NBER WORKING PAPER SERIES

IS FINANCIAL GLOBALIZATION IN REVERSE AFTER THE 2008 GLOBAL FINANCIAL CRISIS? EVIDENCE FROM CORPORATE VALUATIONS

Craig Doidge
G. Andrew Karolyi
René M. Stulz

Working Paper 27022
http://www.nber.org/papers/w27022

NATIONAL BUREAU OF ECONOMIC RESEARCH
1050 Massachusetts Avenue
Cambridge, MA 02138
April 2020

We thank Michele Dathan, Mark Johnson, Byungwook Kim, and Dawoon Kim for research assistance. Comments from Matt Baron, Luo Zuo, and seminar participants at Cornell are appreciated. The views expressed herein are those of the authors and do not necessarily reflect the views of the National Bureau of Economic Research.

At least one co-author has disclosed a financial relationship of potential relevance for this research. Further information is available online at http://www.nber.org/papers/w27022.ack

Is Financial Globalization in Reverse After the 2008 Global Financial Crisis? Evidence from Corporate Valuations

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

NBER Working Paper No. 27022
April 2020
JEL No. F21,F65,G10,G15,G34

ABSTRACT

For the last two decades, non-US firms have lower valuations than similar US firms. We study the evolution of this valuation gap to assess whether financial markets are less integrated after the 2008 global financial crisis (GFC). The valuation gap for firms from developed markets increases by 31%after the GFC – a reversal in financial globalization – while the gap for firms from emerging markets (excluding China) stays stable. There is no evidence of greater segmentation for non-US firms cross-listed on major US exchanges and the typical valuation premium of such firms relative to domestic counterparts stays unchanged. However, the number of such firms shrinks sharply, so that the importance of US cross-listings as a mechanism for market integration diminishes.

Craig Doidge
University of Toronto
105 St. George St.
Toronto, Ontario M5S 3E6
Canada
craig.doidge@rotman.utoronto.ca

G. Andrew Karolyi
Samuel Curtis Johnson Graduate School
of Management
Cornell University
348 Sage Hall
Ithaca, NY 14853
gak56@cornell.edu

René M. Stulz
The Ohio State University
Fisher College of Business
806A Fisher Hall
Columbus, OH 43210-1144
and NBER
stulz@cob.osu.edu

1. Introduction.

Before the 2008 global financial crisis (GFC), it seemed that financial globalization was increasing inexorably. A popular analogy stated that globalization makes the world flatter, so that capital can move more easily to where it is most useful. For financial economists, one natural indicator of financial globalization is the extent to which similar firms are valued similarly across the globe. In a world of perfectly integrated financial markets, the same firm should be valued the same everywhere. Before the GFC, valuations had not fully converged, but there is much evidence that the forces of globalization affected valuations, if not across the globe, then at least within the world of developed economies (see Bekaert, Harvey, Kiguel, and Wang (2016) for a review).

In this paper, we investigate whether the forces of financial globalization weaken after the GFC by assessing how the valuations of non-US firms evolve relative to the valuations of comparable US firms from before to after the GFC. We regard a large and persistent valuation difference between non-US and otherwise equivalent US firms as a measure of global financial market segmentation. Before the GFC, US firms have higher valuations than comparable non-US firms (see, for example, Aggarwal, Erel, Stulz, and Williamson, 2010; Fresard and Salva, 2012). We call this valuation difference the valuation gap of non-US firms. We find that this valuation gap widens after the crisis. However, the evolution of this valuation gap is strikingly different for firms from developed markets (DMs) and those from emerging markets (EMs). We find that the valuation gap widens for firms from DMs and narrows for firms from EMs. In other words, financial market integration advances for firms from EMs and reverses for firms from DMs.

