Listing Gaps, Merger Waves, and the Privatization of American Equity Finance*

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Abstract

We document that the U.S. economy has experienced over the last 25 years sharply declining numbers of listed firms, extraordinary volumes of mergers and of private equity investments, and abnormally high aggregate valuations for U.S. listed corporations. We synthesize and empirically analyze these trends and their interconnections and document the recent emergence of a new model of equity finance in the United States. We show that the listing gap identified by Doidge, Karolyi, and Stulz (2017) was caused by an unprecedented merger wave occurring between 1997-2001, which directly reduced the number of listed firms, and by the rise of the private equity industry, which curtailed new listings through IPOs. Our model of equity financing well explains changes in the number of listed U.S. firms before and after the 1997-2001 transition to a new equilibrium. We conclude that this new model of equity finance has yielded net financial and developmental benefits for the U.S. economy, although the merger waves have increased industrial concentration and the privatization of equity finance has almost certainly increased income inequality. We conclude by presenting preliminary evidence that this new model of equity financing is emerging in other developed countries.

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1 Introduction

A new model of equity finance has emerged in the United States over the past quarter-century, which differs significantly both with late-twentieth century norms and with the equity model observed in other advanced economies. This new model is characterized by four inter-related features: (1) a dramatic decline in the number of publicly listed corporations (Doidge, Karolyi, and Stulz, 2017, hereafter DKS); (2) a surge in U.S. merger and acquisition (M&A) activity that began in 1993, peaked in 1997-2001, but has remained at historic levels ever since (Mulherin, Netter, and Poulsen, 2017); (3) an "aggregate capitalization premium" assigned to U.S. listed stocks that emerged in the early 1990s but has continued ever since, and reached a peak in 2017; and (4) the "privatization of U.S. equity finance" reflected in the massive increase in private equity funding for U.S. entrepreneurial growth companies, particularly since 2005. Today more than five times as much external equity is provided to American businesses through private markets as through the public markets (Bauguess, Gullapalli, and Ivanov, 2018).

In this study we document and empirically assess these four phenomena, describing both their existence as unique features and their tight interconnection. We organize our study through the prism of documenting and explaining the DKS (2017) listing gap. The number of U.S. listed companies declined almost by half between 1996 and 2012, from 8,090 to 4,102 and has since risen only slightly to 4,336 at year-end 2017. However, the real market valuation of these listed companies has tripled over the same period, from $10.2 trillion to $32.1 trillion, implying that the average market valuation of a U.S. listed firm has increased six-fold over the past two decades. Recent studies (Kahle and Stulz, 2017; Gao, Ritter, and Zhu, 2013; Gornall and Strebulaev, 2017a; De Fontenay, 2016, among others) have also noted that the average size of U.S. listed companies has risen sharply, so the American public company is not being eclipsed, as predicted by Jensen (1989), but the U.S. public stock market has become populated almost exclusively by behemoths. Meanwhile, the total number of non-U.S. companies grew significantly from 26,401 in 1996 to 34,274 at year-end 2017, while the real aggregate market valuation of non-US listed companies rose from about $12 trillion in 1996 to $53.2 trillion at year-end 2017.[1]

We show—for the first time to our knowledge—that the U.S. listing gap is principally the result of the other underlying changes that have occurred in American equity finance over the past

[1]Valuations are in 2017 U.S. dollars. We show that most of the net growth in the number of non-U.S. listed firms after 2008 has occurred in Asian markets, especially Greater China–though listings in Canada, Australia and other countries are also still growing.

quarter-century. In particular, we find that the massive and sustained increase in mergers after 1993 explains virtually completely both the magnitude and the timing of the decline in the number of U.S. public corporations. We also show that this surge in mergers itself was and continues to be fueled by rising valuations for U.S. listed companies, relative to both prior-period valuations and corporate valuations in non-U.S. countries, and coincides with a sharp rise in private equity financing following passage of the National Securities Markets Improvement Act in 1996 (Ewens and Farre-Mensa, 2018).

Our change regression analyses show, again for the first time we know of, that the U.S. listing gap occurred exclusively during 1997-2001. Before and after this period the number of U.S. listings is consistent with the predictions of our econometric model. We also contribute to the listing gap literature by presenting preliminary evidence that the number of non-U.S. listed companies has declined almost everywhere outside of Asia since 2008, with an especially sharp 40% decline in European listed firms. This suggests that the new American model of equity finance may be evidencing itself in other developed economies, only a decade or more later than in the United States.

We start our econometric analyses by updating the DKS (2017) results through 2017 and by confirming the robustness of their findings to several additional specifications incorporating country fixed effects. Unsurprisingly, we show that there are more listed firms in rich countries with well-developed financial systems, since the (log) number of listed companies per capita is increasing in (log) GDP per capita and in bank deposits/GDP (Levine and Zervos, 1998; La Porta, Lopez-De-Silanes, Shleifer, and Vishny, 2002). Our most conservative specification produces an estimated listing gap equal to 3,514 missing firms in 2017, confirming that the decline in the number of U.S. publicly listed firms is indeed abnormal. To identify when this listing gap first opened, we run a set of first difference regression models similar to those in Hanselaar, Stulz, and Van Dijk (2018) and show that the DKS (2017) listing gap exclusively occurred between 1997 and 2001, primarily due to a historic surge in M&A activity.

This time specificity strongly suggests that the regulatory wave which took place in the early 2000s was not the primary cause of declining U.S. listings, since the opening of the listing gap predates the four regulatory reforms which are most frequently mentioned as main contributors of the reported decline in the number of U.S. public corporations. These are Regulation FD in 2000; market decimalization in 2001; Sarbanes-Oxley in 2002; and the Global Analyst Research Settlement in 2003. Given this temporal inconsistency, these regulatory shocks could have had at

most a minor impact on the listing gap's evolution. Other academic scholars (Doidge, Karolyi, and Stulz, 2013, 2017; Gao, Ritter, and Zhu, 2013; De Fontenay, 2016) reach a similar conclusion, though we are the first to show this econometrically.

Conversely, one regulatory change might have played a significant role in widening the U.S. listing gap. Consistent with Ewens and Farre-Mensa (2018), our analyses suggest that the National Securities Market Improvement Act of 1996 promoted the development of a nationwide private equity market that increased twenty-fold in size between 1996 and 2017. The value of external equity provided to US entrepreneurial companies by private investors has exceeded the total value of equity provided by public markets every year since the financial crisis of 2008-09, recently by massive amounts. Bauguess, Gullapalli, and Ivanov (2018) document that the total value of US private placements of debt and equity reached $3.0 trillion in 2017, and that two-thirds of the $1.8 trillion raised through Regulation D offerings was equity capital. Thomson Reuters (2017) reports that U.S. companies raised only $172 billion through public equity offerings (IPOs and SEOs) during 2017.

Many scholars have documented the recent growth of private equity (PE) in the United State–including Harris, Jenkinson, and Kaplan (2014); Sensoy, Wang, and Weisbach (2014); Gornall and Strebulaev (2017a); Ang, Chen, Goetzmann, and Phalippou (2018); and Harris, Jenkinson, Kaplan, and Stucke (2018)–and all find that PE fund investment performance (especially buyout fund performance) exceeds that of public market investments. Bernstein, Lerner, Sorensen, and Strömberg (2016) show that the global industries that attract the most PE investment grow more rapidly in terms of total production and employment and appear less exposed to aggregate shocks. We show that private equity financing as a percent of US GDP has averaged about 2.25% since 2000, and spiked during 1999-2001, 2006-08, and 2013-2017, reaching an almost incredible 6.5% in 2007. For comparison, non-US private equity capital investment averaged about 1.5% of GDP over 2000-2017, and at its 2007 peak was 4.0 percentage points of GDP lower for non-US countries. Though private equity capital constitutes an increasingly important source of external funding around the world, it is still far more developed in the United States than elsewhere.

Given these apparently disparate trends in PE financing between the United States and non-U.S. countries, we develop a simple predictive model in the spirit of DKS (2017) to test if this massive increase in external private equity financing is abnormal. Our findings confirm that the American PE market has been systematically and excessively active, with PE investment ranging between 2% and 4% of U.S. GDP the past two decades. We refer to this phenomenon as "the

privatization of American equity finance." The synchronicity of the rise of the PE market and the origination of the U.S. listing gap suggests that these two phenomena are likely connected. While other researchers (DKS, 2017; Kahle and Stulz, 2017) have also posited the rise of PE as a potential (partial) explanation for the U.S. listing gap, to our knowledge we are the first researchers to estimate this empirically. However, before moving towards testing this link, we explore another important feature that has been transforming the U.S. economy since the late 1990s: a big spike in merger and acquisition (M&A) activity.

The U.S. experienced an epic surge in mergers between 1995 and 2001, when the total value of completed M&A deals as a percent of US GDP averaged 10.1%, reaching an astounding 17% of GDP in 2000. Since this massive spike, the U.S. M&A market has remained extremely active, averaging 6% of GDP during a subsequent M&A mini-boom in 2007-08. As a means of comparison, for non-US countries the average level of mergers as a percent of GDP has only exceeded 5% four years (1998-2000 and 2007) since 1990, and during 2000 the level of M&A as a percent of GDP was a full 10 percentage points higher (17% vs 7%) in the United States than in the rest of the world. Two years before that, the number of M&A deals per one million population hit 40 in the United States, compared to an average of 15 in other countries. Consistent with these findings, Dessaint, Golubov, and Volpin (2017) show that the only major country with greater average M&A activity as a percent of GDP than the United States between 1985 and 2007 was the United Kingdom.

Next, we assess empirically whether these univariate trends describe an abnormally high M&A activity for the U.S. market after controlling for relevant macroeconomic and financial factors. In particular, we identify three periods in which the U.S. M&A market recorded a statistically significant excess activity, reporting spikes in 2000 (7.84% of the U.S. GDP), 2007 (4.74%) and 2016 (3.70%). Again, the synchronicity of the peak M&A wave in the U.S. and the origins of the U.S. listing gap points to a likely relation between these phenomena. However, before testing the interdependence of the evolution of the U.S. PE industry, M&A activity and number of listed firms, we analyze a fourth important feature of the recent evolution of the U.S. public equity market: the emergence of an "Excess Total Capitalization Premium" for U.S. listed companies.

While the number of U.S. listed firms has dramatically declined over the last 20 years, aggregate U.S. market capitalization has recorded impressive growth since 1990, reaching levels above 140% of GDP in recent years. The strongest growth in U.S. market capitalization occurred in the late 1990s, simultaneously with the previously discussed merger wave which hit the U.S. between 1998 and 2000, and simultaneously with the decline in the number of listed corporations. Non-U.S. countries

have also experienced rising stock market capitalizations, with aggregate non-U.S. valuation rising from about $12 trillion in 1996 to $53.2 trillion at year-end 2017. This impressive growth captures the transformation of Eastern European countries and, especially, China into modern market economies, with China's market capitalization growing from less than $600 billion in 1996 to over $8.7 trillion in 2017.

We attempt to assess whether the impressive growth of the U.S. market capitalization represents a unique feature of the American economy. In particular, we show that US market capitalization as a percent of GDP is significantly higher than would be predicted by an adjusted version of the DKS (2017) model. In particular the U.S. has displayed significantly higher market capitalization to GDP ratios than other countries every year since 1997, except for 2008-2009. This premium increased steadily during the dot-com era (1995-2001), then declined from 2002 to 2009, after which it increased again–reaching an all-time peak at year-end 2016 of about 55% of U.S. GDP. In summary, global investors have assigned a capitalization premium to listed US companies relative to non-U.S. firms.

The emergence of these four abnormal features characterizing the U.S. financial economy is as puzzling as it is interesting. We thus examine whether the interconnection of excess mergers, excess PE financing, and the U.S capitalization premium can explain the DKS (2017) listing gap, in whole or in part. A conservative model including controls for country-level observations of PE and M&A activity and total market capitalization allows us to explain 60.3% of the original listing gap, which shrinks from the baseline estimation of 3,514 missing U.S. listings to the modified estimation of 1,395 missing U.S. listings as at the year-end 2017. In particular, our tests confirm the findings of Ewens and Farre-Mensa (2018) suggesting that the PE market acts as an effective substitute for the public equity market, thus helping make the public corporation the shining pinnacle of the modern U.S. financial economy, rather than its core building block.

Next, we evaluate the temporal interdependence of the U.S. listing gap, excess merger waves, excess PE investment, and the capitalization premium. By employing a vector autoregressive (VAR) model, we study the U.S. specific evolution of each of these four dimensions and we identify that the level of total market capitalization Granger causes both M&A and PE activity (Rhodes-Kropf, Robinson, and Viswanathan, 2005; Harford, 2005; Harford, Schonlau, and Stanfield, 2018), which, in turn, determines the evolution of the number of listings. Finally, we show that these three dimensions feed back into the evolution of the level of aggregated market capitalization, as expected.

Have the dramatic changes to American equity finance documented here been, on balance, harmful or beneficial to the U.S. economy and financial system? We will argue that, from a financial perspective, these have been largely net beneficial. Record amounts of equity capital have been funneled to American industry during the past quarter-century, especially since 2010, and Kahle and Stulz (2017) document that U.S corporate research and development spending as a percent of corporate assets has roughly doubled (to 8%) since 1990, although this is also accompanied by a nearly identical decline in capital investment as a percent of corporate assets over the same period. The U.S. capital spending has created massive amounts of intangible capital, which Hall (2001) and Peters and Taylor (2017) show is both durable and highly valuable. Recent studies also suggest that shifting to intermediated provision of external equity funding for U.S. companies is probably value-enhancing, both for the investee companies (Lerner, Sorensen, and Strömberg, 2011; Puri and Zarutskie, 2012; Bernstein, Lerner, Sorensen, and Strömberg, 2016) and for private equity investors (Harris, Jenkinson, and Kaplan, 2014; Sensoy, Wang, and Weisbach, 2014; Ang, Chen, Goetzmann, and Phalippou, 2018).

The net welfare impact of permanently higher M&A activity is much less clear-cut. On the one hand, recent literature shows that mergers create value for both bidders and targets (Masulis, Wang, and Xie, 2007; Custodio, 2014; Lee, Mauer, and Xu, 2018; Wang, 2018), and that national legislation promoting mergers subsequently promotes an active venture capital market by creating an exit opportunity for investors (Phillips and Zhdanov, 2017). On the other hand, many studies show that concentration is rising in key American industries, principally due to mergers, and that this is harmful to consumers (De Loecker and Eeckhout, 2017; Hall, 2018; Grullon, Larkin, and Michaely, forthcoming; Blonigen and Pierce, 2016; Butler, Grullon, and Lattanzio, 2019). From a social perspective, the overall implications of the observed transition towards a new equilibrium on the U.S. employment rate seems to be relatively small. Conversely, the increased skewness in the nation-wide distribution of equity holders across consumers (Gans, Leigh, Schmalz, and Triggs, 2018), the emergence of local oligopolies in several industries (Grullon, Larkin, and Michaely, forthcoming), and the rise of private equity investments (Lerner, Sorensen, and Strömberg, 2011) have had a negative distributional effect, contributing to the recent non-negligible increase in the level of inequality in the U.S. economy.

This paper is organized as follows. Section 2 reports a brief description of our dataset. We revisit the US listing gap in Section 3 and pin down the exact period when it occurs. Here we also discuss the role played by the early 2000s regulatory wave in causing the recorded decline in

the number of U.S. public corporations. Section 4 documents the rise of private equity financing recently and describes the global preeminence of the U.S. PE industry. Section 5 documents the surge in US mergers and acquisitions that began after 1996 and analyzes whether it represents an abnormal feature of the U.S. economy. Section 6 analyzes the U.S. "capitalization premium." Section 7 reconciles these three recent innovations of the U.S. economy with the existence of the U.S. listing gap. Section 8 assesses whether these fundamental changes in the American model of equity finance have been, on balance, beneficial or harmful to the U.S. economy, while Section 9 shows that the new model of equity finance appears to be taking hold in at least some other developed economies. Section 10 concludes.

2 Data and variables definitions

A comprehensive list of the countries included in our sample is provided in Appendix A. For each country, we gather data from multiple sources, as described in Appendix B. We collect the number of listed firms in each country from the World Bank's World Development Indicators (WDI) database. This tallies listed firms at the end of each calendar year, after excluding investment companies, mutual funds, real estate investment trusts (REITs), and other collective investment vehicles. The WDI dataset starts in 1988, and its coverage increases over time. We hand check the observed trends using multiple alternative sources, particularly the World Federation of Exchanges (WFE) and Bloomberg. In case of sudden spikes or drops in a country's time-series, we interpolate the lag observation and the lead observation to mitigate eventual reporting errors.[2] Many of these errors are correlated with the process of consolidation that has transformed the stock exchange industry over the past two decades. While we attempt to carefully deal with this important issue, we acknowledge that this might induce measurement error in our dependent variable. Finally, we note that the WDI database reports incomplete time-series for the number of listed firms for several countries. In a few instances, the time-series is interrupted (i.e., the U.K. time-series ends in 2014); in other instances, the time-series has gaps. To address the unbalanced nature of the resulting panel, we report in the online appendix several robustness tests based upon different sub-samples. The consistency of results for all sub-samples mitigates concerns regarding the non-random nature of the distribution of missing observations, providing support for estimates based upon the full

[2]For example, the WDI dataset reports a large drop in France's number of domestic publicly listed firms in 1994, which is immediately re-absorbed in 1995. After hand-checking data from other alternative sources (Bloomberg and WFE), we adjust this observation by computing the average between 1993 and 1995.

sample.

M&A data comes from the Thomson Reuters SDC M&A database (SDC hereafter). Since our objective is to assess a country's overall M&A activity, we do not impose any filters on deal size, nor on whether the transaction causes a transfer of control. That is, we include the acquisition of partial financial interests in our sample. We also include cross-country transactions. To avoid double-counting issues, we attribute these transactions to the country of incorporation of the acquired firm.

Private equity data comes from the Pitchbook dataset. For each country, we accumulate the value of all completed equity financing rounds which takes place in a given calendar year, and we scale this total by the country's gross domestic product. As with our M&A sample, we do not impose any filters on deal size or characteristics. We include cross-country transactions, which are attributed to the country of incorporation of the firms receiving equity financing.

We complete our sample by collecting other macroeconomic and financial indicators which are commonly used in the literature. In particular, we gather GDP per capita level and growth, R&D investments to GDP, Capital Formation to GDP, and the employment ratio from the World Development Indicators dataset (World Bank). We collect bank deposits to GDP, total market capitalization to GDP and stock market returns from the Global Financial Development dataset (World Bank), and we complete our sample with the Anti-Self Dealing Index developed in Djankov, La Porta, Lopez-de Silanes, and Shleifer (2008) and publicly available from Rafael LaPorta's personal website. Data on the Gini Coefficient are gathered from the University of Texas Inequality Project UTIP-EHII dataset. Finally, we gather information about the aggregated country-year level book value of equity from Compustat Global and from the Compustat dataset. All covariates are winsorized at the 1% level. Table 1 reports summary statistics for the identified variables and briefly describes their time trend and cross-sectional properties.

