only seven years because non-U.S. data are much more reliable starting in 1990. To compute the non-U.S. new list (delist) rates we add all new lists (delists) across the 41 countries and divide by the respective total number of listings in the prior year.

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

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

We find that from 1990 to 2012, 7,858 non-U.S. public targets are acquired, but the bulk of these acquisitions (6,367) take place after 1997. In contrast, the U.S. has 6,452 acquisitions from 1990 to 2012 and 4,997 of these acquisitions take place after 1997. However, throughout the post-peak period, these non-U.S. countries have 4.98 times more listings than the U.S. on average. If we apply the U.S. acquisition rate to these non-U.S. countries, they have

21,400 acquisitions instead of 6,367 in the post-peak period. Consequently, the rate of delists by merger in the rest of the world is proportionally much lower than it is in the U.S. Indeed, if we apply the non-U.S. acquisition rate from 1997 to 2012 to the U.S., it has 3,729 fewer merger delists over that period.

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

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

To answer this question, we combine two of our data sets. We use the WDI/WFE data because it has listing counts for the U.S. and for the non-U.S. countries (Table 1 and Fig. 1) and we use the CRSP data to compute new list and delist rates for the U.S. (Table 4). Combining these data sets is a reasonable approximation because the net new list rates for the U.S. in the CRSP and WDI/WFE databases are similar. For the CRSP data, the average net new list rate implied by changes in listing counts for 1975 to 1996 is 2.0% compared to 2.4% for the WDI/WFE data. For 1997 to 2012, the averages are −4.29% and −4.06%, respectively.

We use the historical CRSP new list and delist rates to simulate predicted WDI/WFE listing counts for the U.S. from 1997 to 2012. Recall from Table 4 that the historical new list and delist rates computed as the averages from 1975 to 1996 are, respectively, 9.22% and 7.29%. We apply these rates each year from 1997 to 2012 to compute the number of new lists, delists, and listing counts that the U.S. has if the historical rates apply to this period. For example, the U.S. has 8,025 listings in 1996 (Table 1). Applying the historical rates to this base count yields 740 predicted new lists, 585 predicted delists, and overall 8,180 predicted listings for 1997 (compared to only 7,905 actual listings).

With this approach, the U.S. has 10,897 listed firms in 2012, a count which is 6,795 more than it actually has. The reason the number of listed firms is higher is that the historical net new list rate in the U.S. is positive and we apply that rate to 1997 to 2012, a period in which the actual net new list rate is negative. To isolate the impact of the decrease in the new list rate, we apply the historical new list rate to 1997 to 2012, but we use the actual delist rates in the post-peak period. In this case, the U.S. has 7,659 listings in 2012. Similarly, we can isolate the impact of the increase in the delist rate. We apply the historical delist rate to the post-peak period but use the actual new list rates. In this case, the U.S. has 5,570 listings in 2012 instead. The impact of the increase in the delist rate is lower than that of the decrease in the new list rate, in part because the higher delist rate applies to fewer firms.

We use these predicted listing counts to investigate how missing new lists and excess delists affect the U.S. listing gap from 1997 to 2012. In Table 5, we estimate panel regressions of listings per capita on the anti-self-dealing index, the log of GDP per capita, GDP growth, a non-U.S. indicator variable, year fixed effects, and interactions of the

Table 5
Closing the listing gap.

This table presents panel regressions estimated over 1990 to 2012. The dependent variable is the log of 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, La Porta, Lopez-de-Silanes, and Shleifer (2008). Model 1 reproduces the estimates of Model (7), 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 1997–2012. 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. FE denotes fixed effects.

	(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

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 each year. Model 1 of Table 5 reproduces the estimates from Model 7 of Table 2, which were featured in Fig. 3 as missing listing counts. This regression shows that the U.S. has a listing gap every year starting in 1999 through 2012. The coefficient on the year fixed effect for 2012 is −0.840, which represents the equivalent of 5,436 fewer actual listings (4,102) than predicted by the panel regression model (9,538).