There are good reasons to believe that financial market integration retreats after the GFC (McKinsey, 2013). Global growth came to a halt and the world experienced a significant decline in income (Foda and Prasad, 2018). After the crisis, flows of goods and services dropped sharply and trade flows remain well below their pre-GFC levels. Cross-border capital flows and cross-border financial asset holdings play a critical role in financial globalization as they enable investors to take advantage of valuation discrepancies across the globe and to invest where new funds are valued the most. Yet, after the GFC, global cross-border capital flows decrease sharply. After reaching a peak of $12.7 trillion in 2007, they are only $5.9 trillion in 2017 (McKinsey Global Institute, 2018). Following the GFC, regulatory tightening in the financial sector

reduces cross-border lending; external assets of all banks reporting to the Bank for International Settlements fall from 56% of world GDP in 2007 to 36% by 2015 (Lane and Milesi-Ferretti, 2017).

Most importantly for our study, the impact of the GFC appears to differ for DMs and EMs. While growth in many DMs is weak, some EMs have very strong growth (Foda and Prasad, 2018). EMs now account for a large and rising share of global output and trade. From 2007 to 2015, the share of world GDP in EMs rises from 25% to nearly 40% (Lane and Milesi-Ferretti (2017, Figure 2). Cross-border flows increase dramatically among DMs before the crisis and collapse with the crisis. From 2007 to 2015, external assets/liabilities as a fraction of world GDP related to portfolio and FDI holdings, reserves and other investment claims decline among DMs, but grow among EMs (Lane and Milesi-Ferretti, 2017, Figure 4). The regulatory changes brought about by the GFC are particularly sharp for DMs; foreign claims by BIS-reporting banks on advanced economies fall from $16 trillion to $12 trillion, while those on EMs rise in nominal terms and as a share of world GDP (Lane and Milesi-Ferretti, 2017, Figure 11). With these differing changes in flows and claims, we expect the GFC to impede financial globalization more among DMs than EMs. Therefore, we investigate whether the valuation gap evolves differently for firms in DMs and those in EMs. The gap widens for firms in DMs by 39.3% but narrows for firms in EMs by 38.8% and this difference in the evolution of these valuation gaps is statistically significant. This finding suggests that financial globalization has gone in reverse among DMs, but has advanced among EMs.

To investigate how valuation gaps change, we use the Tobin's *q* ratio as our valuation metric. Tobin's *q* is widely used in studies that compare valuations across countries (e.g., La Porta, Lopez-de-Silanes, Shleifer, and Vishny, 2002). In this study, we are not interested in why there is a valuation gap before the crisis. Instead, we test whether the gap changes over time. With Tobin's *q*, the valuation gap can change because the numerator and/or the denominator of *q* changes. The numerator is the present value of cash flows to capital providers and the denominator, in many implementations including ours, is the book value of assets. The present value of cash flows can change because of changes in discount rates and/or changes in expected cash flows. The advantage of using Tobin's *q* as opposed to an earnings-based valuation metric is that the inputs to Tobin's *q* may be less susceptible to manipulation and less affected by differences in accounting practices. Focusing on changes in value as opposed to changes in discount rates has the advantage that our results do not depend on the specification of a model of required expected returns. This

advantage is important because neither the pre-GFC period nor the post-GFC period we consider are long enough to estimate global asset pricing models reliably.

We first compute Tobin's *q* valuation ratios annually for nearly 20,000 firms from 52 countries around the world from 2001 to 2018. We estimate the valuation gap from regressions on *q* that control for firm characteristics, country-level GDP growth, and industry fixed effects. Consistent with earlier studies, we find that before the GFC non-US firms are systematically valued less than comparable US firms. To test whether this valuation gap changes from before to after the GFC, we use a pre-GFC period from 2001 to 2007 and a post-GFC period from 2010 to 2018. When we include all firms from all countries in our sample, we find that the valuation gap does not change significantly from before to after the GFC.