[Table 1 about here]

3 The U.S. listing gap

We start our analysis by extending the DKS (2017) analysis of the evolution of U.S. listings to the end of 2017. Figure 1 (left axis) reports the number of listed firms in the U.S. since 1990. We confirm the inverted U-shaped time-series pattern identified in DKS (2017) but extend it by showing a marginal increase in the number of publicly listed U.S. corporation over the next five

years. The number of US listed companies declined by about 50% between 1996 and 2012, from 8,090 to 4,102, but has slightly increased since then to 4,343 at the end of 2017.

[Figure 1 about here]

We next examine the number of listed companies in non-U.S. countries, which has a different dynamic than the U.S. time series. The number of non-U.S. listed corporation increased from 23,330 in 1990 to its peak of 38,732 in 2011, after which it slightly declines to 38,583 by year-end 2017. While the impressive increase between 1990 and 2011 is partially explained by the increasing coverage of developing countries by the WDI dataset, it is important to note that the sample is virtually constant over the period from 1994 to 2017, with the newly added countries representing a small fraction of the total number of firms. We will discuss the trends in the number of non-U.S. listings—and assess whether other aspects of the new equity finance model are evidencing themselves in other countries–in more detail in Section 9. To foreshadow, we find that this new model of equity financing seems to be emerging in other developed countries, evidenced most dramatically by a 40% decline in the number of listed European companies since 2008.

Table 2 , Panel A presents listing gap results for several model specifications. First, following DKS, we estimate the following pooled regression model:

$$\begin{aligned}\log(\text{Listings per capita}_{ct}) = \beta_1 \log(\text{GDP per capita}_{ct}) + \beta_2 \text{GDP growth}_{c\ t-1,t} + \beta_3 \frac{\text{Bank deposits}_{ct-1}}{\text{GDP}_{ct-1}} \\ + \beta_4 \text{Anti-self-dealing}_c + \alpha_t + \alpha_{Non-U.S.} + \alpha_t \times \alpha_{Non-U.S.} + \epsilon_{ct}. \qquad (1)\end{aligned}$$

We include in our model year fixed effects (α_t), a non-U.S. dummy variable ($\alpha_{Non-U.S.}$), and an interaction terms for the year fixed effects and the non-U.S. dummy ($\alpha_t \times \alpha_{Non-U.S.}$). We call this specification a pooled regression due to the lack of country fixed effects. Importantly, in this specification, the year fixed effects capture the U.S. residuals, so we can estimate the U.S. listing gap using the estimated year fixed effects.

This model is estimated in Columns 1 and 2 of Table 2, Panel A. Column 1 shows that the number of publicly listed corporations is positively related to the log of GDP per capita. It is also positively related to GDP growth and the anti-self-dealing index, although the loadings on these variables are marginally insignificant in our sample. Overall, this model suggests that countries with more developed economies have a higher number of listings per capita. The adjusted R-squared for this parsimonious model is 40.6%. In column 2, we also control for lagged values of the ratio

of aggregate value of bank deposits to GDP as a proxy for the development of the banking sector, which is a major source of debt financing. This model shows that a well-developed banking system is strongly positively related to the number of listings in a country. Accounting for this additional macroeconomic dimension decreases the estimated sensitivity of the number of listings to GDP, compared to column 1.

[Table 2 about here]

Figure 2, Panel A shows the estimated number of missing U.S. listings, computed using the year fixed effects from column 2 estimation. This model suggests that the U.S. listing gap first appeared in 1998 and that it has widened almost every year ever since, ultimately reaching 10,685 missing firms at the end of 2017. The estimated year fixed effects–by which we estimate the number of missing U.S. listings–are not shown here to save space but are presented in Appendix C.2.

[Figure 2 about here]

We assess the robustness of our findings by estimating an alternative specification that is designed to better absorb cross-country differences that are either unobserved, unobservable or otherwise unknown as a determinant of the number of listings. For this purpose, we estimate the following model:

$$\log(\text{Listings per capita}_{ct}) = \beta_1 \log(\text{GDP per capita}_{ct}) + \beta_2 \text{GDP growth}_{c\ t-1,t} + \beta_3 \frac{\text{Bank deposits}_{ct-1}}{\text{GDP}_{ct-1}} + \alpha_t + \alpha_c + \alpha_t \times \alpha_c + \epsilon_{ct}, \quad (2)$$

This specification–shown in columns 3 and 4 of Table 2, Panel A–regress log of listings per capita on the natural logarithm of GDP per capita, GDP growth, lag values of the bank deposits to GDP ratio (only in column 4), country (α_c) and year (α_t) fixed effects, and interactions of the U.S. dummy with the year fixed effects ($\alpha_t \times \alpha_c$).[3] The year fixed effects capture common global trends and the country fixed effects absorb cross-country differences. The interaction terms capture the U.S. residuals, which are used to estimate the number of missing American listed firms. Note that the coefficient estimates of the fixed effect models are interpreted as the within-country impact of the explanatory variables on the number of listings. This interpretation complements that of the previous specification, for which a main part of identification comes from cross country differences.

[3]The Anti-self-dealing index is dropped because it is a time-invariant country level variable. The Non-U.S. dummy is also not needed due to presence of country fixed effects.

Column 3 shows that there are more listed firms per capita as a country's GDP per capita grows. Column 4 suggests that an increase in bank deposits to GDP ratio leads to subsequent increases in the number of listings per capita. Interestingly, including the banking sector control increases the magnitude and statistical significance of the impact of GDP per capita and also more than doubles the adjusted R-squared, from 5.6% to 12.9%. The estimated interaction terms are not shown here to save space but are presented in Appendix C.2.

Figure 2, Panel B shows the U.S. listing gap estimated from model 4. As for the pooled regression models, this specification confirms the existence of a U.S. listing gap but, perhaps not surprisingly, the estimated magnitude of the gap is much smaller. The country fixed effects prevent unobserved (or unaccounted for) cross-country differences to inflate the U.S. specific residuals, thus yielding a conservative estimate for the number of missing listings. In particular, Panel B plot suggests that the estimated U.S. listing gap starts after 1997 and widens significantly until 2003 to an estimated 4,195 missing listed firms. Since then, the gap shrinks in most years—except during the great recession in 2008 and 2009, and more recently in 2015 and 2016—until 2017, when there are an estimated 3,514 missing U.S. listings.

Next, we focus on the timing of the U.S. listing gap by estimating the first difference model presented in Table 2, Panel B. Motivated by the "step-function shaped" trend illustrated in Figure 2 Panel B, we investigate the exact timing of the gap by regressing the natural logarithm of one-year change in listings per capita on GDP growth and change in bank deposits to GDP ratio (included in column 2, exclusively). Because GDP growth is inherently a change variable—as it is defined as the rate of change in the GDP—we do not compute its first difference. Also, we do not include the change in log of GDP per capita to avoid collinearity with GDP growth. Estimated coefficients in column 1 confirms our previous findings that an increase in GDP growth is significantly related to an increase in the number of listings. However, estimates reported in column 2 shows no significant effect form change in bank deposit to GDP. This could be due to insufficient variation in this variable since bank deposit ratios are very persistent.

Panel C of Figure 2 plots the change in the number of missing U.S. listings based upon estimates produced by the model reported in column 2 of Table 2, Panel B. This figure confirms our previous findings and shows that the U.S. listing gap was generated over the period from 1997 to 2003, during which the U.S. abnormally lost about 300 firms every year. The graph also shows that the U.S. experienced an abnormal reduction in the number of listings with the onset of the great recession in 2008. We observe that after 2003 the U.S. marginally increased the number of listings

each year—except during 2008. Interestingly, this is consistent with the trend in Panel B, implying that the U.S. listing gap exists, is material, but has been shrinking since 2003.

These first difference regressions allow us to contribute to the current debate concerning the ultimate role of the regulatory wave which took place in the early 2000s at causing the U.S. listing gap. In particular, several commentators have argued that Section 404 of the Sarbanes-Oxley Act (2002); the U.S. Securities and Exchange Commission's (SEC) Regulation FD (Fair Disclosure) adopted in 2000; the 2003 Global Analyst Research Settlement (GARS); and the 2001 market decimalization program have imposed additional disclosure costs on publicly traded firms, eventually creating a new regime characterized by a lower propensity to go public (Zweig, 2010; Weild and Kim, 2010, among others). Furthermore, Regulation FD and the GARS have also been blamed for the reduced analysts' coverage experienced by small publicly traded firms in the post-SOX period (IPO Task Force, 2011). However, these regulatory actions are unlikely to explain our findings, due to the chronological discrepancy between the time of origination of the U.S. listing gap (Figure 2) and of these major reforms.

We also investigate the possibility that shifts in technology and composition of industries play a key role in generating the U.S. listing gap (Bowen III, Laurent, and Hoberg, 2019). In particular, we study whether the listing gap is a common trend across all industries or is rooted in heterogeneities across industries. We re-estimate the U.S. listing gap for every industry, defined by 2-digit SIC codes, and report the results in the Online Appendix.[4] We find that the U.S. listing gap is observed in 62 out of 66 industries, for which we do the estimation, suggesting that the dynamics of number of listings is beyond differences among industries, and shifts in technology and industry composition.

4 The Privatization of American equity finance

One regulatory shock could not be ruled out based on the timing argument discussed above. The National Securities Market Improvement Act (NSMIA) of 1996 decreased materially the cost for private firms to sell securities by exempting the sales from state-level regulations known as "blue-sky laws", from which public firms were already exempted. Furthermore, NSMIA increased the ability of unregistered funds such as venture capital and other private equity funds to raise capital. In addition to exempting them from blue-sky laws, NSMIA increased the maximum number of investors a fund could have without being subject to the costly disclosure requirements that apply

[4]We use Compustat Global to generate the variables in above regressions at the country-industry level.

to investment companies (De Fontenay, 2016).

Ewens and Farre-Mensa (2018) show that this law generated a positive shock to the supply of private capital, ultimately allowing late-stage startups to continue financing their growth while remaining privately held. As shown in Figure 3, it seems likely that passage of NSMIA sparked an exponential growth in private equity investment, which recorded major spikes in 2000 (reaching about 2% of GDP) and in 2007 (reaching about 6% of GDP). After shrinking during the financial crisis, the U.S. PE industry has experienced rapid growth ever since, even converging to near its pre-crisis size by 2017. Average PE activity in non-U.S. countries has been systematically lower than that in the U.S. But, as Figure 3 shows, overall trends are comparable, suggesting the rise of PE as a key source of financing is a global phenomenon. However, the magnitude of difference between the U.S. and other economies is still significant, with the U.S. doubling non-U.S. countries in terms of the ratio of total PE activity to GDP at the end of 2017. These univariate statistics show that the take-off of the U.S. PE industry and the timing of the U.S. listing gap occurred virtually simultaneously at around 1996, suggesting a tight link between these two phenomena.

[Figure 3 about here]

We now assess whether the recent U.S. PE growth has indeed been abnormal, compared both to prior-period levels and to other countries. We adopt a similar empirical strategy to the one used in the previous section to formally document the existence of excess PE activity in the U.S., a phenomenon that we define as the "privatization of American equity finance". We use the ratio of aggregate PE investment to GDP as the main dependent variable in our estimations, and regress this on the same covariates used in Table 2: log GDP per capita, GDP growth, and bank deposits to GDP. We further augment the model by including the lagged ratio of total stock market capitalization to GDP, lagged average 1-year stock returns, and the lagged level of M&A activity (ratio of total M&A value to GDP) and the lagged values of the natural logarithm of the total number of M&A deals per million population. The stock market and M&A variables control for the level of development of the public equity market and recent stock performance, which affect PE funds' propensity to invest and the viability of their exit strategies.

Table 3 presents the estimation results. In column 1, we estimate a pooled regression model controlling only for the GDP related variables. The results suggest, unsurprisingly, that there is more PE investment activity in countries with a higher GDP per capita. In column 2, we add all the previously discussed explanatory variables to the model and find a significant positive relationship

between M&A activity and PE activity, which is expected since so much of PE investment is through leveraged buyout (LBO) funds. Also as expected, the more comprehensive model has a slightly higher R-squared (33% versus 29.5%), capturing material determinants of the PE market development. Columns 3 and 4 present the estimation results of the fixed effect models. Overall the results suggest that, over time and within a country, PE activity is not strongly related to the other macroeconomic variables considered here. The only exception is the ratio of bank deposits to GDP, which is positively related to subsequent PE activity.

[Table 3 about here]

Figure 4, Panel A plots abnormal PE investment as a fraction of U.S. GDP, which is captured by the year fixed effects in the pooled regression model in column 2 of Table 3. This documents two major PE investment waves in the U.S. The first begins in 2003 and ends in 2008. At its peak in the year 2007, U.S. abnormal PE investments are estimated to be equal to 5.21% of GDP. The second wave starts after 2009 and peaks in 2016, when abnormal PE investments hit 3.60% of U.S. GDP. Panel B of Figure 4 plots the same time-series but uses the estimated interaction terms of the U.S. dummy and the year fixed effects from the fixed effects regression model in column 4 of Table 3. This graph confirms the two previously identified waves of the abnormal U.S. PE activity with the same timing, but the estimates from this model are between 1% to 2% lower than those of the previous model.

[Figure 4 about here]

Overall, the synchronicity of the NSMIA in 1996 and the beginning of the decline in the number of U.S. public corporations, paired with our new evidence highlighting the existence of a U.S. specific excess PE activity, raise questions about whether the rise of this new form of financing might explain and interact with the DKS (2017) listing gap.[5] However, before formally testing this hypothesis, it is necessarily to acknowledge that another important financial feature was transforming the U.S. economy in those years: a massive M&A wave, which induced a major consolidation of the U.S. market (Grullon, Larkin, and Michaely, forthcoming).

[5]To complement our discussion in Section 7, we specifically show that NSMIA has had a significant effect on the number of U.S. listed firms. Results of this test are presented in the Online Appendix.

5 Excess merger and acquisition activity in the U.S.

We begin by examining the time-series for total U.S. M&A deal values relative to GDP. As reported in Figure 5, Panel A, American M&A activity dominates the average activity in other countries included in our sample. The surge in M&A activity between 1997 and 2001 was particularly impressive: at its peak in 2000 total M&A deal value as a fraction of U.S. GDP reached an astounding 16.91%. Importantly, this massive wave occurred simultaneously with the decline in the number of U.S. corporations, suggesting that the uniquely high level of M&A activity recorded for the U.S. market likely played a primary role in creating the U.S. listing gap. The U.S. M&A market has remained very active ever since, experiencing two additional "mini-booms" in 2007-2008 and in 2015-2016, as shown in Figure 5.

[Figure 5 about here]

For non-U.S. countries, the average level of mergers as a percent of GDP has only exceeded 5% four times (1998-2000 and 2007) since 1990. Even when the level of non-U.S. M&A spikes to 7% of GDP in the year 2000, this is still much smaller that the simultaneous U.S. spike to 17% of GDP.[6] Studying the number of M&A deals per capita (million units of population) yields a similar conclusion. As reported in Panel B of Figure 5, this value reached 40 in the U.S. during 1998, dominating the M&A activity experienced in other countries around the world, which, on average, remained below 15 in that year.

Overall, these simple univariate analyses show that the U.S. M&A market has been systematically more active than what is observed globally. In particular, the synchronicity of the impressive decline in the number of listed firms and in the surge of M&A activity characterizing the period from 1996 to 2001 calls for further analyses evaluating the role of M&A in causing the U.S. listing gap, as well as assessing whether the observed "excess activity" represents abnormal behavior or is consistent with the characteristics and evolution of the U.S. economy.

Our multivariate analyses employ empirical strategies similar those used in the previous two sections to formally document the existence of excessive M&A activity in the U.S. market as compared to other countries around the world. Our main dependent variable is the total value of all M&A transactions as a fraction of GDP. We control for the usual suspects—log GDP per capita,

[6] Comparable trends can be observed if we study public-to-public acquisitions, transactions in which the acquiring firm is public, exclusively, as well as transaction in which the targeted firm is public, exclusively. These figures are available in the Online Appendix.

GDP growth, and bank deposits to GDP—and then augment our baseline model by including the lagged ratio of total stock market capitalization to GDP, lagged average stock returns, and the lagged ratio of total private placements of equity (PE investment hereafter) to GDP. The stock market variables control for level of market development and recent stock performance, which are known to affect M&A markets (Rhodes-Kropf, Robinson, and Viswanathan, 2005). Adding the ratio of PE investment to GDP absorbs the impact of the level of activity and development in the private equity markets, particularly LBOs, which might inflate a country's M&A activity if it represents a viable exit strategy.

Table 4 presents our estimates. Column 1 shows a pooled regression model in which only the GDP controls are present, thus excluding country fixed effects. As with the pooled regressions discussed in the previous two sections, we include year fixed effects, a non-U.S. dummy, and the non-U.S. dummy interacted with year fixed effects. The column 1 estimation shows that having a more developed economy as measured by higher GDP per capita and GDP growth is strongly positively related to more M&A activity. Column 2 estimates a pooled regression model that includes all the proposed explanatory variables. Results show that the lagged ratios of stock market capitalization to GDP and PE investment to GDP are significantly positively related to the ratio of total M&A value to GDP, as expected. Having these additional right-hand side variables increases the adjusted R-squared from 26.8% to 46.4%, ultimately underscoring the importance of the interconnections between these markets.

[Table 4 about here]

The abnormal M&A activity in the U.S. is captured by the U.S. residuals, which are the estimated year fixed effects in the pooled regression models. Figure 6, Panel A shows the U.S. abnormal M&A activity over the sample period estimated by the model in column 2 of Table 4. The figure documents three waves of U.S. specific excessive M&A activity. The first and the largest wave starts around 1995 and lasts until 2001. At its peak in the year 2000, the U.S. abnormal M&A activity is estimated to be equal to 12.20% of its GDP. The second wave that goes from 2004 to 2008 is smaller, with the U.S. abnormal M&A activity reaching 6.19% of GDP at its peak in 2007. The smallest U.S. wave is also the most recent one that goes from 2014 to 2016, when the abnormal total M&A to GDP ratio hit 1.86%.

[Figure 6 about here]

We also present the estimation results for the fixed effect regression models in columns 3 and 4 of Table 4. Given the presence of country fixed effects, the estimates are interpreted as within country relationships between M&A activity and the explanatory variables. Overall, the results are consistent with those from the pooled regressions. The column 3 estimation shows that on average there is more M&A activity when a country experiences higher growth in GDP. The column 4 estimation indicates that an increase in the ratio of bank deposits to GDP and stock market capitalization to GDP leads to significant subsequent increases in M&A activity. The estimated coefficients on GDP growth and the lagged ratio of PE investment to GDP are positive, but not statistically significant.

The U.S. abnormal M&A activity is estimated by the interactions of the U.S. dummy with the year fixed effects. We use the estimation in column 4 of Table 4 and plot the estimated time series of the U.S. abnormal M&A activity in Panel B of Figure 6. In this graph we confirm three excessive M&A waves for the U.S. The timing and the relative magnitudes are consistent with previous findings. Estimated abnormal magnitudes at the peaks are on average lower for the second wave (7.84% in the year 2000 and 4.74% in the year 2007), but higher for the third (3.7% in the year 2016).