Model 2 of Table 5 shows that if we replace actual listing counts with predicted listing counts using historical new list and delist rates, the listing gap no longer exists. From 1997 to 2000, the year fixed effects coefficients are positive but never significant. After 2000, they are positive and significant in most years through 2012 so that an excess of listed firms would actually have arisen. The coefficient in 2012 is 0.137, which represents the equivalent of a surplus of 1,360 listed firms relative to predicted. In Model 3, we apply the historical new list rate but use actual delist rates to predict the counts from 1997 to 2012. In 1999, the year fixed effect is still negative but is not significant. The coefficients for 2000 and for years thereafter are still negative and significant so that the U.S. still has a listing gap from 2000 to 2012. In 2012, the coefficient is −0.216 (equivalent to a deficit of only 1,879 listed firms) which is much smaller than the coefficient of −0.840 (and implied deficit count of 5,436) in Model 1. Finally, Model 4 uses predicted listing counts based on actual new list rates and the historical delist rate. In this case, there is no listing gap until 2002. Like Model 3, the listing gap narrows but remains through 2012. The coefficient for 2012 is −0.534 (the equivalent of a deficit of 3,967 listed firms).

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

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

To now, our paper shows that the U.S. has a listing gap, that the listing gap is explained by a decrease in the propensity to be listed, and that the propensity to be listed falls because of too few new lists and too many delists compared to the historical U.S. rates before the listing peak. If these historical rates persist, the U.S. does not have a listing gap relative to other countries. Importantly, even if there are not too few new lists, the U.S. still has a listing gap because of the excess delists. There is much research on the missing new lists (e.g., Gao, Ritter, and Zhu, 2013; Doidge, Karolyi, and Stulz, 2013), but not on the excess delists. In this section, we examine whether excess delists are explained by market conditions or by the characteristics of listed firms at the time of the listing peak. If the excess delists are the result of poor economic conditions or too many weak new lists, we can conclude that the part of the listing gap due to excess delists is not due to changes in the costs or benefits of being listed.

7.1. Market conditions, new lists, and delists

One explanation for the negative net new list rate since the listing peak in 1996 is that market conditions are less favorable to new lists and more conducive to delists, implying that a common force may be at work for both phenomena. To assess whether market conditions can explain the listing gap, we estimate the size of the listing gap using actual market conditions after the listing peak and assume that the relation between new lists and delists and market conditions is the same after the peak as it was before the peak. To model the relation between market conditions, new lists, and delists, we estimate a vector-autoregression (VAR) model for new list and delist rates for the sample period 1975–1996. It captures the joint dynamics of the new list and delist rates and their interactions and allows for exogenous forces from the capital market environment to play a role. We use the estimates from this model to simulate the path of the number of listings to 2012 to assess whether market conditions explain the listing gap. For this analysis, we follow Lowry (2003) and construct a quarterly times series of new lists, delists, and listing counts from the CRSP data set as well as capital market time-series variables that influence these listing patterns.

Table 6 shows the VAR model estimates over the period from 1975 to 1996. These models account for the joint dependence of new lists on past delists and of delists on past new lists. As discussed earlier, we would expect the delist rate to be higher if there are more new lists (Fama and French, 2004). Model 1 shows estimates from a VAR with only new lists and delists and hence serves as a benchmark later for an evaluation of the role of market conditions. Using a Bayes-Schwarz criterion, we estimate a number of lag structures to the system and determine that four quarterly lags are enough to capture linear dependencies for the new list and delist rate series. The first two lags of the new list rate are significant and positive in the new list regression. The third lag is negative and significant at the 5% level and the fourth lag is not significant. In the delist regression, the most notable coefficient is for the fourth lag of the new list rate, which is positive and statistically significant. In other words, there is some evidence that a high new list rate leads to a higher delist rate some quarters later. Turning to the lags for the delist rate in the new list regression, the third lag is positive with a t-statistic of 1.60 and, in the delist regression, the first lag is positive and significant. The two series are 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.

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

VAR models are estimated for the new list and delist rates by quarter in the U.S. New list (delist) rates are computed as the number of new lists (delists) in quarter t divided by the number of listed firms in $t-1$. The sample period is 1975–1996. 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 $R \times 1$ 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. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively. N is the number of quarters from 1975 through 1996. F-statistics are for zero-exclusion tests of whether the four quarterly lags jointly equal zero with associated p-value in parentheses.