Next, we analyze the evolution of the valuation gap between DM and EM firms since, as discussed, there are good reasons for these valuation gaps to evolve differently. Specifically, we ask whether there are important forces at work post-GFC that can explain our findings and that are not related to the shifts in DM and EM cross-border capital flows? An obvious issue with the sample of EMs is that China is much larger than any other EM by market capitalization and by firm counts. In 2018, there are 10,383 firms from EMs in our sample, of which 3,919 (38%) are Chinese. The next EM with the largest number of firms is South Korea at 1,352 firms in 2018. China is a concern not only because of its size and rapid growth (40% of GDP of all EMs by 2015), but also because it has strong barriers to international investment. Its financial markets are mostly segmented from those of other countries (see Carpenter and Whitelaw, 2017, for a review). The fact that China is not well integrated in world financial markets implies that we have no prediction about how the valuation of Chinese firms should evolve compared to the valuation of US firms if financial globalization reverses after the GFC. We, therefore, examine whether our key results hold if we do not include China. When we remove China from the sample, the EM gap no longer decreases significantly. But, with or without China, the divergent post-GFC evolution of valuation gaps for DM and EM firms is robust and statistically significant. For the remainder of our analyses, we exclude China as it would be odd to reach conclusions about the evolution of financial globalization that depend on a single country not part of the financial globalization process during most of our sample period.

An obvious concern with our study of the divergent evolution of valuation gaps among DM and EM firms is that accounting conventions differ across countries. Different conventions could perturb our

inferences about how financial integration evolves. Perhaps the most important of these differences is that the US tends to expense rather than capitalize research and development (R&D) investment much more than other countries. Accounting principles state that expenses ideally should be recognized in the period when related revenues occur, but long-lived revenues associated with R&D can be difficult to quantify, so guidance from national and international accounting standards can vary. Such differences in standards could lead to a valuation gap with our metric because the denominator of Tobin's *q* (the book value of a firm's assets in our implementation) for firms in non-US countries likely includes R&D more so than for firms in the US. More importantly, R&D expenditures have become more important for US firms, (see Kahle and Stulz, 2017), so that it could be that the growing importance in R&D expenditures explains why the valuation gap changes from before to after the crisis.

A simple way to address this issue is to capitalize R&D for US firms. When we do so, the valuation gaps shrink but remain significant. For instance, the pre-crisis valuation gap for DMs is 45.8% lower. However, we still find that the valuation gap for firms in DMs widens after the crisis and stays constant for firms in EMs. Specifically, the DM gap now increases by 45% instead of 31%. Consequently, the different treatment of R&D expenditures across countries does not seem to explain the different evolutions of valuation gaps we document. For the remainder of the study, we adjust for R&D capitalization for US firms when we compute Tobin's *q*.

We investigate whether the differing evolutions of the valuation gaps for DMs and EMs we document are pervasive across industry sectors and across firm types. If the differing evolution of the valuation gaps for firms in DMs and EMs is due to some types of firms or to some industry sectors, a possible explanation for our results could be that our valuation metric fails to capture important changes in firms or industry sectors that are unrelated to changes in financial integration. However, it could also be the case that the valuation gaps evolve differently across sectors or firm types because of decreased integration in the real economy caused by the GFC. For instance, the literature argues that some industries, such as tradeable goods industries, might be better integrated globally (among others, see Bergin and Glick, 2007). To the extent that greater integration of goods markets promotes greater financial integration, it is possible that the adverse impact of the GFC on international trade leads to a reversal in the financial integration of firms in tradeable goods industries. If the pace of integration differs across sectors, changes in the relative

importance of sectors across countries could lead us to conclude that valuation gaps change when instead it is the composition of firms across sectors that changes and for reasons unrelated to the pace of financial integration.

Contrary to the hypothesis that firms producing traded goods are valued more similarly globally, we find that the valuation gap pre-GFC is the same for traded and non-traded goods industries and in DMs and EMs. Comparing the evolution of the valuation gap between traded and non-traded goods industries, there is no difference between the two types of industries in both DMs and EMs, and even between DMs and EMs. Neither the slowdown in global trade flows nor changes in the sectoral allocation between traded and non-traded goods industries can explain our results.