Thus far, we have documented an as yet unexplained but massive merger wave hitting the U.S. economy simultaneously to the beginning of the observed decline in the number of publicly listed firms and to the rise of the private equity market. We next complete our analyses by assessing the overall evolution of the U.S. public equity market capitalization, as market valuation acts as a primary driver for a country's M&A activity (Shleifer and Vishny, 2003; Rhodes-Kropf, Robinson, and Viswanathan, 2005) thus implicitly impacting its PE activity as well (Phillips and Zhdanov, 2017).

6 The U.S. capitalization premium

While the *number* of U.S. listed firms has experienced a dramatic decline over the last 20 years, the U.S. total *market capitalization* has massively grown since 1990, reaching levels above 140% of GDP in recent years. Figure 7 shows that much of this increase in market capitalization occurred in the late 1990s, simultaneously to the previously discussed merger wave which hit the U.S. between 1998 and 2000, and to the beginning of the decline in the number of listed corporations. The synchronous decline in the number of public corporations and the increase in the U.S. market

capitalization implies that the average market valuation of a U.S. listed firm has increased six-fold over the past two decades, suggesting that the U.S. public stock market has become populated by behemoths.

[Figure 7 about here]

What about non-U.S. markets? The number of public corporations outside the U.S. increased from 26,401 in 1996 to 36,515 in 2014, then declined to 34,274 at year-end 2017. This growth in numbers is also paired with sharply increased aggregate stock market capitalization, which has risen from about $12 trillion in 1996 to $53.2 trillion at year-end 2017.[7] It is thus important to examine whether the increase in the U.S. market capitalization is abnormally large, as anecdotally described in Figure 7, or whether it is consistent with the historical evolution of the U.S. economy as compared to other countries around the world. The existence of a capitalization premium for the United States would suggest that the American public equity market is healthy and that it has been able to systematically allow firms to accumulate superior levels of financial and intangible capital as compared to other equity markets (Hall, 2001).

We formally investigate whether the U.S. stock market is abnormally highly valued. We focus on the ratio of the aggregate stock market capitalization to GDP and project this variable on all of the explanatory variables used thus far to control for the level of GDP, development of the banking industry, the market for private equity investments, stock returns, and the M&A market. For the latter set of controls we use the lagged total value of M&A deals to GDP and the log of the total number of M&A deals per million population. We compute these two M&A variables using *all* M&A deals, but we also do it using only M&A deals that have a *publicly listed target*, as this subgroup is likely to drive any eventual economic relation between market capitalization and M&A activity.

Table 5 presents the estimation results. Columns 1 and 2 show the estimated pooled regression models with M&A controls that are based on all deals and public target deals, respectively. Perhaps not surprisingly, we find that stock market valuation is strongly related to lagged stock returns. We also find that aggregate market cap to GDP is increasing in lagged values of GDP growth, bank deposits to GDP, PE investment to GDP, and M&A value to GDP. M&A activity measured by the number of M&A deals is also positively related to stock market valuations, but only statistically significant when we consider public target deals exclusively. These results are intuitive and suggest

[7] The values are in 2015 USD.

that development and aggregate valuations of the stock market are positively related to the other financial markets in the economy. Columns 3 and 4 present within country estimations using the fixed effect models with all M&A control variables and public target M&A control variables, respectively. Interestingly, these results suggest that, within a country, only higher GDP growth and higher stock returns lead to subsequently higher values of stock market capitalization to GDP. That is, M&A induced market consolidation has only marginally contributed to the outstanding performance of the U.S. public equity market.

[Table 5 about here]

We use both the pooled regression model (column 2) and the fixed effect model (column 4) to estimate the U.S. abnormal stock market capitalization, which is presented in Panels A and B of Figure 8, respectively. Both show that the U.S. aggregate stock market capitalization to GDP ratio is normal (as predicted by the models) in the early 1990s. However, this ratio is abnormally high for every year except 2008 (during the great recession) since then. Both models estimate that in 2017 the U.S. aggregate market capitalization is too high–by about a whopping 40% of GDP.

[Figure 8 about here]

What are the causes of the identified U.S. excess market capitalization? A possible explanation is that the previously documented increase in market consolidation has allowed U.S. firms to extract large economic rents by exploiting the existence of local oligopolies within the product market space (Larkin, Ng, and Zhu, 2018; Blonigen and Pierce, 2016; Butler, Grullon, and Lattanzio, 2019). This condition would materialize in a systematically superior financial performance by U.S. firms as compared to those incorporated in other countries, which would be reflected in higher aggregate valuations. We formally tests this hypothesis by developing for each country, for which data are available (the OECD sample), an aggregate measure of corporate profitability.[8] We employ this proxy as an additional control in our market capitalization regressions. As reported in the Online Appendix, our results are virtually unaffected by the inclusions of this country-level profitability measure. Thus, the identified U.S. excess capitalization is not fully derived by the exploitation of oligopolistic rents induced by more than two decades of unchallenged consolidation.

[8]This proxy is defined as the aggregate level of corporate gross value added, minus the sum of (1) the aggregate cost of goods sold, (2) the aggregate labor costs and (3) total interest expenses. We scale this profitability measure by GDP or by corporate assets.

An alternative hypothesis is that U.S corporations have been successfully forming large amount of intangible capital over the last two decades (Hall, 2001; Peters and Taylor, 2017). If this accumulation has been disproportionately large for U.S. firms, this phenomenon might explain the identified U.S. excess aggregate capitalization. In order to assess this hypothesis, we repeat the market capitalization tests using a country's aggregate book value of equity for its publicly traded firms as the dependent variable. Results of this test, presented in the Online Appendix, suggests that there is no abnormality in the U.S. aggregate book value of equity. This finding could suggest that intangible capital formation is driving the extraordinary performance experienced by the U.S. public equity market over the last three decades. Regardless, the aggregate book equity captures the size of public markets. So, observing no abnormal book equity for the U.S. confirms that the market value results are indeed a "U.S. valuation premium" and are not the effect of an abnormally larger equity market.

7 Reconciling the four features of the new American model of equity finance

The co-existence of these four unique "puzzles" is fascinating. In this section we study how the four key features of modern equity financing in the U.S. are related to each other. Specifically, we ask what happens to the U.S. listing gap when we account for the excessive M&A activity, PE investments, and stock market capitalization in the U.S. To answer this question, we re-estimate our model of the number of listings per capita, but this time including additional explanatory variables to control for the ratios of M&A activity, PE investments, and stock market capitalization to GDP.

Table 6 shows the estimation results for all countries. Column 1 and 2 show the estimated pooled regression models with M&A controls that are based on all deals and public target deals, respectively. Overall, the estimation results from these two models confirm our previous findings regarding the positive impact of GDP and the development of the banking sector on the number of listings per capita. Regarding the new explanatory variables, we find that, unsurprisingly, countries with a higher stock market capitalization to GDP ratio have more listings per capita. However, it is important to note that such a relationship is far from mechanical, as the correlation between these two covariates is as low as 43%. Our findings further suggest that an increase in PE investment activity is negatively related to the number of listings. This is consistent with a recent literature documenting the substitution of private for public sources of financing (Ewens and Farre-Mensa,

2018; Nain and Ying, 2018). Regarding the M&A controls, the results suggest that, all else equal, countries with a more active M&A market have a higher number of listings. This effect is driven by the number, rather than the aggregate value of these transactions. This is consistent with the "acquisition motive" in IPOs reported in Brau and Fawcett (2006) and Celikyurt, Sevilir, and Shivdasani (2010), as firms issue stock to acquire an acquisition currency to fund their external growth by going public. Importantly, the estimated positive coefficient for M&A activity does not imply that this factor is positively contributing to creating the observed listing gap. The listing gap represents an abnormal level of listings, being captured by the residuals of the proposed predictive model. Thus, the statistical significance of proxies for M&A activity, rather than the sign of the estimated coefficient should be assessed to support the relevance of this dimension for the estimated U.S. listing gap.

[Table 6 about here]

Columns 3 and 4 show the within-country estimation results using the fixed effects models. Again, these models confirm the previously discussed impact of an increase in GDP per capita and bank deposits to GDP ratio on the subsequent increase in the number of listings per capita in a country. Regarding the new explanatory variables, however, we find that, over time and within a country, PE investments negatively affect the number of listings and the number of M&A deals is positively related to subsequent number of listings.

Figure 9 shows the U.S. listing gap estimated by the comprehensive models that also account for the other three features of the modern U.S. equity financing model. In particular, Panel A of Figure 9 plots the number of missing U.S. listings computed from the estimated year fixed effects in model 2 of Table 6. As a point of reference, this graph also shows (in a dashed line) the baseline estimation of the U.S. listing gap as was initially shown in Figure 2, Panel A. Comparing the modified estimation of the U.S. listing gap (the solid line) with the baseline estimation (the dashed line) shows that the three documented new features of the U.S. equity financing model—namely, the "privatization of American equity finance", the excess U.S. M&A activity and the U.S. capitalization premium–are significantly interconnected and have a large impact on each other in equilibrium. For instance, as the estimation in Panel A of Figure 9 shows, accounting for the other three features reduces the estimated U.S. listing gap in 2017 by 69.7% (from the baseline estimation of 10,685 missing U.S. listings to the modified estimation of 3,231 missing U.S. listings).

Figure 9, Panel B shows similar qualitative results. It plots the baseline (dashed line) and the

modified (solid line) U.S. listing gap but uses the fixed effect models to compute the estimated number of missing listings. Using the results in this figure, accounting for the ratios of M&A activity, PE investments, and stock market capitalization to GDP reduces the U.S. listing gap by 60.3% from the baseline estimation of 3,514 missing U.S. listings to the modified estimation of 1,395 missing listings.

[Figure 9 about here]

7.1 Vector autoregressive analyses of the interconnections in the new model of equity finance

As shown in the above estimations, these four dimensions of the modern U.S. model of equity financing affect each other and are jointly determined in equilibrium. To understand more deeply the interconnections between these features we focus on the U.S. subsample and estimate a vector autoregression (VAR) model. In the baseline specification, presented in Table 7, we set up the VAR model to include up to three lags of the main variables we studied above: log of listings per capita, M&A value as a fraction of GDP, log of number of M&A deals per capita, PE investment as a fraction of GDP, and stock market capitalization as a fraction of GDP. In the baseline case, the M&A variables are defined based on deals with public targets, which lead to stronger and more interpretable estimations. We find qualitatively similar results with all M&A variables although the results are, expectedly, not as strong quantitatively. We confirm the stability of the VAR estimations by performing a stability test, results of which are shown in the Online Appendix.

[Table 7 about here]

Each column of Table 7, Panel A shows the estimation result for each one of the equations in the VAR system, which are estimated simultaneously. The first two columns show how M&A activity is related to lagged values of the other variables. M&A activity has a negative autocorrelation with its second and third lags, which is consistent with mean reversion explained by the fact that there are waves of M&A activity in the U.S. Otherwise, M&A value as a fraction of GDP is positively related to past stock market valuations and M&A deal count is positively related to the number of listings—potential targets—in the past. Column 3 documents that PE activity is positively related to M&A activity and stock market valuations in the past. Importantly, column 4 shows that the number of U.S. listings are strongly negatively affected by past M&A and PE activity.

This confirms the substitution between public and private equity financing that is taking place in the U.S. in a more comprehensive setting. The stock market capitalization to GDP ratio does not show a significant direct effect on the number of U.S. listings, but columns 1 to 3 underscore its indirect effect through the impact of market valuations on M&A and PE investments. Finally, column 5 shows that all other variables feed back into the model to determine aggregate stock market valuations.

We use the estimated VAR model to conduct Granger causality tests to formally investigate the "predictive causality" between these variables. Admittedly, this test does not provide a concrete proof of "true causality," but rather is an attempt to learn from the time series about the relations between these variables in the U.S. economy. Panel B of Table 7 presents the results. This panel consists of five blocks that are derived from the five VAR equations, respectively. Each block shows p-values for the Wald tests of the hypotheses that "the dependent variable is not Granger caused by each of the other variables." Overall, the results are consistent with the VAR discussion above and are helpful in clarifying the recent trends in the U.S. equity financing. Based on the U.S. time series evidence (Granger causality), stock market valuations spur M&A activity. Market valuations together with M&A activity leads to higher levels of PE activity. Both M&A and PE activity, in turn, result in changes in the number of U.S. listings. Finally, as shown in the last block in the table, all of these variables affect subsequent stock market valuations.

8 Have the changes in the U.S. equity finance model been net positive or negative?

The emergence of a U.S. listing gap has attracted particular attention from academics and policymakers, concerned that a decline in the number of publicly traded firms and the lack of a vibrant IPO market might stifle innovation (Babina, Ouimet, and Zarutskie, 2017; Black and Gilson, 1998) and generate severe negative consequences for the long-term economic growth of the United States through a M&A-induced increase in market concentration (Grullon, Larkin, and Michaely, forthcoming). The additional findings we document here—of sustained U.S. merger activity, the ongoing substitution of private equity for public market financing, and the rise of a U.S. capitalization premium—only increase concern regarding the overall social welfare implications of the new equity finance model and require us to attempt an assessment of the net financial and economic ben-

efits or costs implied by this new model.[9] This new model has likely impacted firms' access to financing opportunities and altered economic agents' investment behaviors and the overall labor market equilibrium. We integrate our evidence with findings reported in different literatures and global macro-economic trends in an attempt to provide a first-order assessment of the social welfare implications of these new features of U.S. capital markets.

8.1 Access to financing opportunities

The observed sharp decline in the number of publicly listed companies might be due to increasing financial frictions which are undermining firms' ability to access external sources of equity financing. Such a critical risk should be assessed separately with respect to entrepreneurial growth companies (EGC) and large, public corporations. The rise of the private equity industry and the role it plays in substituting intermediated equity capital for capital-market equity (IPOs and SEOs) has clearly been a net blessing for EGCs. Recent academic research conclusively shows that private equity investors create significant value for both portfolio companies and fund investors, contributing to EGCs' economic and financial growth both through direct equity injections and by improving their corporate governance (Lerner, Sorensen, and Strömberg, 2011). In particular, Puri and Zarutskie (2012) show that venture capital-backed companies achieve critical scale far more rapidly than do similar non-venture-capital backed companies; they are also far more likely to survive early stage trials and, ultimately, to either go public or be sold through merger. With respect to EGCs' access to financing, PE financing has allowed these firms to stay private much longer while still raising adequate external equity to sustain their growth.

The increasing role of PE funds has further reduced disclosure and contracting costs for founders by further expanding financing opportunities for EGCs and, ultimately, allowing late-stage startups to continue financing their growth while remaining private (Ewens and Farre-Mensa, 2018; Nain and Ying, 2018). Additionally, the U.S. excess merger activity has offered a viable exit window to PE funds, further increasing EGCs' ability to access this source of financing. Indeed, mergers and trade sales have become the preferred exit for company founders and early-stage investors alike. In recent years, both VC and LBO funds have exited their investments by mergers six times as

[9] Our conclusion that new disclosure regulations have not materially affected new listing incentives is consistent with finding reported in Gao, Ritter, and Zhu (2013) documenting that the June 2007 SEC's interpretive guidance and the Public Company Accounting Oversight Board's Auditing Standard No. 5 for public accounting firms were unable to rivitalize the U.S. IPO market. Analogously, recent political initiatives aimed to reverse the (eventual) adverse impact of the 2001 market decimalization on small firms, such as the two-year Tick Size Pilot Program implemented by the SEC on October 3, 2016, are unlikely to induce a material increase small firms' relative propensity to go public, as discussed in Section 3.

often–and six times the value–as through IPOs (KPMG Enterprise, 2018). Further support for the interconnectedness of the viability of M&A investments as an exit strategy for PE funds is provided by Phillips and Zhdanov (2017). They examine the impact of adopting pro-merger legislation around the world on subsequent stock market development, identifying that the regulatory-induced increase in M&A activity is followed by a material increase in VC investment one year later. There is in fact no clear evidence that EGCs' access to external financing has declined over the last 25 years, rather the availability of external funding–especially equity funding–has massively increased, both for early-stage and late-stage entrepreneurial firms.

What about the large decline in IPOs and the dramatic decline in the number of publicly listed U.S. firms; might these suggest declining overall access to external equity financing? On balance, we think not. First, as previously discussed, Ewens and Farre-Mensa (2018) has shown that the NSMIA of 1996 increased the availability of financing opportunity for late-stage private capital, ultimately increasing the average number of financing round VC-backed firms go through prior to their eventual IPO. Furthermore, this risk capital is being provided through intermediation at significantly lower cost than it is through IPOs, due to the latter's high preparatory costs (legal, filing, registration expenses), underwriting fees (7% for all but largest offerings), and underpricing. Second, while the overall number of IPOs has massively decreased over the last two decades, newly public firms have subsequently completed acquisitions at an extremely high pace (Brau and Fawcett, 2006; Celikyurt, Sevilir, and Shivdasani, 2010). When required, private firms appear to be successful at completing their IPO aimed at rising both fresh capital and creating an acquisition currency to fund their external growth, and, to date, there is no clear evidence that withdrawn/failed IPOs in the U.S. have systematically increased in percentage terms (Lattanzio and Megginson, 2019). Overall, it is difficult to identify systematic issues affecting corporations' ability to access external equity financing sources. This evidence, coupled with the historically high levels of cash-holdings (Bates, Kahle, and Stulz, 2009), and the overall decreasing trends for firms' investment-cash flow sensitivity (Lewellen and Lewellen, 2016; Larkin, Ng, and Zhu, 2018) suggest that large U.S. corporations are not facing increasing frictions preventing them from accessing domestic capital markets.

8.2 Market consolidation

U.S. industries are clearly becoming more concentrated. Two decades of virtually uncontrolled mergers have allowed U.S. firms to enjoy higher profit margins (Grullon, Larkin, and Michaely, forthcoming), generating enormous wealth for both bidders and for combined companies (Masulis,

Wang, and Xie, 2007; Custodio, 2014; Lee, Mauer, and Xu, 2018; Wang, 2018). From a consumer perspective, this massive consolidation has allowed firms to gain market power and to extract rents from their local oligopolies, ultimately damaging consumers' welfare (De Loecker and Eeckhout, 2017; Hall, 2018; Grullon, Larkin, and Michaely, forthcoming; Blonigen and Pierce, 2016; Butler, Grullon, and Lattanzio, 2019). At the same time, the U.S. excess M&A activity we document has also promoted the development of the PE industry (Phillips and Zhdanov, 2017), and coincided with (perhaps promoted) a massive increase in aggregate U.S. listed firm valuation.

Assessing the implications of the observed consolidation is more complicated if we take the perspective of a globalized economy. Mergers over the past 25 years have dramatically increased the average size and market power of US public companies, increasing their competitiveness both domestically and in a global competitive environment. Corporate profits as a percent of GDP have risen steadily (except during recessions) from 4.7% in 1990 to 9.4% in 2017 according to the Federal Reserve Economic Data (FRED) dataset, and profits exceeded $2 trillion for the first time in 2018. This exponential growth has allowed US corporations to dominate global rankings of companies by size, market capitalization, and/or profits. For example, the 564 U.S. headquartered corporations on the Forbes 2000 Global List of the World's Largest Companies in 2017 accounted for over 37% of the total profits of these 2000 global companies. Similarly, Fortune reports that U.S. corporations are the most profitable in ten of 16 global industries, and they are ranked second or third in all the rest.