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

We then turn to VAR estimates where we add market condition variables as exogenous variables and following Lowry (2003), an indicator variable for the first quarter of each year. Given the limited length of the sample period, we estimate a model where we add the IPO first-day return, the value-weighted market return, and average Tobin's q, all lagged by one quarter.[5] The estimates are in Model 2. Adding these variables increases the adjusted R^2s, but they were already quite high. There is only one difference in the sign or significance between the two sets of regressions for the lagged coefficients on the new list and delist rates themselves. In the new list rate regression, the third lag of the delist rate is now significant at the 10% level. The coefficient on the Quarter 1 dummy is negative and significant for the new list rate, and 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. We explore several other specifications with the macroeconomic and capital market variables used by Lowry (2003). These include different proxies for capital demand, future growth opportunities, as well as market sentiment and with different numbers of lags. We also explore 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 used, the findings remain similar to those reported.

We next simulate the evolution of the number of listings based on Model 2. In these simulations, we use the estimated coefficients from the 1975 to 1996 subperiod 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 even more, and definitely not fewer, listings. As a result, it is not the case that the number of listings is low because of poor capital market conditions.

7.2. The survival of new lists

Fama and French (2004) show that over the 1980s and the 1990s, new lists increasingly have lower profits and no

[5] IPO first-day returns are from Jay Ritter's website (http://bear.warrington.ufl.edu/ritter/ipodata.htm). The data set 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 are 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 (2003), 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).

history of positive profits. They also find the survival rate of new lists falls sharply. Their sample covers new lists from 1973 to 2001, a period that has little overlap with the period of negative net new list rates that starts after the listing peak in 1996. Nevertheless, weaker new lists could explain the abnormally high delists. Therefore, we investigate the survival of new lists before and after the listing peak through 2007. We stop in 2007 as it is the last year in our sample when a new list could potentially survive at least five years.

The first important fact we uncover is that during the pre-peak period (1975 to 1996), 63% of new lists survived at least five years compared to 60% for IPO cohorts from 1997 to 2007 (not tabulated but available from the authors). Hence, the survival rate falls only slightly after the peak. However, for the IPO cohorts from 2001 to 2007, the survival rate is actually higher at 65%. This implies that the lower post-peak survival rate is explained by a low survival rate in the years immediately after the 1996 peak. For the new list cohorts from 1997 to 2000, the survival rate is only 51%.

To compare the delisting behavior of newly listed firms to that of seasoned firms more formally, we proceed as follows. We first classify firms as "young" or "seasoned" listed firms, where young listed firms are those in a given year 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. Our pre-peak period starts with the IPO cohort of 1977. Nasdaq stocks were added to the CRSP database in 1972 and were all assigned a listing date of 1972. Therefore, 1977 is the first year that we can accurately assign firms into young listed and seasoned listed categories. During the pre-peak period, the delist rate averages 7.4% for young firms and 7.9% for seasoned firms. A paired *t*-test cannot reject the hypothesis that the two rates are the same. After the peak, both rates are notably higher. The rate for young firms is 9.1% and that for seasoned firms is 9.7%, and again, the two rates are not significantly different.

When we examine reasons for delisting among young and seasoned firms, we find a sharp change between the pre-peak period and the post-peak period. From 1977 to 1996, 40.4% of delists of young firms are merger-related and 57.9% are for cause. After 1996, merger delists become more important for young firms. For more detailed evidence on the increase in the rate of acquisitions involving young firms in the 1990s, see Arikan and Stulz (2016). The percentage of young firms that delist because of a merger is 55.2% over that period, while only 41.3% of delists are for cause. By contrast, the percentage of delists due to mergers for seasoned firms does not change much from the pre-peak to the post-peak period (62.4% vs. 62.0%). For young (seasoned) firms, the percentage of voluntary delists increases from 1.7% (1.7%) to 3.7% (4.1%) from the pre-peak to the post-peak period. While voluntary delists are more important in the post-peak period, they remain a small fraction of all delists for both young and seasoned firms.