Another possible explanation is that tangible assets have become less important on firms' balance sheets in the US (Kahle and Stulz, 2017). Poorer institutions make it harder to invest in intangible assets (Claessens and Laeven, 2003). If intangible assets become more important, firms from countries with weaker institutions could experience a widening valuation gap relative to US firms because capital providers might find it harder to protect their ownership of intangible assets in non-US firms compared to US firms. We find that the changes in the valuation gap mostly concentrate among firms that have proportionally more, not fewer, tangible assets. Among DMs, the valuation gap widens almost twice as much for high tangible-asset firms than for other firms. In EMs, the valuation gap narrows post-GFC for high tangible-asset firms but does not change for other firms. This result raises the question of whether we are observing changes in valuation gaps more so among older firms and less so among younger firms. We would expect tangible assets to be relatively more important for older, more established firms. When we divide our sample into older and younger firms, we find that older firms have a wider valuation gap before the GFC in DMs and in EMs. After the GFC, there is no longer a difference in valuation gaps between young and old firms in EMs but a difference persists in DMs. Strikingly, in EMs the decrease in the valuation gap is due to older firms, as the valuation gap does not narrow for young firms.

The US experiences a post-GFC boom in valuations among firms in technology-related ("high-tech") sectors. Hence, it is plausible that the evolution of the US high-tech sector and dominant high-tech sectors in some DM or EM countries distorts valuation comparisons. Since high-tech firms tend to have fewer tangible assets, such an outcome would be surprising given our earlier results. Nevertheless, we investigate

whether the valuation gap for the high-tech sector evolves differently from that for the other sectors. For DMs, the valuation gap does not change from before the GFC to after for firms in the high-tech sector whereas for EMs, the valuation gap significantly widens for firms in the high-tech sector. Outside the high-tech sector, the valuation gap widens for firms in DMs and narrows for firms in EMs.

The differing evolutions of the DM and EM valuation gaps are driven by changes in valuation gaps among older firms, firms with proportionally more tangible assets, and firms outside the high-tech sector. One sector with disproportionately high tangible assets that is outside the high-tech sector and with well-established older firms is the resource sector. We investigate separately the evolution of the gap for resource and non-resource firms. We find that resource firms in DMs have similar valuations to US firms before the GFC but a large gap arises after the GFC. After the GFC, resource firms in DMs are valued much like their counterpart non-resource firms. Among EMs, resource firms evolve similarly to resource firms in DMs, so that there is no valuation gap for these firms before the GFC but there is a very large valuation gap after the GFC. Strikingly, the valuation gap of resource firms is indistinguishable after the GFC between DMs and EMs. Our results about the differing evolutions of the valuation gap between DMs and EMs hold when we exclude resource firms.

Historically, the cross-listing of shares (via American Depositary Receipts, ADRs, or directly) by non-US firms on major US exchanges has fostered financial globalization by enabling non-US firms to access US capital markets and their investors (Alexander, Eun, and Janakiramanan, 1988, 1989; Foerster and Karolyi, 1993, 1999) as well as US institutions that protect shareholders (Stulz, 2005; Doidge, Karolyi, and Stulz, 2004). Research shows that, as more firms cross-list their shares in the US, there can be a spillover impact on other firms within the same country, so cross-listings help spur on greater capital inflows and thus advance financial integration (Karolyi, 2004; Fernandes, 2009; Karolyi and Wu, 2018). Given the differing evolutions of the valuation gaps in DMs and EMs, a natural question is whether the cross-listing mechanism is no longer performing its integrating function post-GFC. We next test this proposition.

We estimate the valuation gap separately for non-US firms cross-listed on US exchanges and for local firms; that is, for non-US firms that are not cross-listed on a US exchange. For cross-listed firms, the valuation gap is slightly negative before the GFC; they are valued higher than comparable US firms. After the GFC, this gap is not significantly different from zero so that cross-listed firms are valued like US firms

after the GFC. The change in the valuation gap of cross-listed firms from before to after the GFC is not significant. This finding prompts us, in turn, to assess the "cross-listing premium," which Doidge, Karolyi, and Stulz (2004, 2009) define as the difference in valuation of a firm cross-listed on a US stock exchange and a comparable local firm. The cross-listing premium is robustly positive and remains intact post-GFC. Before the GFC, DM cross-listed firms are valued at a premium to comparable US firms, but after the GFC they are valued similarly. However, the change in the gap is not significantly different from zero. The valuation gap of EM cross-listed firms is not significant before or after the crisis. There is no statistically significant change in the cross-listing premium for DM or EM firms.