8.3 Corporate innovativeness

The extremely low number of IPOs recorded in the U.S. over the last 20 years have sparked an important debate concerning whether this decline might cause (or be caused) by a systematic and dramatic decrease in corporate innovativeness. Babina, Ouimet, and Zarutskie (2017) show that IPOs induce employees to leave the firm for start-ups. Therefore, a decline in the number of IPO could negatively affect new firm creation, reducing both the U.S. economy's innovativeness and incumbent firms' incentive to retain a competitive hedge out of fear of potential new entrants. However, recent papers provide robust evidence that private companies can be as innovative as—or even more than–public companies, though usually in different ways (Ferreira, Manso, and Silva, 2012; Nanda and Rhodes-Kropf, 2013, 2016). New research has also shown that firms' innovativeness decreases following an IPO (Bernstein, 2015).

Finally, it is difficult to assess the country-level effect of competition on corporate innovativeness,

as the effects of competition on R&D investments are heterogenous across firms and economic systems (Aghion, Bloom, Blundell, Griffith, and Howitt, 2005; Aghion, Bechtold, Cassar, and Herz, 2018). However, there is no evidence that U.S. firms have decreased their investments in R&D over the last 20 years. Indeed, as shown in Panel A of Figure 10, the ratio total R&D to GDP has been steadily increasing over the studied period and, while non-U.S. countries are experiencing comparable growth, U.S. firms remain predominant in terms of their commitment to innovation.

[Figure 10 about here]

8.4 Social considerations

Mergers are often followed by massive restructurings that often involve significant layoffs (Dessaint, Golubov, and Volpin, 2017), ultimately negatively affecting a country's employment rate. Furthermore, the increasing predominance of intangible capital and the declining relative marginal productivity of low-skill labor, paired with the declining number of publicly traded companies, might suggest that the U.S. employment rate might have decreased dramatically since the emergence of this new model of equity financing. However, as described in Panel B of Figure 10, the massive merger wave occurring between 1997 and 2001 had relatively small impact on the U.S. employment rate, which ranged between 61% and 63% over the period 1990-2007. The recent financial crisis had dramatic consequences for the U.S. employment rate, which has not yet fully recovered. However, despite this material decline, the U.S. economy has been extremely successful at creating new jobs. Over the 1990-2017 period, the U.S. economy created 34.10 million net new jobs, experiencing a 34.1% increase in total employment with respect to the 1990 baseline level of 111.90 million existing full-time jobs. Over the same period, the G7 countries, U.S. excluded (Japan, Canada, UK, France, Germany, and Italy), created 25.09 million new jobs, representing a 13.27% increase with respect to the 1990 baseline level of 189.07 million jobs. The reported differential growth is particularly impressive if we take into consideration that the U.S. population accounts for only 42.7% of the total G7 population, as measured at the end of 2017. Overall, no obvious structural break in the time-series for the employment ratio can be associated with the emergence of the U.S. listing gap, nor with the U.S. specific level of abnormal M&A activity. Consequently, the emergence of this new model of equity financing has thus far likely induced marginal effects on the overall labor market equilibrium, though consolidation may have suppressed wage growth below what it would have been without so many mergers.

More complicated are considerations about the distributional properties of the new American model of equity financing. First, the emergence of private equity industry and its negative effects on firm's propensity to go public preclude retail investors from participating in the massive value-creation phase of EGC firms' life, which for Google, Facebook, Apple, and other VC-backed companies occurred after they went public (Gornall and Strebulaev, 2017b; Ljungqvist, Persson, and Tåg, 2018). This concern is partially offset by the increasing involvement by mutual funds in funding unicorns, as described in Chernenko, Lerner, and Zeng (2017). Further exacerbating the effect of the privatization of the U.S. equity finance on inequality, the increased product market consolidations and the consequent increase in firm's mark up (Grullon et al., 2018) have likely induced a further increase in income inequality. Indeed, as discussed in Gans, Leigh, Schmalz, and Triggs (2018), the skewed distribution of equity holding across retail investors induce non-homogeneous returns from corporates exploiting their eventual market power, further exacerbating the eventual increase in inequality. A simple analysis of the Gini coefficient for the U.S. confirms the expected increase in income inequality over our 1990-2017 study period. Panel C of Figure 10 shows the Gini coefficient has been steadily increasing since the late 1990s, slowly converging towards the mean inequality level of non-U.S. countries.

All in all, the emergence of this new model of equity finance seems to have generated material financial returns for both U.S. investors and corporations, for which no clear evidence of increased financial friction can be easily identified. Furthermore, the new equilibrium does not seem to be characterized by dramatically lower level of employment. However, despite the extremely positive economic results achieved by the U.S. economy over the last 25 years, the emerging new equilibrium seemingly is associated with rising income inequality. Finally, as a concluding remark, it is important to acknowledge that the ability of corporation to remain private induces a negative information shock on society, ultimately resulting in a decrease in market efficiency which, at the extreme, could lead to the eclipse of the public equity market (De Fontenay, 2016).

9 Is the new model of equity finance emerging in other developed economies?

We have argued above that a new model of equity financing—characterized by declining numbers of (increasingly large) listed firms, steadily increasing reliance on private equity funds for provision of external equity to industry, and permanently high rates of M&A activity—has emerged in the

United States. Is this model also emerging in other countries, particularly other large, developed economies? DKS (2017) show that the decline in the total number of U.S. listings (both in absolute terms and in per capita terms) over the period 1996 to 2012 is uniquely negative among developed economies. Indeed, they show that only six countries (Venezuela, Egypt, Colombia, Portugal, Lithuania, and the Czech Republic) experienced a greater decline than the U.S. in terms of percentage change in the number of listed companies over 1996-2012.

We update the listing gap study through 2017 and ask whether these findings still hold. In important ways, they do not. While the total number of non-U.S. listed companies peaks at 38,732 firms in 2011, then declines slightly to 38,583 in 2017, and the net change in the number of public corporations over our 1990-2017 study period is positive for most countries, the observed evolution of many important non-U.S. developed economies resembles the one characterizing the U.S., just shifted later in time. As presented in the first four graphs of Figure 11, the number of European publicly traded firms peaked in 2008, and then falls by more than 40% over the next nine years.[10] The observed decline in EU listed firms is mostly driven by the United Kingdom, Germany, and France, where listings peaked in 2006, 2008 and 2001, respectively. In all three countries, listings had by 2017 dropped back near, or below, 1990 levels.

[Figure 11 about here]

What then is driving the sustained growth until 2011 in the total number of non-U.S. listed firms? The surge of listings in China, Hong Kong, and Singapore is undeniable, as shown in the last three graphs of Figure 11. The rapid growth of these new markets has acted as a counter-balancing force, delaying the global decline in the number of listed firms. Total listings have also continued to grow in Australia, Canada, parts of South America, and some smaller European countries. The decline in total non-U.S. listings thus appears to be concentrated in a few large developed countries—particularly Britain, France and Germany.

But is the decline in the number of listed companies in Britain, France and Germany truly abnormal, or can it be explained by the new model of equity finance described in sections 3-6 above? Panels A through C of Figure 12 present total private equity investment as a percent of GDP (Panel A), total M&A activity as a percent of GDP (Panel B) and aggregate market

[10] This time-series include the eight European countries for which the full data are available over the studied period: Austria, Belgium, France, Germany, Greece, Luxembourg, Netherlands, and Spain. These countries account for more than 66% of the total number of listed firms in the EU.

capitalization as a percent of GDP (Panel C) for Britain, Germany, and France over 1990-2017.[11] As can be seen, all three countries evidence the same pattern of steadily rising PE investment as a percent of GDP since 1990 (particularly since 1995) as does the United States, and aggregate capitalization relative to GDP has nearly tripled since 1990 for Germany and France—though there has been little or no net increase in capitalization as a fraction of GDP for any of these countries since 2000. However, none of these three countries show the same pattern of sharply rising M&A activity as a percent of GDP experienced in the United States. While this fraction roughly doubled for France since 1995 (reaching 4% of GDP by 2017), M&A activity only spiked sharply during 1998-2001 in all three countries and in Britain and Germany remains in 2017 at roughly the same fraction of GDP as in 1995.

[Figure 12 about here]

While we do not have space here to present a full econometric estimation of the listing gap for all non-U.S. countries, we can report a summary of this for Britain, France and Germany.[12] We estimate the number of "missing" listed firms using first the fixed effects model and then the first-differences model of Section 4–which incorporates the full set of financial development controls, as well as the PE investment, M&A activity, and aggregate capitalization measures we develop to explain the new American model of equity finance—for Britain, Germany, and France. Graphs displaying the results of these estimations are presented in Panels A and B of Figure 13. As can be seen, the listing gap disappears completely for Britain and Germany, in that they have the number of listed companies predicted by our augmented model, while the unexplained listing gap for France grows to about 400 companies by 2017.

[Figure 13 about here]

10 Conclusion

We document and analyze a new model of equity finance that has emerged in the United States since the late 1990s. We characterize this model by four interconnected and unique features of equity financing in the U.S. in recent decades. First, a significant and abnormal decline in the

[11] Similar overall patterns are observed for EU 28 countries, since Britain, France and Germany account for over two-thirds of all EU listed companies.

[12] We have conducted these tests, and results are available upon request, but are deferring a full analysis of the evolution of non-U.S. listings to a second paper.

number of U.S. listed firms, from 8,090 in 1996 to 4,334 in 2017–dubbed "the U.S. listing gap" by DKS (2017). Second, an abnormally high level of private equity investments in the form of buyouts and venture capital investment, among others. Third, an abnormally large number of high value M&A transactions. Fourth, an aggregate stock market capitalization premium in the U.S. stock markets.

We analyze each of these features separately and show that the U.S. economy has been unique and significantly different from an average non-U.S. economy with respect to all of these features. All of our results are robust to various model specifications and to the sample of non-U.S. countries that we use a the benchmark.

Importantly, the timing of these features suggests a meaningful connection between them. We document that the emergence of the U.S. listing gap that occurred from 1997 to 2001 was related to a simultaneous increase in the U.S. M&A activity, record volumes of private equity financing, and abnormally high level of market capitalization in the U.S. stock markets. We find that accounting for the latter three features of equity financing could explain at least 60.3% of the U.S. listing gap as previously estimated. The timing of this abnormal decline is inconsistent with the hypothesis that regulatory and industry-specific technological changes played primary roles in explaining the US listing gaps and the identified aggregated capitalization premium.

We discuss the potential financial, industrial, and social benefits and costs of this new equity financing model. We argue that, overall, it is hard to identify systematic problems with access to equity finance in the U.S. caused by the recent trends. Also, U.S. firms are dominant in terms of R&D expenditure and commitment to innovation. On the other hand, during the same period, the U.S. has experienced an increase in industries' consolidation and firms' market power, which are arguably a result of abnormally high M&A activity. Also, while the new model of equity financing does not seem to directly affect the U.S. employment ratio, it might have contributed to wealth inequality in the U.S.

Finally, we investigate whether this new model of equity financing is emerging in other countries. We find that the observed evolution of some of the non-U.S. developed economies follow, with a few years of delay, the path of the U.S. economy. For instance, we show that in France, Germany, and the U.K., the number of listed firms peaked in the mid-2000s and has been declining ever since. At the same time, these economies have experience an increased level of PE investments, market capitalization, and to a lesser degree M&A activity.

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Figure 1: Number of publicly listed companies in the U.S. and non-U.S. countries (1990-2017)

This figure shows the number of domestic publicly listed firms in the U.S. and non-U.S. countries from 1990 to 2017. Number of listings in each country is collected from the World Bank's WDI database. The set of Non-U.S. countries consists of 52 countries listed in Appendix A.

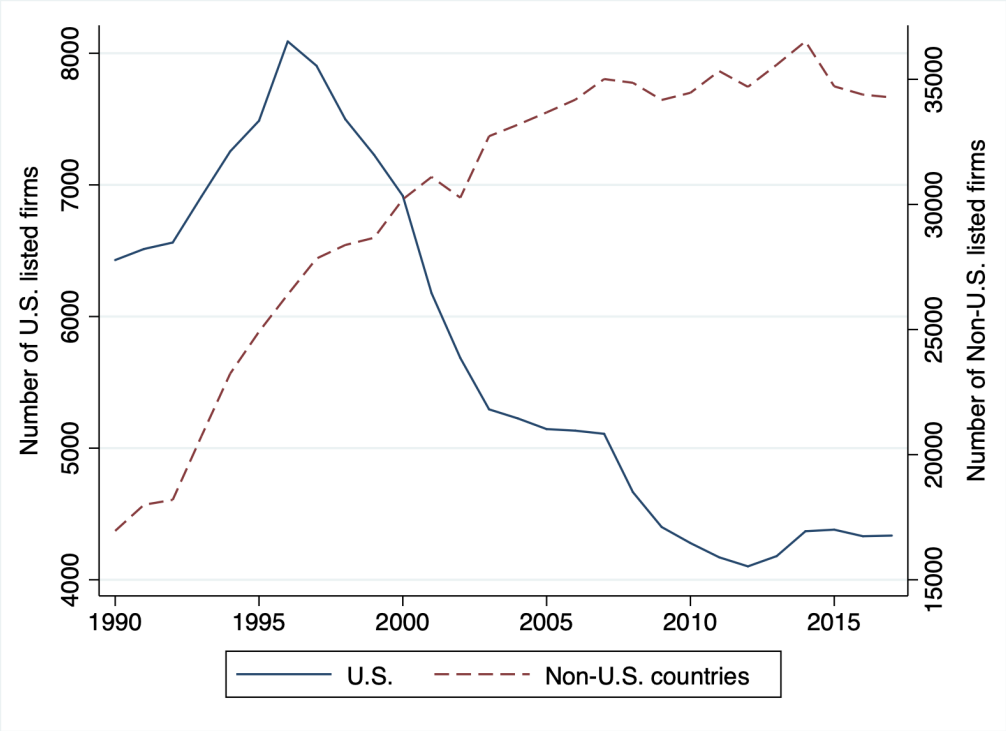
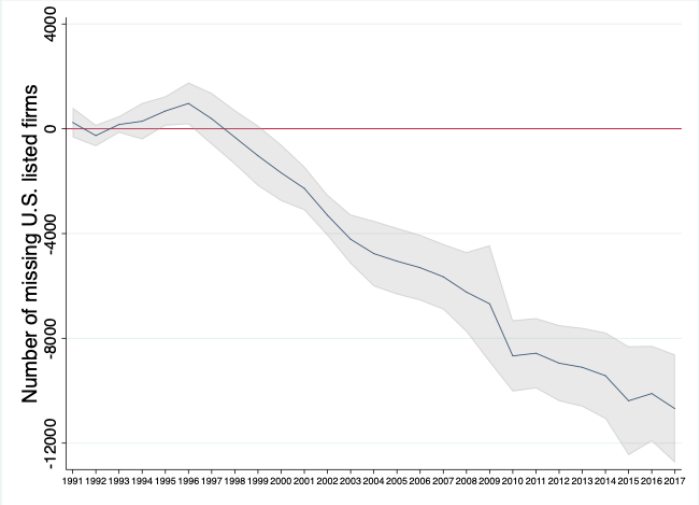


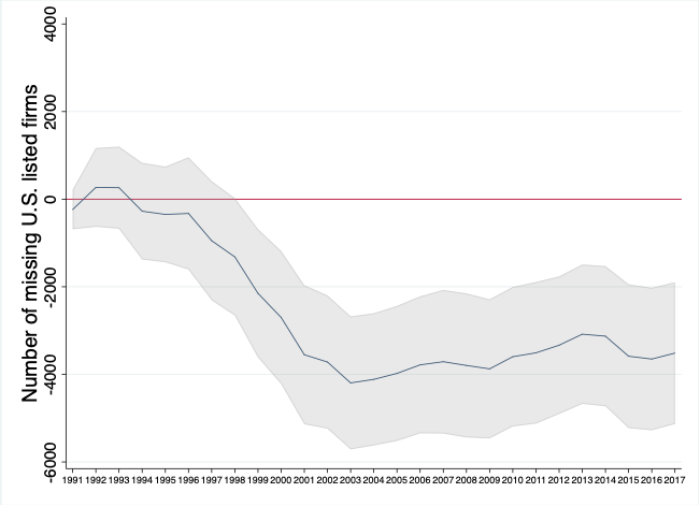
Figure 2: The U.S. listing gap (1990-2017)

Panels A and B show the U.S. listing gap, measured as the estimated number of missing U.S. listed firms in each year, and Panel C shows the annual change in the U.S. listing gap. Shaded area shows the 90% confidence intervals.

(a) U.S. listing gap estimated by the pooled regression–model (2) of Table 2, Panel A.



(b) U.S. listing gap estimated by the FE regression–model (4) of Table 2, Panel A.



(c) Change in the U.S. listing gap estimated by the first difference reg.–model (2) of Table 2, Panel B.

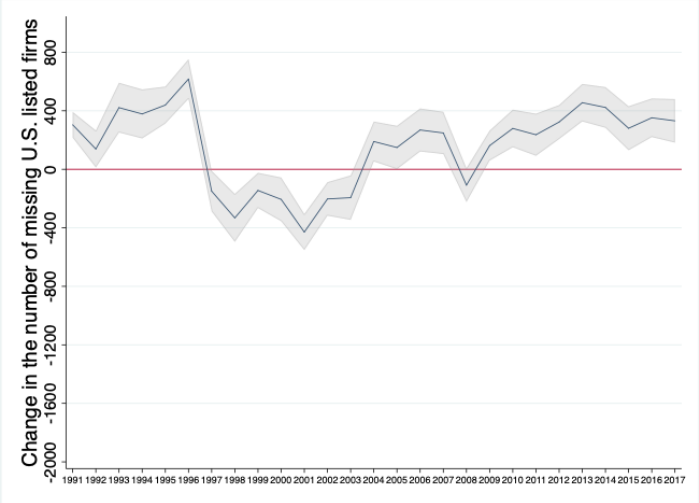


Figure 3: Private placements of equity in the U.S. and non-U.S. countries (1990-2017)

This figure shows total private placements of equity (PE investment) as a fraction of GDP in the U.S. and non-U.S. countries from 1990 to 2017. The set of Non-U.S. countries consists of 52 countries listed in Appendix A. The PE investment data is from PitchBook data set.