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

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

After the listing peak, there are fewer small firms and fewer young firms. To assess whether changes in the characteristics of listed firms can explain the change in the delisting pattern, we estimate multinomial logistic ("logit") regressions at the firm level from 1975 to 2012. The sample includes over 175,000 firm-year observations. Firms that do not delist in a given year constitute the base category and we consider three delisting outcomes—namely, merger, for cause, and voluntary—each of which is treated as an independent outcome in the multinomial logit setting. We include the following lagged firm characteristics: size (Log(Assets), inflation adjusted), earnings over assets (Profitability), the percentage change in assets over the last year (Asset growth), and a dummy that indicates whether a firm became listed within the last five years (Young firm). We also include an indicator variable for the years after the listing peak in 1996 (Post-peak dummy) and interactions of it with the lagged firm characteristics. Finally, we include industry fixed effects. If the firm characteristics we consider explain the pattern of delisting over our sample period, the post-peak dummy should not be significant. Given the data requirements, we omit firms in the first two years after the IPO. Standard errors are clustered at the firm-level.

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

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

Table 7
Multinomial logits for delisting types.
This table presents multinomial logit regressions estimated over the period from 1975 to 2012. The dependent variable equals zero if a firm did not delist. It equals one for delistings because of merger, two for cause, and three for voluntary. Data for listed firms and delists are from CRSP. The counts include U.S. common stocks (share codes 10 and 11) and firms listed on Amex, Nasdaq, or NYSE (exchange codes 1, 2, and 3). Investment funds and trusts (SIC codes 6722, 6726, 6798, and 6799) are excluded. We count a delisting as such in the year in which a record drops out. We use CRSP delist codes to categorize delists as mergers (codes 200–399) and for cause (codes 400 and above except 570 and 573). The Post-peak dummy equals one from 1997 to 2012. The Young firm dummy equals one for firms that became listed within the last five years. Firm characteristics are lagged by one year. *t*-statistics are based on standard errors clustered at the firm-level. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

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

listed firms explain the higher likelihood of delisting after the peak.

7.4. Merger as alternative to delist for cause

An increase in delists classified as for cause by CRSP cannot explain the higher delist rate after the peak. We infer it must arise from an unusually high merger delist rate. An obvious concern is that firms can merge to avoid being delisted for cause. In this section, we estimate how many mergers could be delists for cause in disguise.

Exchanges have formal initial and continuing listing requirements. However, a firm can meet the listing requirements in several different ways. Further, as Macey, O'Hara, and Pompilio (2008) show, firms that fail to meet listing requirements are not necessarily delisted for cause by the exchange. However, we know from listing criteria that exchanges pay attention to profitability, market capitalization, assets, level of the stock price, recent stock returns, and the number of shareholders. Using a logit model in which a delist for cause takes a value of zero and a delist for merger a value of one, we predict whether a firm that delists does so for cause or because of a merger using the firm-level characteristics the exchanges are known to consider in making their decision to delist for cause. We then examine whether the number of false positive associations of merger delists increases after the peak. In other words, we ask whether the number of firms that delist because of a merger, but were predicted to delist for cause based on their firm-level characteristics, increases after the peak.

Table 8
Predicting merger delists.
We present 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, 6798, 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.

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

In Table 8 we show estimates of four different logit specifications. The sample includes 14,863 delisting observations (out of 17,303) from 1975 to 2012 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 log of assets to measure size, but results are similar if we use a firm's market capitalization. These models differ in their use of industry and year fixed effects. We show that, conditional on delisting, the probability of a delisting by merger increases when prior returns, the stock price, profitability, and assets are higher. This is true for all the models we estimate and the coefficients are similar across the models. The coefficients on profitability are larger with industry fixed effects, but the other coefficients seem little affected.