Cross-listed firms are valued like US firms after the crisis and they continue to be valued at a premium to local firms from their respective home markets. One remaining possible explanation for our findings is that firms are simply not taking advantage of these cross-listing opportunities as they once did. The role of a US cross-listing as an integrating mechanism may now be diminished. We find the propensity to cross-list in the US decreases sharply in both DMs and EMs during our sample period, consistent with a decrease in their economic importance. This dramatic decrease in the propensity to cross-list is itself evidence of a reversal in financial globalization. If cross-listed firms continue to be valued at a premium to local firms and if their valuations, as a result, are closer to those of comparable US firms, having proportionately fewer cross-listed firms overall means that non-US countries have fewer firms with valuations closer to those of similar US firms. This, in turn, would lead to an increase in the valuation gap.

Our paper contributes new evidence to a long-standing literature that seeks to understand why corporate valuations vary across countries. Early work by La Porta, Lopez-de-Silanes, Shleifer, and Vishny (2002), Lemmon and Lins (2003), and Hail and Leuz (2006) shows that cross-country differences in legal and governance systems explain differences in corporate valuations. Most of these studies, like ours, employ Tobin's q as the valuation measure at the individual firm level. Our paper's most important new findings about how post-GFC valuations diverge among DMs and converge among EMs must be juxtaposed against a now decade-old series of studies that demonstrate convergence in valuations (among others, Bekaert and Harvey, 1995; Bekaert, Harvey, Lundblad, and Siegel, BHLS, 2007, 2011; Bergin and Glick, 2007).

There are three studies that are important for our investigation. First, BHLS (2011) devise a valuation-based measure (based on price-to-earnings, or P/E, ratios) of the degree of effective equity market

segmentation. It is based on the dispersion among country-level P/E ratios which they argue should be small under the null hypothesis of financial integration. With a sample period that pre-dates the GFC, they show that dispersion in P/E ratios among EMs is, on average, double that among DMs, and, most importantly, that the P/E ratios converge dramatically over time with expanded foreign capital flows and other measures of greater financial openness. Bekaert, Harvey, Kiguel, and Wang (2016) provide an empirical analysis of convergence in asset *returns*, not valuation ratios, as captured by time-varying correlations (or factor betas) among equities, bonds, and currencies, and how they are explained by trade/financial market openness. They, like us, note the reversal in *de facto* measures of openness post-GFC, but their key tables do not reveal any differences between EMs and DMs. We do. In a related study that uses a similar approach to assess market integration, Bekaert and Mehl (2019) find different results for the post-crisis period, as they "find no evidence of financial globalization reversing since the Great Recession." Though the former study includes emerging markets, including China, the latter does not. We are cautious about these comparisons, because it is important to note that return correlations can increase for reasons other than an increase in financial integration. For instance, common fundamental shocks across countries could lead to higher correlations in asset returns, but these higher correlations would be unrelated to financial integration. We elaborate on this important distinction in our next section on hypothesis development.[1]

2. Hypothesis development.

There is a large literature that defines what it means for financial markets across countries to be integrated and examines whether financial markets are actually integrated (see Karolyi and Stulz, 2003; Lewis, 2011; and, Bekaert, Harvey, Kiguel, and Wang, 2016). Markets are integrated if the same asset that delivers the same cash flows to capital providers in different markets has the same value. An investigation of market integration can assess whether the same assets in two different markets are valued identically or whether they have identical expected returns. Much of the empirical literature focuses on whether markets

[1] Other research that studies the dynamics of financial integration via returns, factor models, and the pricing of market risks includes, Carrieri, Errunza, and Hogan (2007), Pukthuanthong and Roll (2009), and Carrieri, Chaieb, and Errunza (2013). Akbari, Carrieri, and Malkhozov (2019) recognize the post-GFC reversals in market integration and propose the importance of funding frictions impeding cross-border investing as one explanation for them. They measure funding frictions across global markets using a distance norm between countries of their respective expected returns on a "betting against beta" spread portfolio of low- relative to high-market-beta stocks.

for common stocks across countries are integrated and examines whether common stocks with identical risk exposures have identical expected returns.