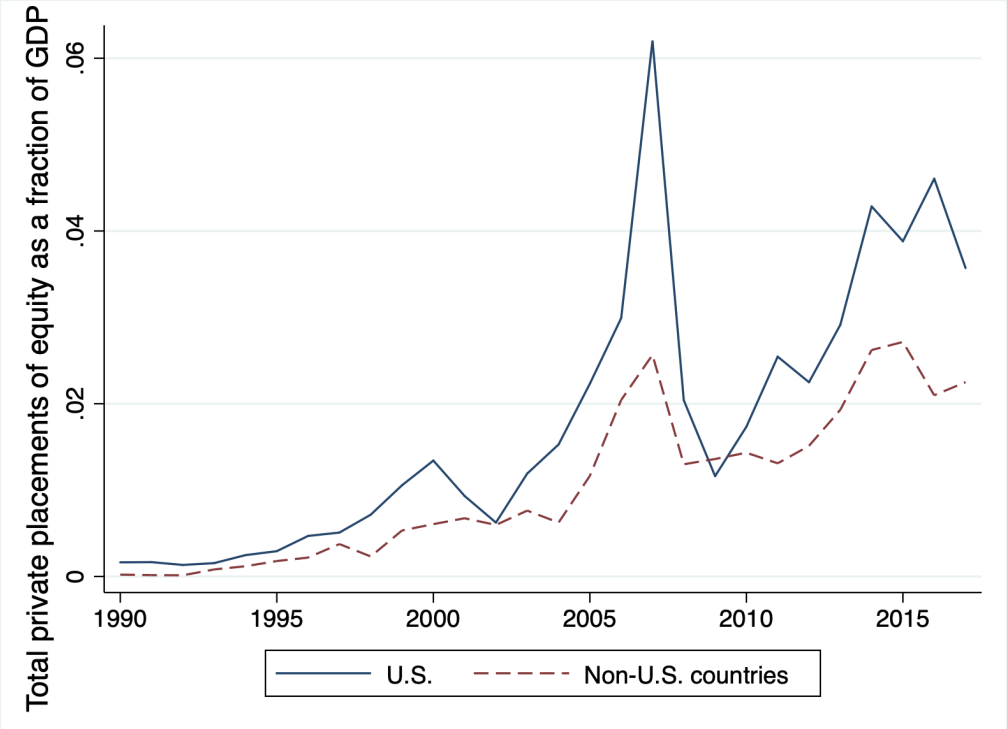
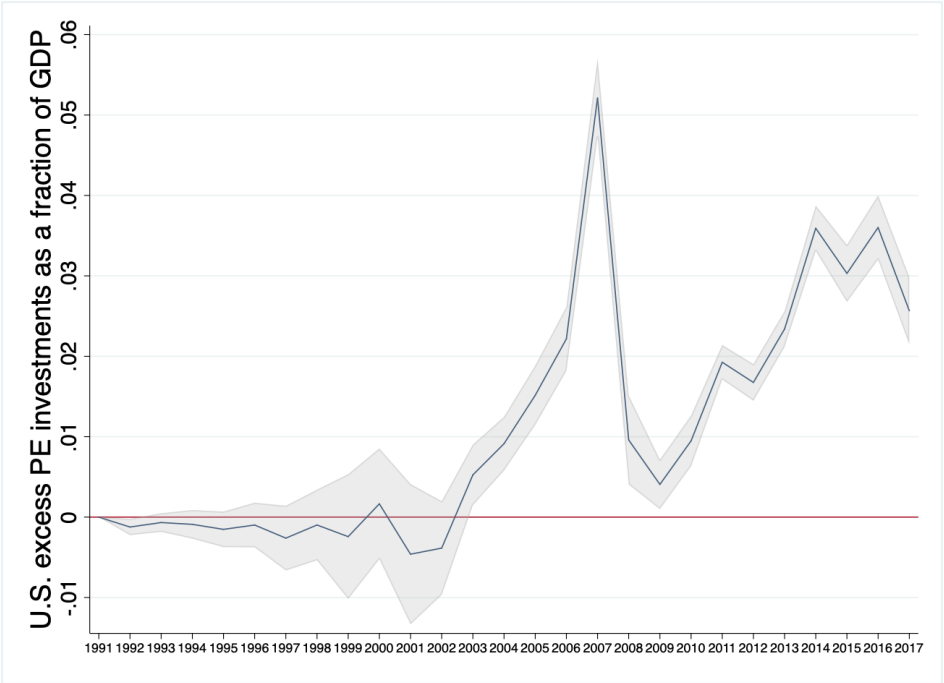


Figure 4: Excess private placements of equity in the U.S. (1990-2017)

These figures show the U.S. excess PE investments as a fraction of GDP, estimated by two different model specifications shown in Table 3. Shaded area shows the 90% confidence intervals.

(a) Estimated by the pooled regression–model (2) of Table 3



(b) Estimated by the FE regression–model (4) of Table 3

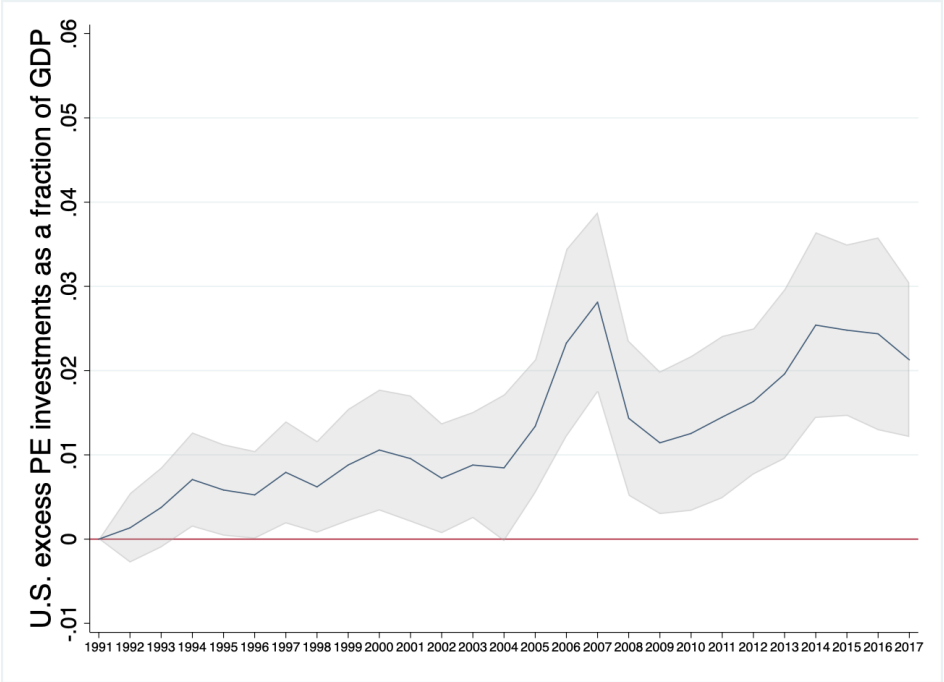
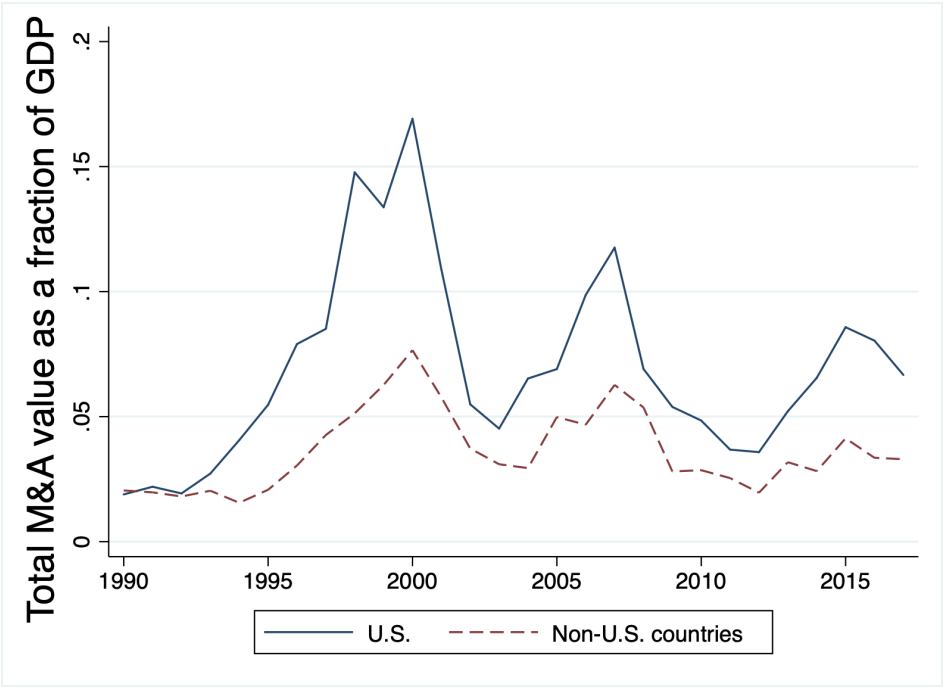


Figure 5: M&A activity in the U.S. and non-U.S. countries (1990-2017)

Panels A and B show total value of M&A deals as a fraction of GDP and total number of M&A deals per million population in the U.S. and non-U.S. countries from 1990 to 2017. The set of Non-U.S. countries consists of 52 countries listed in Appendix A. The M&A data is from Thomson Reuters' SDC platinum data set.

(a) Value of all M&A deals as a fraction of GDP



(b) Number of M&A deals per million population

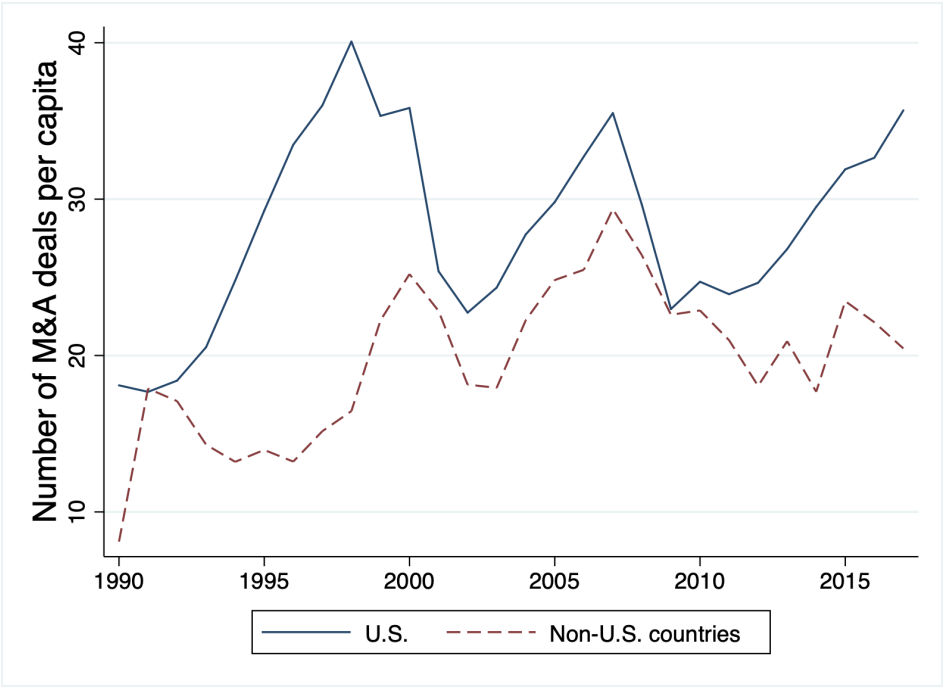
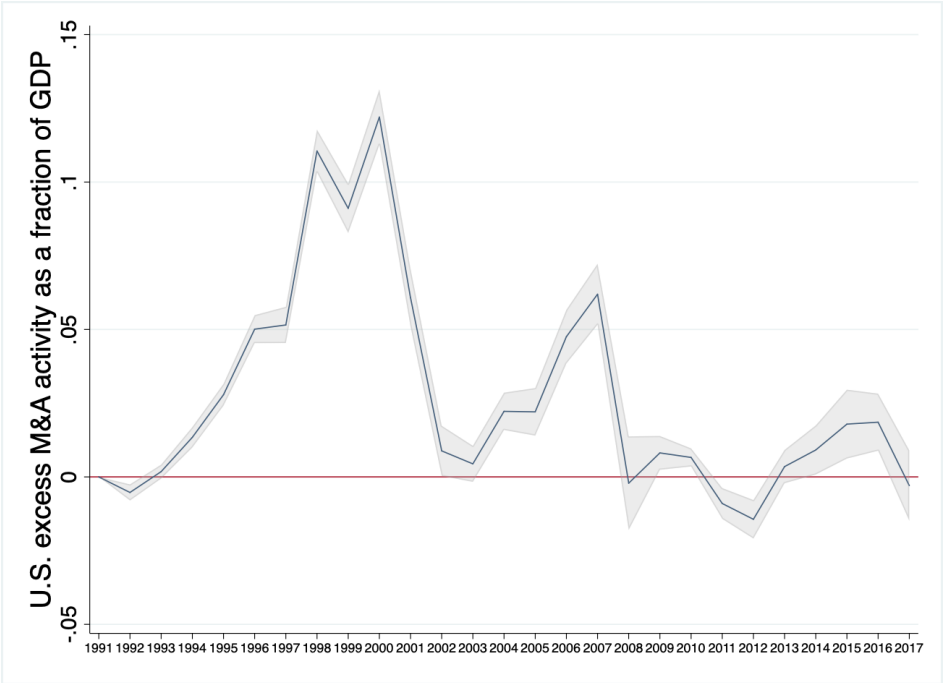


Figure 6: Excess M&A activity in the U.S. (1990-2017)

These figures show the U.S. excess M&A value as a fraction of GDP, estimated by two different model specifications shown in Table 4. Shaded area shows the 90% confidence intervals.

(a) Estimated by the pooled regression–model (2) of Table 4



(b) Estimated by the FE regression–model (5) of Table 4

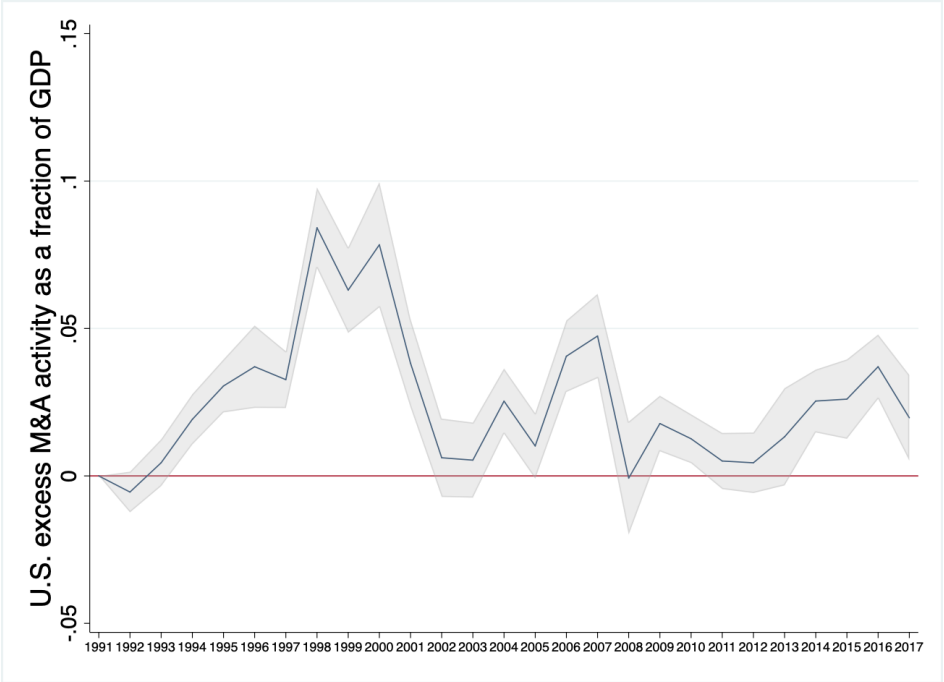


Figure 7: Aggregate stock market capitalization in the U.S. and non-U.S. countries (1990-2017)

This figure shows the aggregate stock market capitalization as a fraction of GDP in the U.S. and non-U.S. countries from 1990 to 2017. The set of Non-U.S. countries consists of 52 countries listed in Appendix A. The market capitalization data is from the World Bank's Global Financial Development data set.

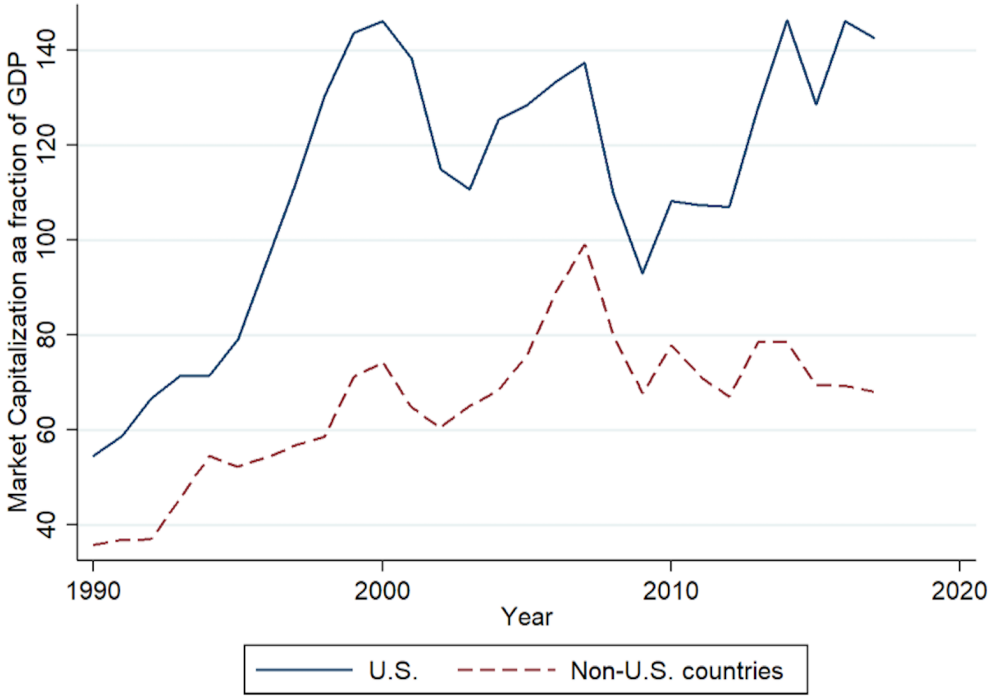
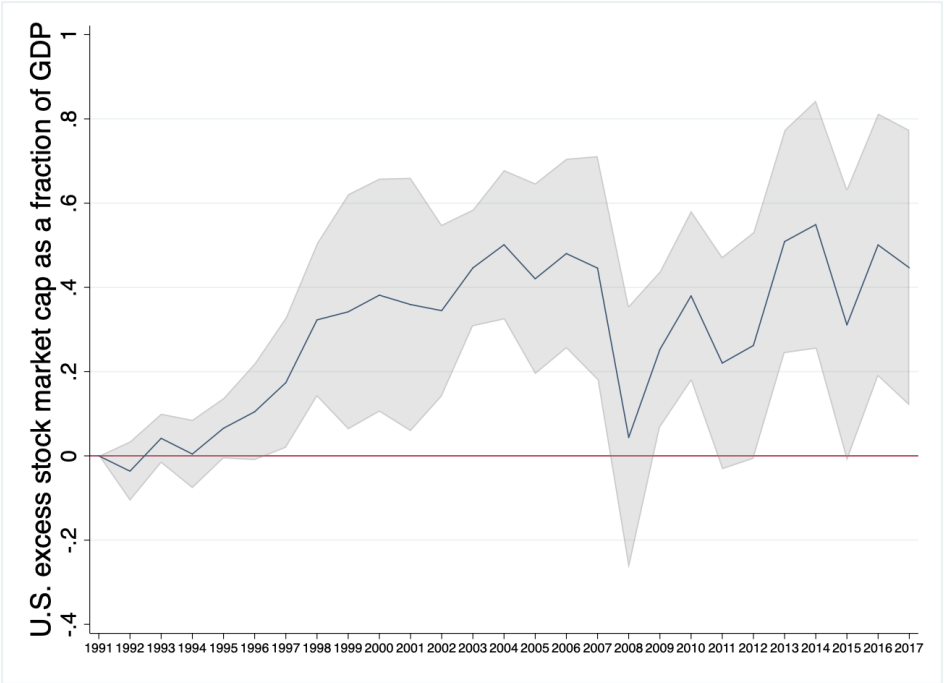


Figure 8: Excess stock market capitalization in the U.S. (1990-2017)

These figures show the U.S. excess stock market capitalization as a fraction of GDP, estimated by two different model specifications shown in Table 5. Shaded area shows the 90% confidence intervals.