We next use Model 3 to predict which delists are classified as mergers. This model includes year fixed effects to allow for the fact that delisting criteria changed over time but it does not include industry fixed effects because industry affiliation is not a criterion for delisting used by the exchanges. Predicted values from logit models are between zero and one and we need to choose a probability cutoff to assign predicted delists as either a merger or for cause. We use the optimal probability cutoff of 49.1%.[6] We compare the actual delisting classifications to the predicted classifications and particularly 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 delists. There were three waves of unusually high rates of false classification during 1977–1979, 1990–1992, and 2001–2004, but rarely do the error rates exceed 5% in any given year.

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

7.5. Do firms merge to go private?

In a famous article, Jensen (1989) writes that "the publicly held corporation has outlived its usefulness in many sectors of the economy." He goes on to predict the "eclipse" of the public corporation.[7] His view is 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 reduce this conflict and are more efficient for firms in which agency problems are severe. With this view, it could be that an increasing fraction of mergers are actually transactions where a firm chooses to go private. In other words, we understate the importance of the going-private phenomenon and overstate the importance of mergers. In this section, we show that the evolution of listings cannot be explained by the success of acquisitions involving private equity firms. We use SDC data to identify the ownership status of acquirers of U.S. public target firms. The analysis starts in 1981 as earlier data are sparse. Gao, Ritter, and Zhu (2013) conduct a related analysis on recent IPO firms and show the fraction of recent IPO firms acquired by private firms does not increase. Our analysis considers all firms and compares the experience of the U.S. to that of non-U.S. countries.

Panel A of Fig. 6 shows that the percentage of public U.S. firms acquired by other public firms (as opposed to those by private firms) varies greatly over time. From 1981 to 1996, 68.6% of listed firms are acquired by public firms. This percentage falls only slightly after 1996 to 66.0% and the difference is not statistically significant. If we exclude the credit crisis and subsequent years, the average after 1996 is 70.0%. It does not appear that acquisitions by private firms occur at an unusually higher rate after the peak. Turning to acquisitions by private non-operating companies, these companies acquire an average of 12.2% of public firms each year from 1981 to 1996 and 12.9% afterwards. Fig. 6 shows that the percentage of public firms acquired by private non-operating firms increases after 2002, but never reaches the peak levels from the 1980s. Finally, leveraged buy-outs (LBOs) account for 8.06% of the acquisitions from 1981 to 1996 and 6.84% afterwards. It follows from this that there is little evidence that acquisitions corresponding to going-private transactions and acquisitions by private equity firms become more important after 1996.

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

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

Our simple theory provides an explanation for the increase in size of listed firms. An increase in the cost of listing or a decrease in the benefit of listing that affects firms regardless of their size results in an increase in the average size of listed firms. If either or both affect smaller firms more, the increase in the average size of listed firms is that much greater. Of course, the size of listed firms can increase without a change in the cost or benefit of listing if for some reason it is optimal for firms in general to be-

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

[7] The quoted sentence is from the abstract of the Social Science Research Network (SSRN) version of the paper. The published version in the *Harvard Business Review* does not have an abstract.

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

come larger. With this explanation, however, we expect the size of unlisted firms to increase as well.

We explore first whether there are fewer small firms as a percentage of listed firms. To do this, we return to our investigation using the LBD Census data for all firms and CRSP/Compustat for listed firms. In Panel A of Fig. 7, we show the number of listed firms with 100–499 employees (what we call the "Small size category") as a percentage of the number of all listed firms. We also form an equivalent Small size category for all firms (including both public and private firms). To compute the percentages, we do not include firms with less than 100 employees because the number of these firms dwarfs that of all other firm size groups when we consider all firms. The figure shows that