(a) Estimated by the pooled regression–model (2) of Table 5



(b) Estimated by the FE regression–model (4) of Table 5

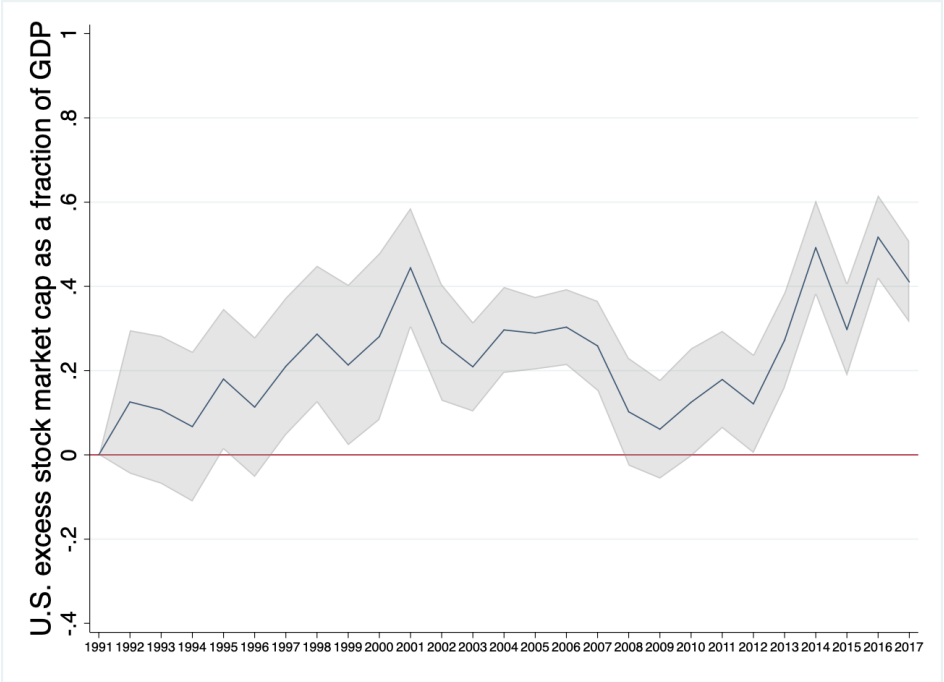
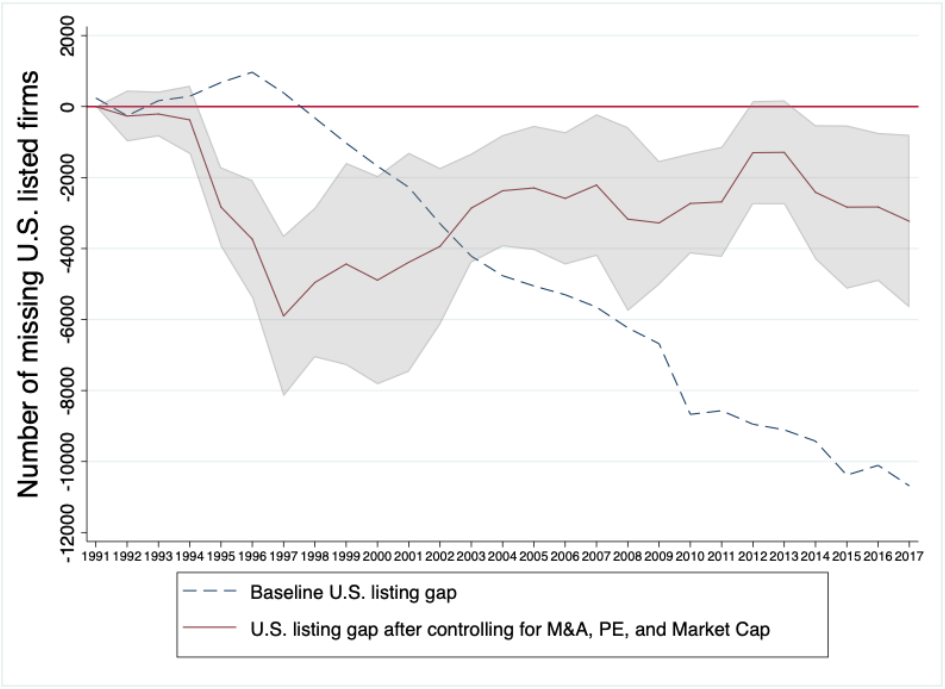


Figure 9: Reconciling the U.S. listing gap with the trends in M&A, PE, and Market Cap

These graphs show the impact of accounting for all aspects of equity financing on the U.S. listing gap using two different model specifications. The dashed lines show the baseline U.S. listing gap , shown in Figure 2, as a point of reference.

(a) U.S. listing gap after controlling for PE investments, M&A activity, and stock market capitalizations–estimated by the pooled regression as in Model (2) of Table 6



(b) U.S. listing gap after controlling for PE investments, M&A activity, and stock market capitalizations–estimated by the FE regression as in Model (4) of Table 6.

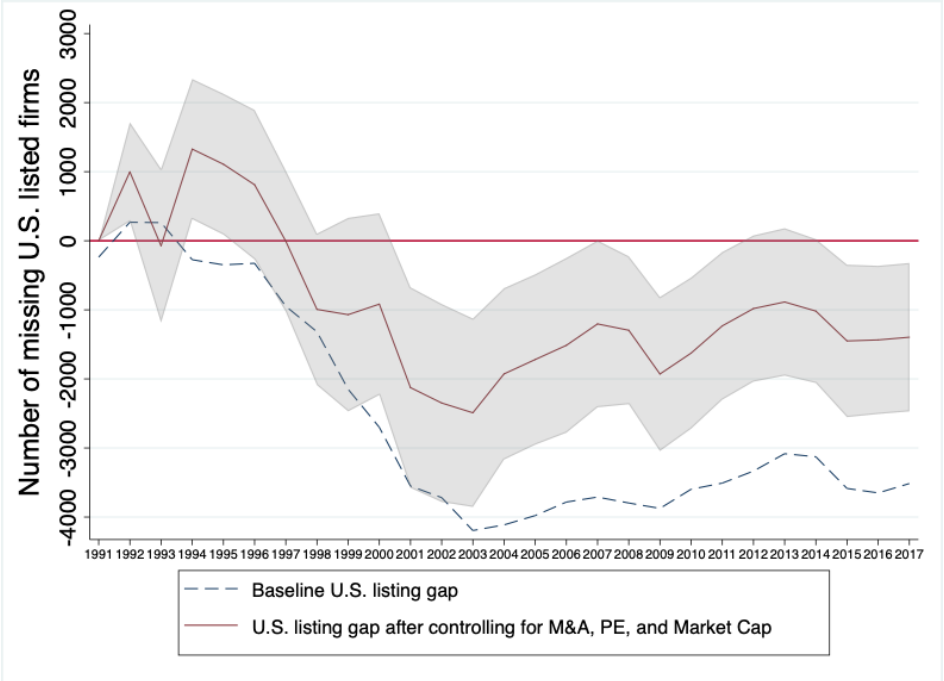
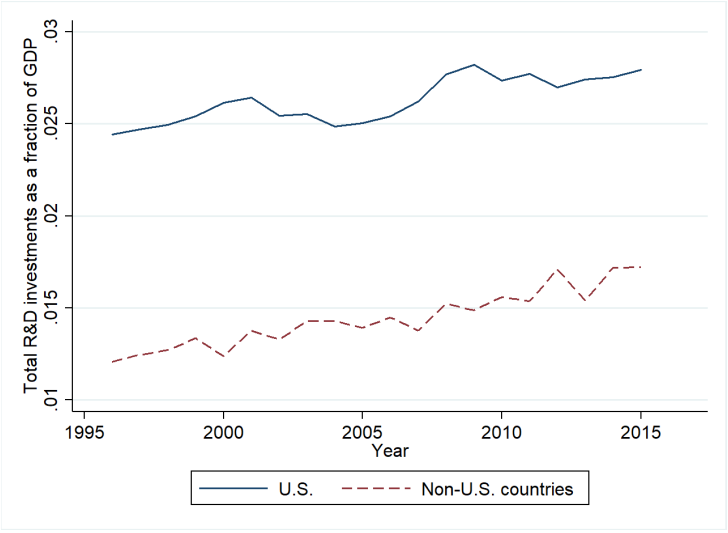
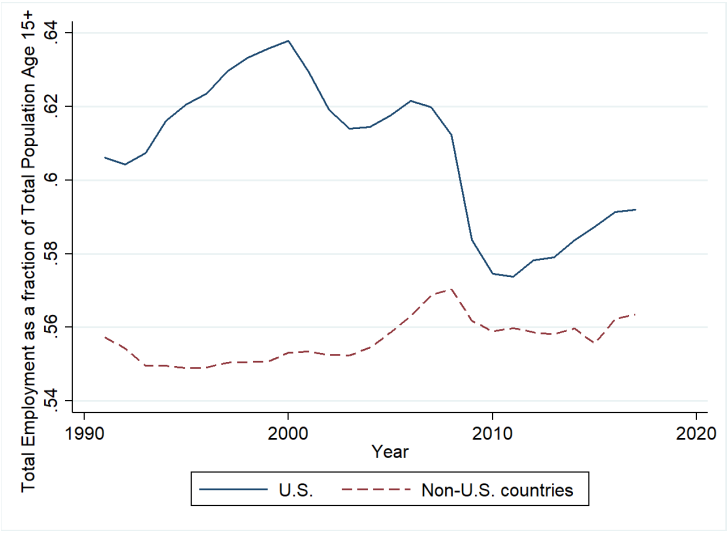


Figure 10: R&D expenditure, employment ratio, and Gini coefficient in the U.S. and non-U.S. countries

(a) R&D expenditure as a fraction of GDP (1990-2017)



(b) Employment ratio defined as the fraction of working age population (1990-2017)



(c) Gini coefficient (1990-2017)

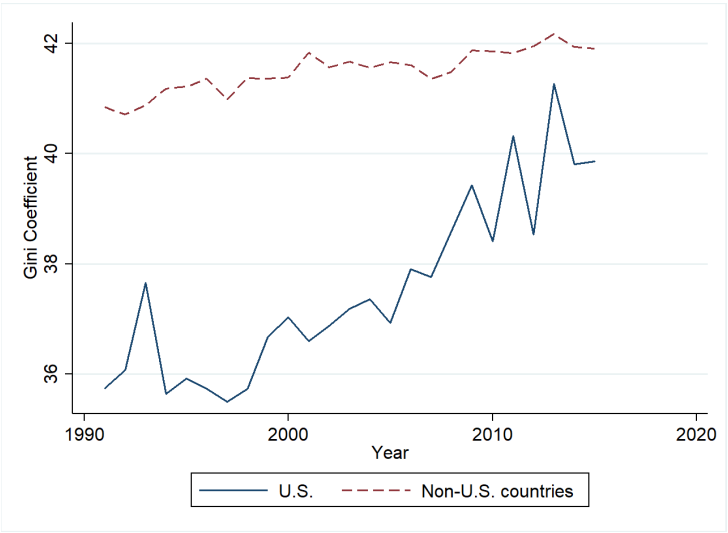


Figure 11: Evolution of the number of listings in non-U.S. regions and countries (1990-2017)

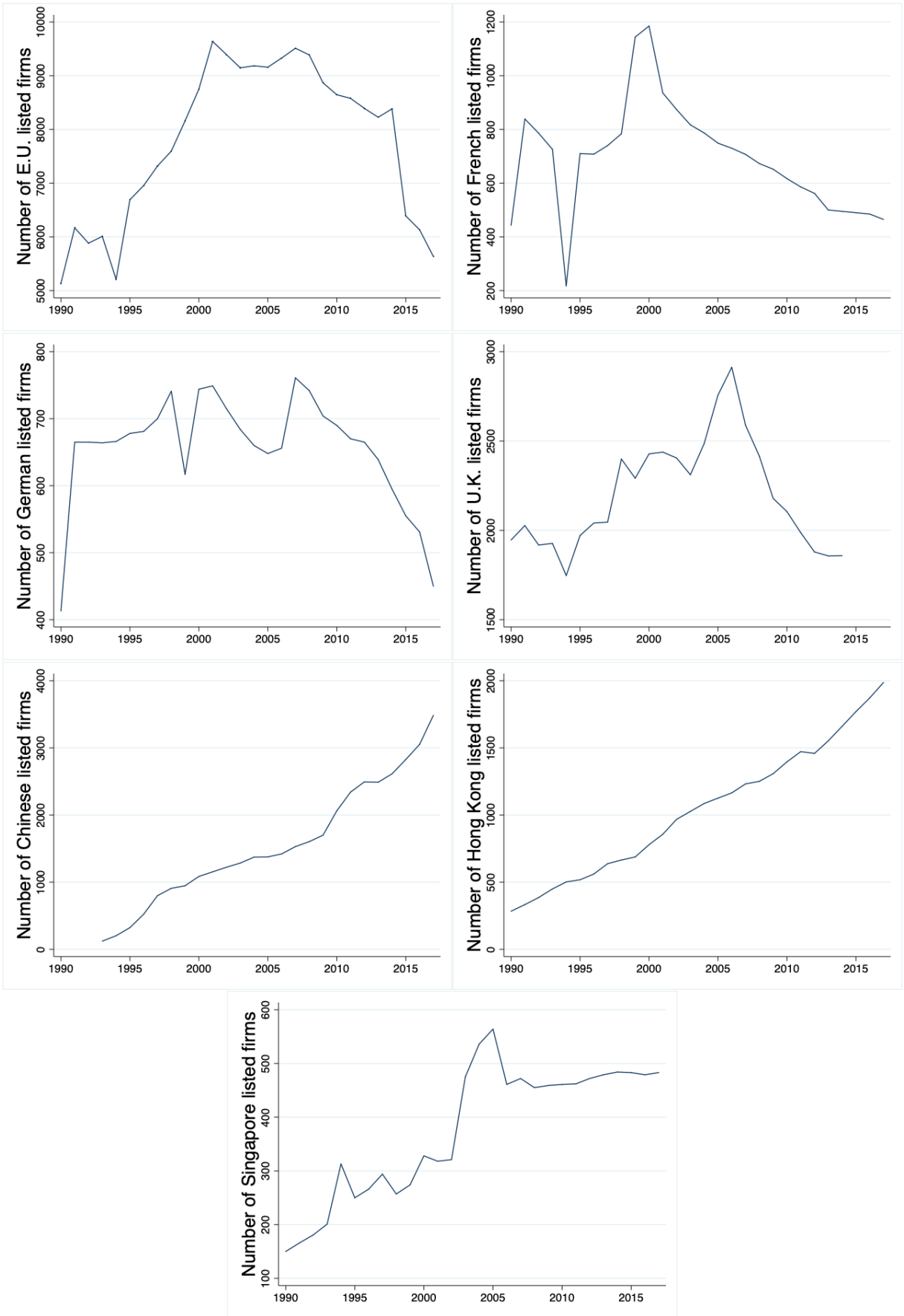
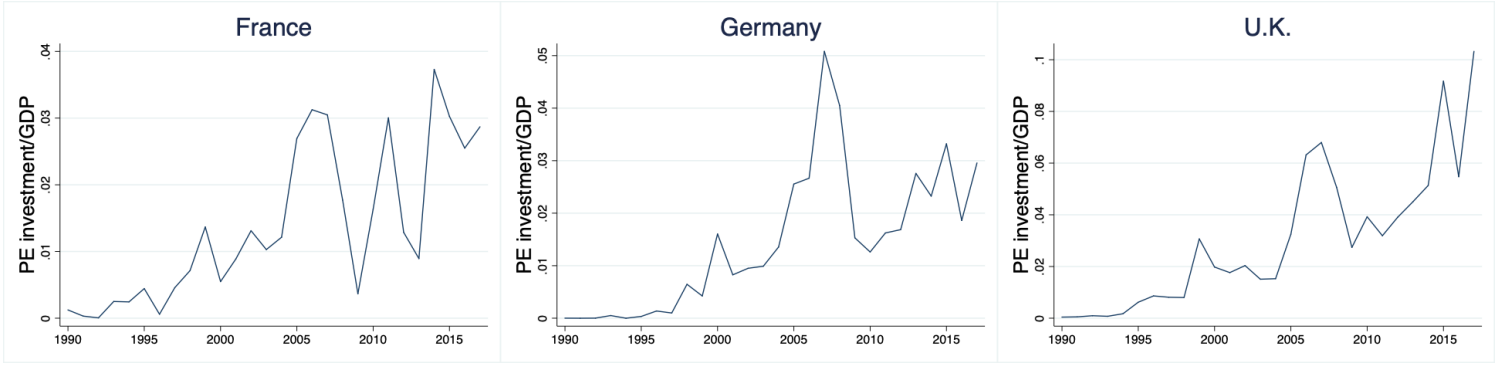
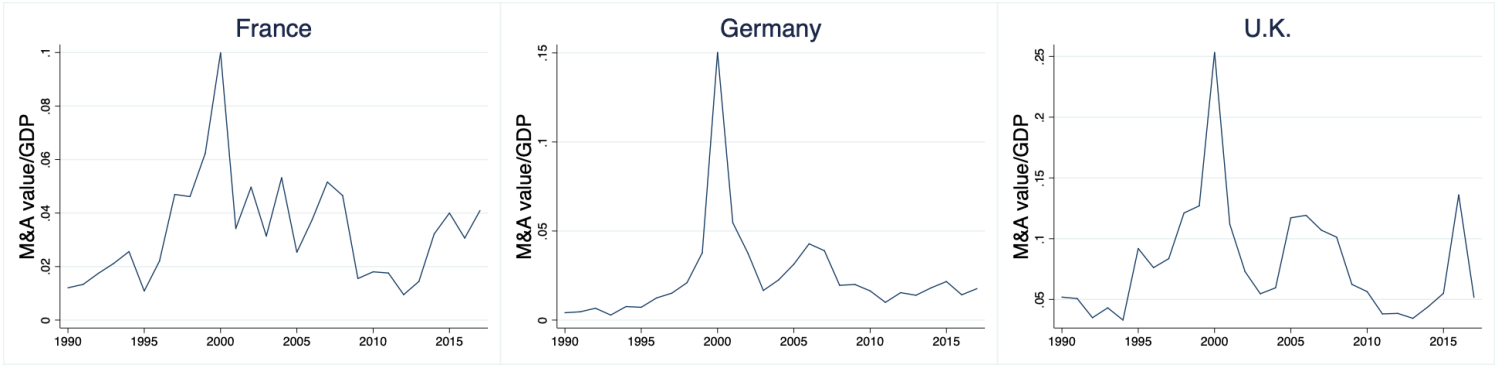


Figure 12: Is the new model of equity finance emerging in other countries?

(a) Private placements of equity as a fraction of GDP



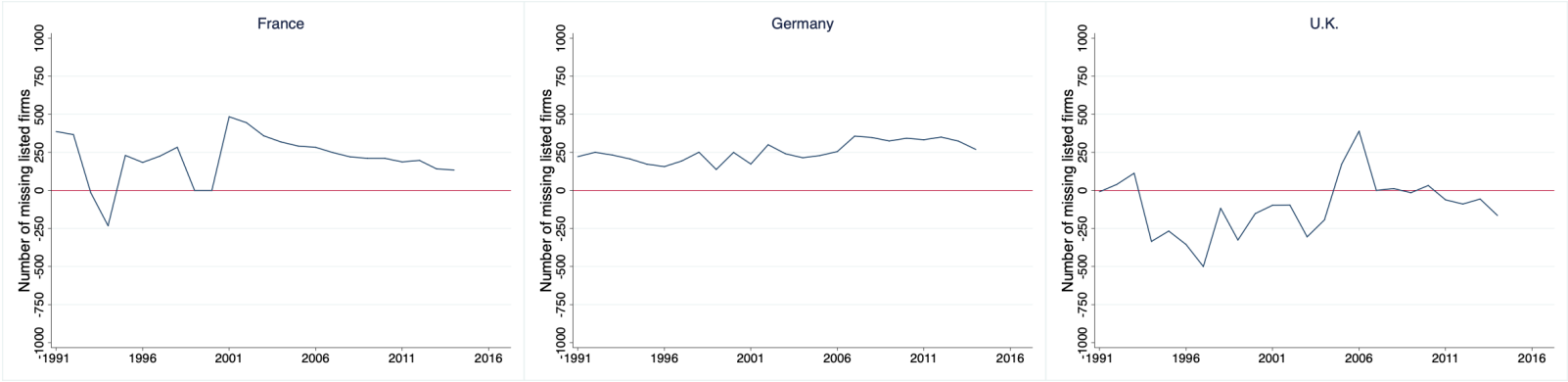
(b) Total M&A value as a fraction of GDP



(c) Stock market capitalization as a fraction of GDP

Figure 13: Estimating the listing gap for France, Germany, and the U.K. (1990-2017)

(a) Number of missing listed firms–Baseline fixed effects model (only GDP and banking controls).



(b) Number of missing listed firms–Fixed effects model with all controls.

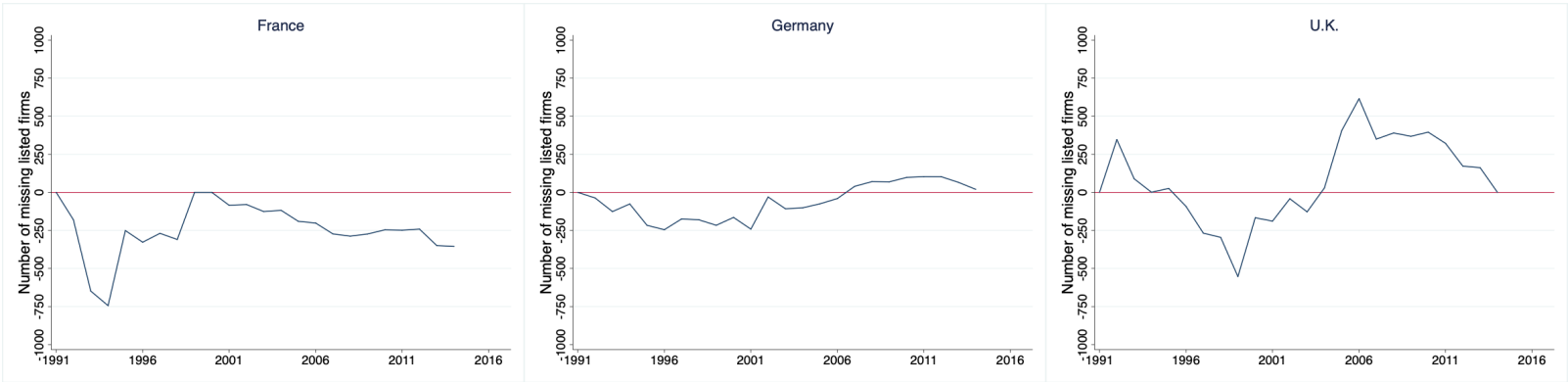


Table 1: Descriptive Statistics

This table describes our sample. Variable definitions are provided in Appendix B. All variables are Winsorized at the 1% and 99% levels.

Period:	1990-2017		'90-'95	'96-'00	'01-'05	'06-'10	'11-'17
	mean	S.D.	mean	mean	mean	mean	mean
Full Sample:							
GDP per Capita	9.220	1.388	8.886	8.869	9.067	9.480	9.704
GDP Growth	0.023	0.032	0.022	0.026	0.025	0.021	0.021
Size of the Banking Sector	0.707	0.578	0.586	0.603	0.708	0.782	0.854
1-Years Stock Market Returns	0.111	0.283	0.145	0.175	0.106	0.090	0.058
Size of the Private Equity Industry	0.011	0.018	0.001	0.004	0.008	0.017	0.020
Size of the Public Equity Market	0.720	0.963	0.477	0.650	0.677	0.961	0.835
Anti-Self Dealing Index	0.459	0.230	0.447	0.456	0.455	0.465	0.470
Log Firm per Capita	2.429	1.363	2.437	2.531	2.489	2.396	2.319
Number of M&A Transactions	19.280	21.070	14.590	19.108	20.860	22.880	18.770
Total M&A Activity	0.039	0.041	0.019	0.055	0.042	0.045	0.031
Total R&D to GDP	0.014	0.010	–	0.013	0.014	0.014	0.015
Employment Ratio	0.556	0.076	0.557	0.552	0.552	0.560	0.556
Gini Coefficient	41.63	5.63	40.74	41.17	41.75	42.17	42.49
United States sample:							
GDP per Capita	10.580	0.285	10.170	10.410	10.600	10.770	10.910
GDP Growth	0.015	0.016	0.012	0.031	0.016	-0.001	0.016
Size of the Banking Sector	0.679	0.099	0.604	0.578	0.643	0.756	0.807
1-Years Stock Market Returns	0.079	0.133	0.091	0.216	-0.024	0.004	0.101
Size of the Private Equity Industry	0.018	0.016	0.002	0.008	0.013	0.028	0.034
Size of the Public Equity Market	1.120	0.284	0.670	1.256	1.236	1.163	1.295
Anti-Self Dealing Index	0.544	0.000	0.544	0.544	0.544	0.544	0.544
Log Firm per Capita	2.956	0.304	3.279	3.305	2.941	2.739	2.594
Number of M&A Transactions	28.220	6.127	21.460	36.140	26.000	29.110	29.300
Total M&A Activity	0.070	0.038	0.030	0.123	0.069	0.078	0.060
Total R&D to GDP	0.026	0.001	–	0.025	0.025	0.026	0.027
Employment Ratio	0.607	0.020	0.611	0.631	0.618	0.602	0.583
Gini Coefficient	0.38	1.65	36.09	36.13	36.99	38.42	39.96
Non-U.S. sample:							
GDP per Capita	9.190	1.388	8.855	8.838	9.035	9.452	9.674
GDP Growth	0.023	0.032	0.022	0.026	0.026	0.021	0.018
Size of the Banking Sector	0.707	0.585	0.585	0.604	0.709	0.782	0.845
1-Years Stock Market Returns	0.111	0.286	0.147	0.189	0.108	0.092	0.077
Size of the Private Equity Industry	0.011	0.018	0.001	0.004	0.008	0.017	0.019
Size of the Public Equity Market	0.711	0.971	0.472	0.638	0.665	0.956	0.869
Anti-Self Dealing Index	0.457	0.233	0.444	0.454	0.453	0.464	0.467
Log Firm per Capita	2.417	1.375	2.417	2.515	2.479	2.388	2.298
Number of M&A Transactions	19.030	21.280	14.360	18.790	20.720	22.720	18.150
Total M&A Activity	0.038	0.041	0.019	0.054	0.041	0.044	0.029
Total R&D to GDP	0.013	0.009	–	0.012	0.014	0.013	0.015
Employment Ratio	0.554	0.077	0.556	0.551	0.551	0.559	0.554
Gini Coefficient	41.73	5.66	40.87	41.28	41.87	42.26	42.56

Table 2: Listings per capita and aggregate economic and financial characteristics

Variable definitions are provided in Appendix B. Standard errors are shown in parentheses. The *, **, and *** symbols denote statistical significance at 10%, 5%, and 1% levels, respectively.

Panel A: Level regressions

The two regression models below are used to generate the results in columns (1)–(2) and (3)–(4), respectively. The first model is similar to the one used by Doidge, Karolyi, and Stulz (2017) to document the U.S. listing gap. The second model includes country fixed effects and has a different set of interaction terms. Subscripts c and t index country and year, respectively. Variable $\alpha_{Non-U.S.}$ in the first model is a Non-U.S. dummy. Variables α_t and α_c are the year and country fixed effects. The U.S. listing gap, plotted in Figure 2, Panels A and B, is captured by the the year fixed effects α_t in the first model (columns 1-2) and by the interaction term Year FE×U.S. dummy in the second model (columns 3-4).

$$\log(\text{Listings per capita}_{ct}) = \beta_1 \log(\text{GDP per capita}_{ct}) + \beta_2 \text{GDP growth}_{c\ t-1,t} + \beta_3 \frac{\text{Bank deposits}_{ct-1}}{\text{GDP}_{ct-1}} + \beta_4 \text{Anti-self-dealing}_c + \alpha_t + \alpha_{Non-U.S.} + \alpha_t \times \alpha_{Non-U.S.} + \epsilon_{ct}$$

$$\log(\text{Listings per capita}_{ct}) = \beta_1 \log(\text{GDP per capita}_{ct}) + \beta_2 \text{GDP growth}_{c\ t-1,t} + \beta_3 \frac{\text{Bank deposits}_{ct-1}}{\text{GDP}_{ct-1}} + \alpha_t + \alpha_c + \alpha_t \times \alpha_c + \epsilon_{ct}$$

	log(Listings per capita)			
	Pooled regressions		Fixed effects regressions	
	(1)	(2)	(3)	(4)
log(GDP per capita)	0.702***	0.488***	0.397*	0.441**
	(0.095)	(0.102)	(0.201)	(0.201)
GDP growth	1.756	1.692	-0.245	-0.215
	(2.693)	(2.557)	(0.612)	(0.550)
Bank deposits/GDP		0.849***		0.894***
		(0.273)		(0.178)
Anti-self-dealing index	0.782	0.427		
	(0.613)	(0.576)		
Non-U.S. dummy	0.129	-0.099		
	(0.226)	(0.233)		
Country FE	No	No	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Year FE×non-U.S. dummy	Yes	Yes	No	No
Year FE×U.S. dummy	No	No	Yes	Yes
N	1301	1224	1301	1224
adj. R^2	0.406	0.484	0.056	0.129

Table 2: Listings per capita and aggregate economic and financial characteristics (continued)

Panel B: First difference regressions

The regression model below is used to generate the results shown in this panel. Subscripts c and t index country and year, respectively. Variables α_t and α_c are the year and country fixed effects. Changes in the U.S. listing gap, plotted in Figure 2, Panel C, are captured by the interaction term Year FE×U.S. dummy.

$$\log\left[\Delta(\text{Listings per capita}_{ct})\right] = \beta_1 \text{GDP growth}_{c\ t-1,t} + \beta_2 \Delta\left(\frac{\text{Bank deposits}_{ct}}{\text{GDP}_{ct}}\right) + \alpha_t + \alpha_c + \alpha_t \times \alpha_c + \epsilon_{ct}$$

	$\log\left[\Delta(\text{Listings per capita})\right]$	
	(1)	(2)
GDP growth	3.526***	3.114***
	(0.852)	(0.873)
Δ(Bank deposits/GDP)		-0.310
		(0.425)
Country FE	Yes	Yes
Year FE	Yes	Yes
Year FE×U.S. dummy	Yes	Yes
N	1282	1195
adj. R^2	0.066	0.056

Table 3: Private placements of equity and aggregate economic and financial characteristics

The two regression models below are used to generate the results in columns (1)–(2) and (3)–(4), respectively. Subscripts c and t index country and year, respectively. Variable $\alpha_{Non-U.S.}$ in the first model is a Non-U.S. dummy. Variables α_t and α_c are the year and country fixed effects. The U.S. excess private placements of equity, plotted in Figure 4, is captured by the year fixed effects α_t in the first model (columns 1-2) and by the interaction term Year FE×U.S. dummy in the second model (columns 3-4).

$$\frac{\text{PE investment}_{ct}}{\text{GDP}_{ct}} = \beta_1 \log(\text{GDP per capita}_{ct}) + \beta_2 \text{GDP growth}_{c\ t-1,t} + \beta_3 \frac{\text{Bank deposits}_{ct}}{\text{GDP}_{ct}} + \beta_4 \text{Stock returns}_{c\ t-1,t}$$
$$+\beta_5 \frac{\text{Stock market cap}_{ct-1}}{\text{GDP}_{ct-1}} + \beta_6 \frac{\text{M\&A value}_{ct-1}}{\text{GDP}_{ct-1}} + \beta_7 \log(\text{M\&A deals per capita}_{ct-1}) + \alpha_t + \alpha_{Non-U.S.}$$
$$+\alpha_t \times \alpha_{Non-U.S.} + \epsilon_{ct}$$

$$\frac{\text{PE investment}_{ct}}{\text{GDP}_{ct}} = \beta_1 \log(\text{GDP per capita}_{ct}) + \beta_2 \text{GDP growth}_{c\ t-1,t} + \beta_3 \frac{\text{Bank deposits}_{ct}}{\text{GDP}_{ct}} + \beta_4 \text{Stock returns}_{c\ t-1,t}$$
$$+\beta_5 \frac{\text{Stock market cap}_{ct-1}}{\text{GDP}_{ct-1}} + \beta_6 \frac{\text{M\&A value}_{ct-1}}{\text{GDP}_{ct-1}} + \beta_7 \log(\text{M\&A deals per capita}_{ct-1}) + \alpha_t + \alpha_c + \alpha_t \times \alpha_c + \epsilon_{ct}$$

Coefficients are multiplied by 100 for easier readability. Variable definitions are provided in Appendix B. Standard errors are shown in parentheses. The *, **, and *** symbols denote statistical significance at 10%, 5%, and 1% levels, respectively.

	PE investment/GDP			
	Pooled regressions		Fixed effects regressions	
	(1)	(2)	(3)	(4)
log(GDP per capita)	0.497***	0.210	-0.238	0.138
	(0.108)	(0.163)	(0.237)	(0.290)
GDP growth	1.451	2.658	-0.056	0.456
	(2.072)	(1.938)	(1.787)	(1.908)
Bank deposits/GDP		0.352		1.388**
		(0.576)		(0.535)
Stock market cap/GDP		-0.051		0.356
		(0.315)		(0.265)
Stock returns		-0.256		-0.302
		(0.252)		(0.231)
Total M&A value/GDP		6.946*		-0.740
		(3.977)		(1.578)
log(Total M&A deals per capita)		0.206		-0.092
		(0.126)		(0.173)
Non-U.S. dummy	0.107	0.034		
	(0.123)	(0.176)		
Country FE	No	No	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Year FE×non-U.S. dummy	Yes	Yes	No	No
Year FE×U.S. dummy	No	No	Yes	Yes
N	1199	852	1199	852
adj. R^2	0.295	0.330	0.312	0.304

Table 4: M&A activity and aggregate economic and financial characteristics

The two regression models below are used to generate the results in columns (1)–(3) and (4)–(6), respectively. Subscripts c and t index country and year, respectively. Variable $\alpha_{Non-U.S.}$ in the first model is a Non-U.S. dummy. Variables α_t and α_c are the year and country fixed effects. The U.S. excess M&A activity, plotted in Figure 6, is captured by the year fixed effects α_t in the first model (columns 1-3) and by the interaction term Year FE×U.S. dummy in the second model (columns 4-6).

$$\frac{\text{Total M\&A value}_{ct}}{\text{GDP}_{ct}} = \beta_1 \log(\text{GDP per capita}_{ct}) + \beta_2 \text{GDP growth}_{c\ t-1,t} + \beta_3 \frac{\text{Bank deposits}_{ct-1}}{\text{GDP}_{ct-1}} + \beta_4 \frac{\text{PE investment}_{ct-1}}{\text{GDP}_{ct-1}}$$
$$+\beta_5 \frac{\text{Stock market cap}_{ct-1}}{\text{GDP}_{ct-1}} + \beta_6 \text{Stock returns}_{c\ t-1,t} + \alpha_t + \alpha_{Non-U.S.} + \alpha_t \times \alpha_{Non-U.S.} + \epsilon_{ct}$$

$$\frac{\text{Total M\&A value}_{ct}}{\text{GDP}_{ct}} = \beta_1 \log(\text{GDP per capita}_{ct}) + \beta_2 \text{GDP growth}_{c\ t-1,t} + \beta_3 \frac{\text{Bank deposits}_{ct-1}}{\text{GDP}_{ct-1}} + \beta_4 \frac{\text{PE investment}_{ct-1}}{\text{GDP}_{ct-1}}$$
$$+\beta_5 \frac{\text{Stock market cap}_{ct-1}}{\text{GDP}_{ct-1}} + \beta_6 \text{Stock returns}_{c\ t-1,t} + \alpha_t + \alpha_c + \alpha_t \times \alpha_c + \epsilon_{ct}$$

Coefficients are multiplied by 100 for easier readability. Variable definitions are provided in Appendix B. Standard errors are shown in parentheses. The *, **, and *** symbols denote statistical significance at 10%, 5%, and 1% levels, respectively.