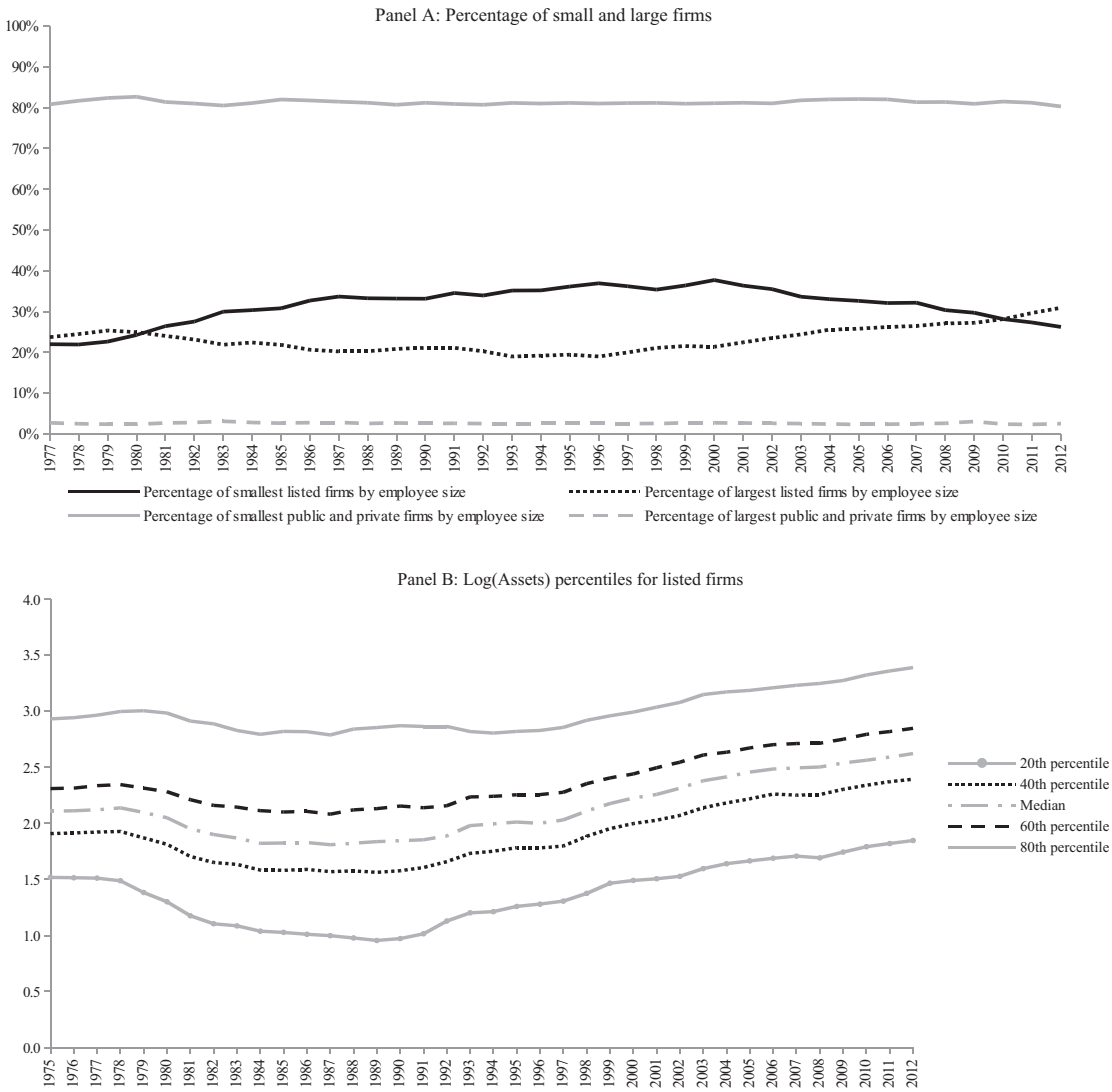

Fig. 7. The size of U.S. firms. Panel A shows the percentage of small (100–499 employees) and large firms (5,000 or more employees) for listed firms and for the total number of firms (public and private) from 1977 to 2012. The total number of firms is from the Longitudinal Business Database provided by the U.S. Census Bureau. Listed firms are from CRSP/Compustat 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) that we can assign to an employee size group. Investment funds and trusts (SIC codes 6722, 6726, 6798, and 6799) are excluded. For listed firms, Panel B shows the evolution of the log assets (in 1990 dollars) for the 20th, 40th, 50th, 60th, and 80th percentiles from 1975 to 2012.

the percentage of firms in the Small size category among all firms is roughly constant over time. By contrast, the percentage of firms in the Small size category for listed firms has an inverted U-shape; it increases steadily from 1977 to 2000 and then falls so that by 2012, that percentage is the same as it was at the beginning of the 1980s. The percentage of small firms among listed firms falls from 38% in 2000 to 27% in 2012. The figure also shows that the percentage of large firms (>5,000 employees) among all firms (again excluding the firms with less than 100 employees) does not change from 1977 to 2012. In contrast, the percentage of large firms among listed firms follows a U-shape.