	Total M&A value/GDP			
	Pooled regressions		Fixed effects regressions	
	(1)	(2)	(3)	(4)
log(GDP per capita)	1.245***	0.452***	0.460	0.500
	(0.276)	(0.132)	(0.496)	(0.577)
GDP growth	12.207*	5.444	9.082**	6.896
	(6.420)	(4.078)	(4.195)	(4.930)
Bank deposits/GDP		1.079		2.474**
		(1.159)		(1.083)
Stock market cap/GDP		2.017***		1.401***
		(0.497)		(0.518)
Stock returns		-0.294		-0.556
		(0.583)		(0.484)
PE investment/GDP		48.446***		22.746
		(12.557)		(17.816)
Non-U.S. dummy	0.492	-0.417		
	(0.565)	(0.493)		
Country FE	No	No	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Year FE×non-U.S. dummy	Yes	Yes	No	No
Year FE×U.S. dummy	No	No	Yes	Yes
N	1124	834	1124	834
adj. R^2	0.268	0.464	0.268	0.258

Table 5: Stock market capitalization and aggregate economic and financial characteristics

Estimations of the following two regression models are shown in columns (1)–(2) and (3)–(4), respectively. The U.S. excess stock market capitalization, plotted in Figure 8, is captured by the year fixed effects α_t in the first model (columns 1-2) and by the interaction term Year FE×U.S. dummy in the second model (columns 3-4).

$$\frac{\text{Stock Mkt cap}_{ct}}{\text{GDP}_{ct}} = \beta_1 \log(\text{GDP per capita}_{ct}) + \beta_2 \text{GDP growth}_{ct} + \beta_3 \frac{\text{Bank deposits}_{ct-1}}{\text{GDP}_{ct-1}}$$
$$+\beta_4 \frac{\text{PE investment}_{ct-1}}{\text{GDP}_{ct-1}} + \beta_5 \text{Stock ret}_{c\ t-1,t} + \beta_6 \text{Anti-self-dealing}_c + \beta_7 \frac{\text{M\&A value}_{ct-1}}{\text{GDP}_{ct-1}}$$
$$+\beta_8 \log(\text{M\&A deals per capita}_{ct-1}) + \alpha_t + \alpha_{Non-U.S.} + \alpha_t \times \alpha_{Non-U.S.} + \epsilon_{ct}$$

$$\frac{\text{Stock Mkt cap}_{ct}}{\text{GDP}_{ct}} = \beta_1 \log(\text{GDP per capita}_{ct}) + \beta_2 \text{GDP growth}_{ct} + \beta_3 \frac{\text{Bank deposits}_{ct-1}}{\text{GDP}_{ct-1}}$$
$$+\beta_4 \frac{\text{PE investment}_{ct-1}}{\text{GDP}_{ct-1}} + \beta_5 \text{Stock ret}_{c\ t-1,t} + \beta_6 \frac{\text{M\&A value}_{ct-1}}{\text{GDP}_{ct-1}} + \beta_7 \log(\text{M\&A deals per capita}_{ct-1})$$
$$+\alpha_t + \alpha_c + \alpha_t \times \alpha_c + \epsilon_{ct}$$

Variable definitions are provided in Appendix B. Standard errors are shown in parentheses. The *, **, and *** symbols denote statistical significance at 10%, 5%, and 1% levels, respectively.

	Aggregate stock market cap/GDP			
	Pooled regressions		Fixed effects regressions	
	(1)	(2)	(3)	(4)
log(GDP per capita)	0.069	0.170	-0.011	-0.011
	(0.165)	(0.152)	(0.125)	(0.123)
GDP growth	1.494	1.846*	2.406***	2.383***
	(0.937)	(1.005)	(0.681)	(0.662)
Bank deposits/GDP	0.228*	0.179*	-0.138	-0.133
	(0.117)	(0.098)	(0.214)	(0.217)
PE investment/GDP	1.697	3.420**	1.000	1.081
	(1.328)	(1.551)	(1.084)	(1.077)
Stock returns	0.459***	0.432***	0.292**	0.293**
	(0.132)	(0.138)	(0.133)	(0.131)
Anti-self-dealing index	-0.263	-0.216		
	(0.445)	(0.422)		
Total M&A value/GDP	2.434**		0.191	
	(1.033)		(0.399)	
log(Total M&A deals per capita)	0.129		0.004	
	(0.083)		(0.058)	
Public target M&A value/GDP		2.298		-0.100
		(1.487)		(0.548)
log(Public target M&A deals per capita)		0.149*		0.049
		(0.084)		(0.050)
Non-U.S. dummy	0.022	-0.010		
	(0.121)	(0.116)		
Country FE	No	No	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Year FE×non-U.S. dummy	Yes	Yes	No	No
Year FE×U.S. dummy	No	No	Yes	Yes
N	539	539	539	539
adj. R^2	0.358	0.338	0.425	0.428

Table 6: Reconciling the U.S. listing gap with the trends in M&A, PE, and Market Cap.

Estimations of the following two regression models are shown in columns (1)–(2) and (3)–(4), respectively.

$$\log(\text{Listings per capita}_{ct}) = \beta_1 \log(\text{GDP per capita}_{ct}) + \beta_2 \text{GDP growth}_{ct} + \beta_3 \frac{\text{Bank deposits}_{ct-1}}{\text{GDP}_{ct-1}}$$
$$+\beta_4 \frac{\text{Stock market cap}_{ct-1}}{\text{GDP}_{ct-1}} + \beta_5 \frac{\text{PE investment}_{ct-1}}{\text{GDP}_{ct-1}} + \beta_6 \text{Anti-self-dealing}_c + \beta_7 \frac{\text{M\&A value}_{ct-1}}{\text{GDP}_{ct-1}}$$
$$+\beta_8 \log(\text{M\&A deals per capita}_{ct-1}) + \alpha_t + \alpha_{Non-U.S.} + \alpha_t \times \alpha_{Non-U.S.} + \epsilon_{ct}$$

$$\log(\text{Listings per capita}_{ct}) = \beta_1 \log(\text{GDP per capita}_{ct}) + \beta_2 \text{GDP growth}_{ct} + \beta_3 \frac{\text{Bank deposits}_{ct-1}}{\text{GDP}_{ct-1}}$$
$$+\beta_4 \frac{\text{Stock market cap}_{ct-1}}{\text{GDP}_{ct-1}} + \beta_5 \frac{\text{PE investment}_{ct-1}}{\text{GDP}_{ct-1}} + \beta_6 \frac{\text{M\&A value}_{ct-1}}{\text{GDP}_{ct-1}} + \beta_7 \log(\text{M\&A deals per capita}_{ct-1})$$
$$+\alpha_t + \alpha_c + \alpha_t \times \alpha_c + \epsilon_{ct}$$

Variable definitions are provided in Appendix B. Standard errors are shown in parentheses. The *, **, and *** symbols denote statistical significance at 10%, 5%, and 1% levels, respectively.

	log(Listings per capita)			
	Pooled regressions		Fixed effects regressions	
	(1)	(2)	(3)	(4)
log(GDP per capita)	-0.073	0.252***	0.456**	0.487***
	(0.140)	(0.089)	(0.181)	(0.181)
GDP growth	0.202	0.180	-0.107	-0.151
	(1.915)	(1.894)	(0.622)	(0.584)
Bank deposits/GDP	0.494***	0.255	0.708***	0.772***
	(0.131)	(0.162)	(0.135)	(0.131)
Anti-self-dealing index	-0.180	-0.187		
	(0.543)	(0.497)		
Stock market cap/GDP	0.439***	0.434***	0.096	0.074
	(0.124)	(0.133)	(0.097)	(0.097)
PE investment/GDP	-7.341**	-3.167	-1.749*	-1.550*
	(2.814)	(2.962)	(0.930)	(0.845)
Total M&A value/GDP	-2.020		-0.066	
	(1.265)		(0.521)	
log(Total M&A deals per capita)	0.755***		0.232***	
	(0.127)		(0.069)	
Public target M&A value/GDP		-3.434*		-0.706
		(1.831)		(0.701)
log(Public target M&A deals per capita)		1.023***		0.297***
		(0.136)		(0.102)
Non-U.S. dummy	0.648**	0.598***		
	(0.246)	(0.211)		
Country FE	No	No	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Year FE×non-U.S. dummy	Yes	Yes	No	No
Year FE×U.S. dummy	No	No	Yes	Yes
N	848	848	848	848
adj. R^2	0.660	0.687	0.195	0.205

Table 7: U.S. equity financing through the lens of a VAR model

Panel A: The VAR model estimations

This panel shows the estimation results for a vector autoregression (VAR) model to study the interconnections between the four features of the modern American equity financing. We only use U.S. time series from 1990 to 2017 to estimate the VAR. Each column shows one of the equations. We include up to three lags of each variable in the model. Variable definitions are provided in Appendix B. Standard errors are shown in parentheses. The *, **, and *** symbols denote statistical significance at 10%, 5%, and 1% levels, respectively.

	(1) $\frac{\text{PT M\&A value}}{\text{GDP}}$	(2) log(#PT M&A)	(3) $\frac{\text{PE inv}}{\text{GDP}}$	(4) log(#Listings)	(5) $\frac{\text{Mkt Cap}}{\text{GDP}}$
Public target M&A value/GDP					
$t-1$	0.158	0.960	0.308**	0.048	1.069
	(0.242)	(1.440)	(0.139)	(0.346)	(1.392)
$t-2$	-0.458**	-1.561	-0.243*	-0.291	-4.057***
	(0.227)	(1.347)	(0.130)	(0.324)	(1.302)
$t-3$	-0.616**	-3.133**	-0.206	-0.699*	-2.866*
	(0.269)	(1.602)	(0.154)	(0.385)	(1.548)
log(Public target M&A deals per capita)					
$t-1$	0.008	0.132	-0.036	-0.002	0.178
	(0.040)	(0.242)	(0.023)	(0.058)	(0.233)
$t-2$	0.028	0.152	0.030	0.008	-0.230
	(0.041)	(0.244)	(0.023)	(0.058)	(0.236)
$t-3$	0.038	-0.286	-0.025	-0.182***	0.488**
	(0.035)	(0.211)	(0.020)	(0.050)	(0.204)
PE investment/GDP					
$t-1$	-0.324	-1.433	-0.252	-1.602***	-8.648***
	(0.334)	(1.986)	(0.191)	(0.478)	(1.919)
$t-2$	-0.087	-0.114	-0.376	-1.094*	-3.263
	(0.418)	(2.486)	(0.239)	(0.598)	(2.403)
$t-3$	0.327	1.799	-0.133	0.112	0.893
	(0.346)	(2.056)	(0.198)	(0.495)	(1.986)
log(Listings per capita)					
$t-1$	-0.046	1.947**	0.119	0.906***	0.256
	(0.137)	(0.815)	(0.078)	(0.196)	(0.787)
$t-2$	-0.027	-0.721	-0.071	0.196	0.482
	(0.160)	(0.951)	(0.091)	(0.229)	(0.919)
$t-3$	0.072	0.243	-0.052	0.026	-1.314**
	(0.113)	(0.671)	(0.064)	(0.161)	(0.648)
Stock market cap/GDP					
$t-1$	0.059	-0.227	-0.010	-0.012	0.957***
	(0.037)	(0.221)	(0.021)	(0.053)	(0.214)
$t-2$	0.092**	0.382	0.030	-0.004	0.213
	(0.041)	(0.245)	(0.023)	(0.059)	(0.237)
$t-3$	-0.029	0.214	0.044**	0.054	0.397*
	(0.038)	(0.230)	(0.022)	(0.055)	(0.222)
Constant	-0.151	-3.399***	0.023	-0.154	1.045
	(0.127)	(0.758)	(0.073)	(0.182)	(0.732)

Table 7: U.S. equity financing through the lens of a VAR model (continued)

Panel B: Granger causality Wald test

This panel shows the Granger causality test results based on the VAR estimations in Panel A. Each of the five blocks below is derived from one of the VAR equations, respectively. Each block shows p-values for the Wald tests of the hypotheses that "the dependent variable is not Granger caused by each of the other variables." Variable definitions are provided in Appendix B.

Dependent variable	H_0 : The dependent variable is not Granger caused by:	χ^2	df	p-value	H_0 Rejected at 10%?
PT M&A value/GDP	log(#PT M&A per cap.)	5.320	3	0.150	No
PT M&A value/GDP	PE investment/GDP	1.930	3	0.587	No
PT M&A value/GDP	log(Listings per cap.)	0.470	3	0.925	No
PT M&A value/GDP	Stock market cap/GDP	21.940	3	0.000	Yes
PT M&A value/GDP	ALL	37.522	12	0.000	Yes
log(#PT M&A per cap.)	PT M&A value/GDP	7.793	3	0.049	Yes
log(#PT M&A per cap.)	PE investment/GDP	1.301	3	0.729	No
log(#PT M&A per cap.)	log(Listings per cap.)	25.241	3	0.000	Yes
log(#PT M&A per cap.)	Stock market cap/GDP	5.608	3	0.132	No
log(#PT M&A per cap.)	ALL	71.128	12	0.000	Yes
PE investment/GDP	PT M&A value/GDP	10.914	3	0.012	Yes
PE investment/GDP	log(#PT M&A per cap.)	4.016	3	0.260	No
PE investment/GDP	log(Listings per capita)	2.890	3	0.409	No
PE investment/GDP	Stock market cap/GDP	14.684	3	0.002	Yes
PE investment/GDP	ALL	58.47	12	0.000	Yes
log(Listings per capita)	PT M&A value/GDP	6.078	3	0.098	Yes
log(Listings per capita)	log(#PT M&A per cap.)	20.366	3	0.000	Yes
log(Listings per capita)	PE investment/GDP	17.18	3	0.001	Yes
log(Listings per capita)	Stock market cap/GDP	1.297	3	0.730	No
log(Listings per capita)	ALL	114.470	12	0.000	Yes
Stock market cap/GDP	PT M&A value/GDP	19.736	3	0.000	Yes
Stock market cap/GDP	log(#PT M&A per cap.)	7.340	3	0.062	Yes
Stock market cap/GDP	PE investment/GDP	25.077	3	0.000	Yes
Stock market cap/GDP	log(Listings per capita)	8.550	3	0.036	Yes
Stock market cap/GDP	ALL	75.508	12	0.000	Yes

A Countries Included in the Main Sample

Argentina
Australia
Austria
Belgium
Brazil
Canada
Chile
China
Colombia
Croatia
Czech Republic
Denmark
Egypt, Arab Rep.
Finland
France
Germany
Greece
Hong Kong
India
Indonesia
Ireland
Israel
Italy
Japan
Jordan
Kenya
Korea, Rep.
Lithuania
Luxembourg
Malaysia
Mexico
Netherlands
New Zealand
Nigeria
Norway
Pakistan
Philippines
Poland
Portugal
Russian Federation
Singapore
South Africa
Spain
Sri Lanka
Sweden
Switzerland
Thailand
Turkey
United Kingdom
United States
Venezuela
Zimbabwe

B Variable definitions

Table B.1: Variable definitions

Variable name	Definition	Source
GDP per Capita	The natural logarithm of a country's gross domestic product, scaled by its total Population.	World Development Indicators (World Bank)
GDP Growth	A country year-on-year percentage change in its GDP.	World Development Indicators (World Bank)
Size of the Banking Sector	The ratio of a country's total bank deposits to its GDP.	World Development Indicators (World Bank)
Size of the Private Equity Industry	The ratio of a country's total value of private placements of equity (VC, PE, etc.) to its GDP.	PitchBook Dataset
Size of the Public Equity Market	The ratio of a country's aggregate stock market capitalization to its GDP.	WDI Dataset
1-Years Stock Market Returns	The average annual return observed for a country's main equity index over the last calendar year.	Global Financial Development (World Bank)
Anti-Self Dealing Index	Anti-Self Dealing Index as measured by Djankov, La Porta, Lopez-de-Silanes, and Shleifer (2008)	Rafael La Porta's Website
Firm per Capita	The number of domestic publicly listed corporations at the end of a given calendar year.	World Development Indicators (World Bank)
Number of M&A Transactions	The ratio of a country's total number of completed M&A transactions to its total population.	Thomson Reuters' SDC Platinum
Total M&A Activity	Cumulative value of M&A transactions completed in a given country-calendar year to its GDP.	Thomson Reuters' SDC Platinum
Total R&D to GDP	Country-year investments in research and development, scaled by the country's GDP	World Development Indicators (World Bank)
Employment Ratio	Total number of employed and self-employed people to total population aged 15+.	World Development Indicators (World Bank)
Gini Coefficient	The Estimated Household Income Inequality based Gini Coefficient. Missing country-year observations are estimated via linear interpolation.	EHII Dataset of University of Texas, Inequality Project.

C Complementary evidence on the U.S. listing gap

Table C.2: Listing per capita and aggregate economic and financial characteristics (full table)

This table present the full table results for the models presented in Table 2. The dependent variable for models (1) (left panel) and (2) (right panel) is log(Listings per capita), and for model (3) (right panel) is log $\left[\Delta(\text{Listings per capita}_{ct})\right]$.

	(1) log(LPC)		(2) log(LPC)	(3) log $\left[\Delta(\text{LPC})\right]$
log(GDP per capita)	0.488***	log(GDP per capita)	0.441**	
GDP growth	1.692	GDP growth	-0.215	3.114***
Anti-self-dealing index	0.427	Bank deposits/GDP	0.894***	
Bank deposits/GDP	0.849***	Δ(Bank deposits/GDP)		-0.310
Non-U.S. dummy	-0.099	1990×U.S. dummy	0.000	0.000
1990	0.000	1991×U.S. dummy	-0.044	0.402***
1991	0.038	1992×U.S. dummy	0.063	0.156
1992	-0.039	1993×U.S. dummy	0.056	0.399***
1993	0.024	1994×U.S. dummy	0.113	0.348***
1994	0.041	1995×U.S. dummy	0.130	0.462***
1995	0.095*	1996×U.S. dummy	0.132	0.499***
1996	0.127*	1997×U.S. dummy	0.066	-0.174*
1997	0.050	1998×U.S. dummy	0.030	-0.452***
1998	-0.042	1999×U.S. dummy	-0.029	-0.179**
1999	-0.133	2000×U.S. dummy	-0.075	-0.254**
2000	-0.217***	2001×U.S. dummy	-0.260**	-0.874***
2001	-0.313***	2002×U.S. dummy	-0.325**	-0.301***
2002	-0.458***	2003×U.S. dummy	-0.405***	-0.245**
2003	-0.586***	2004×U.S. dummy	-0.386***	0.204*
2004	-0.648***	2005×U.S. dummy	-0.360***	0.157
2005	-0.684***	2006×U.S. dummy	-0.331**	0.278**
2006	-0.709***	2007×U.S. dummy	-0.329**	0.254**
2007	-0.745***	2008×U.S. dummy	-0.397***	-0.144
2008	-0.848***	2009×U.S. dummy	-0.473***	0.200**
2009	-0.923***	2010×U.S. dummy	-0.449***	0.308***
2010	-1.107***	2011×U.S. dummy	-0.432***	0.247**
2011	-1.116***	2012×U.S. dummy	-0.403***	0.337***
2012	-1.157***	2013×U.S. dummy	-0.358**	0.437***
2013	-1.156***	2014×U.S. dummy	-0.334**	0.358***
2014	-1.150***	2015×U.S. dummy	-0.395***	0.257**
2015	-1.215***	2016×U.S. dummy	-0.389***	0.353***
2016	-1.204***	2017×U.S. dummy	-0.357**	0.308***
2017	-1.243***	Year FE	Yes	Yes
Year FE×non-U.S. dummy	Yes	Country FE	Yes	Yes
N	1224	N	1224	1195
adj. R^2	0.484	adj. R^2	0.129	0.056