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

It follows that small listed firms in 2012 are much larger than firms classified as small listed firms in 1996. In 1996, the 20th percentile for total assets is $19.05 million (inflation-adjusted) and there are 1,392 listed firms with data in that quintile. By 2012, there are only 282 listed

firms (or 7.94% of 3,551 listed firms with data in Compustat) with less than $19.05 million in assets. Another way to see this is that the 20th percentile is $19.05 million in 1996 compared to $70.43 million in 2012.

9. Conclusion

There is a dramatic decrease in the number of publicly listed firms in the U.S. since the peak in listing counts in 1996. In this paper, we explore possible explanations for this decrease.

We introduce a simple model to outline the costs and benefits of being listed and how they increase with firm size. In this model, there is a fixed cost of being listed, but no fixed benefit of being listed. The benefit of being listed increases with firm size and faster than the cost, at least beyond some threshold. As a result, larger firms are listed, smaller firms are not. With this model, we predict that a proportional increase in the cost of being listed or a proportional decrease in the benefit of being listed causes a decrease in the number of listed firms and an increase in the size of listed firms. Of course, a possible explanation for a decrease in the number of listed firms is that there are fewer firms in the economy, perhaps because it is optimal for firms to be larger for technological or other reasons. However, with this alternative explanation, the size of listed *and* unlisted firms both increase. Moreover, similar changes arise in non-U.S. countries. In contrast, a decrease in the cost or benefit of being listed *due to changes specific to the U.S.* predicts that the number of listed firms evolves differently in the U.S. than in non-U.S. countries and does not predict the size of unlisted firms increases.

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

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

The increase in the cost of being listed or the decrease in the benefit of being listed that is required in our simple model to explain the evidence we document could result from increased regulatory hurdles to being public. However, since regulatory changes mostly occur more than four years after the listing peak, these changes can be at most a partial explanation. Alternatively, it could be that the decrease in the net benefit of being listed is mostly related to developments in financial markets that make it easier for firms to thrive without being listed. In this case, it could well be that the decrease in the net benefit of being listed is a positive development in that it is the consequence of easier and possibly more efficient access to capital. But, if this is the explanation for our results, the way financial economists think about the functioning and role of exchanges in these capital markets has to change to reflect the new reality that an exchange listing may not be as important as it once was.

Appendix

The WDI/WFE data set

The WDI data start in 1988 with information for 50 countries and for 111 countries by 2012. WFE data start 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 data set, we merge the WDI and WFE databases (the WDI/WFE data set). If the overlapping observations from the WDI and WFE data sets are close, we use the data set with the longest series. Where possible we also combine the data sets to create the longest series possible.

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 check the data to resolve the differences. Many large discrepancies are due to errors or inconsistencies in one of the databases and around years when stock exchanges merge or amalgamate listings (say, from regional exchanges into a single national exchange like Spain's Bolsas y Mercados Españoles in 2002). In addition, some large discrepancies are due to double or triple counting across exchanges in the WFE data and when the WFE counts include 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 information. If we cannot resolve the discrepancies or if there are large gaps in the data, we drop those observations. For the U.S., the WFE data do not include Nasdaq listings until 1991. We use CRSP to construct listing counts from 1975 through 1988 and use the WDI and WFE counts in subsequent years.

Determining new lists and delists outside the U.S.

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

There are a number of challenges with these 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 data to drop records that are not common stocks (or the main record for a firm's traded equity) and drop investment funds and trusts to make the data as comparable as possible to our other data sets, the final counts of new lists and delists we produce is likely to be less accurate. To mitigate this problem as much as possible, we focus on the 41 countries that are in Datastream and for which the listing counts correspond to those in the WDI/WFE data set. Specifically, 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 data set, 41 meet this criterion (24 developed and 17 emerging countries).

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 the reason for delisting. 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.

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