In this paper, we focus on valuation differences rather than differences in expected returns. In contrast to differences in expected returns, valuation differences can be analyzed in the cross-section. We know since Merton (1980) that it takes many observations to estimate expected returns precisely. And we know that small differences in imprecisely-estimated expected returns generally lead to large identifiable differences in valuations. To see this, consider a firm that has a perpetual cash flow of $1. If that cash flow is discounted at 10%, the firm is worth $10. Suppose that, in another country, the discount rate is 11% for the same firm. In that country, the firm would be worth $9.1, or 9% less. The potential advantage of focusing on valuations increases further when expected returns change over time and when the researcher is assessing how financial integration changes between two relatively short periods. The valuation approach allows us, as researchers, to assess relative changes in valuations across countries with more confidence.

Whether the empiricist examines differences in expected returns or differences in valuations to assess market integration, it is necessary to define what it means for two assets to be the same. With the expected return approach, this task requires defining risk factors that can affect a stock's expected return. With the valuation approach, one specifies the determinants of firm or common stock value that, if they were identical for two firms, should lead to identical valuations. A fundamental principle in financial economics is that the value of a firm for its capital providers is the present value of the cash flows they will receive over time. For a given set of future expected cash flows, this relation is tautologically true in that there is always a set of discount rates that will equate the present value of expected cash flows to firm value. However, for a given set of expected cash flows, discount rates can differ across countries when markets are not perfectly integrated.

Cash flows to a firm do not always equate cash flows to capital providers. The literature on agency costs that builds on Jensen and Meckling (1976) provides many reasons for why capital providers do not necessarily receive all cash flows generated by the firm. Agency costs differ across countries because of differences in the quality of institutions (Shleifer and Wolfenzon, 2002). Across countries, there are also differences in the role of the state that matter for cash flows. For example, the risk of expropriation differs across countries (Stulz, 2005). Firms with similar fundamentals can be valued differently across countries,

even if discount rates are the same, because capital providers expect to receive a different fraction of the cash flows generated by the firm. Empirically, firms from countries with worse institutions and with greater political risk have lower valuations (e.g., La Porta, Lopez-de-Silanes, Shleifer, and Vishny, 2002). It is not surprising then that the literature documents a valuation gap between US firms and non-US firms (Aggarwal, Erel, Stulz, and Williamson, 2010).

Given the above considerations, we use a definition of market integration that focuses on the valuation of firms rather than on the valuation of cash flows to capital providers. Therefore, we define market integration using firm value as follows:

> **Definition.** Two countries are financially integrated if a firm with a given stream of cash flows is valued identically in both countries by the firm's capital providers.

With this definition in hand, valuations can differ because the fraction of firm cash flows that capital providers receive differs across countries or because discount rates can differ across countries. While the question of why valuations differ across countries is important, it is not the issue on which we focus in this paper. Rather, we are interested in the question of whether relative valuations of non-US firms relative to those of US firms *change* from before to after the GFC.

Between two dates, relative valuations can change for many reasons. Existing literature explores whether removal of barriers to international investment and, more generally, the phenomenon of financial globalization, leads to convergence in valuations (among others, Bekaert, Harvey, Lundblad, and Siegel, 2011). If the GFC is the only shock that affects relative valuations among non-US and US firms, then our investigation answers the question of whether the GFC led to a change in relative valuations.

We analyze *relative* valuation changes rather than absolute valuation differences, so that concerns that arise from exploring *absolute* valuation differences are mitigated. For instance, if laws do not change in important ways from before to after the crisis, any valuation differences caused by differences in laws are likely to be unaffected by the GFC. Viewed from this perspective, the null hypothesis we test is:

A financial globalization hypothesis: With an expansion of cross-border capital flows and with an advancement of financial globalization, the valuation gap between non-US and similar US firms narrows. An important corollary is that, if an event, such as the GFC, reverses financial globalization, the same valuation gap widens.

An obvious issue with our identification strategy is that we cannot run the experiment of how integration would have evolved without the GFC. Hence, it is possible that other events besides the GFC could explain a financial globalization reversal. In this paper, our focus is on whether such a reversal happens and, if so, whether it does so in a way consistent with how cross-border capital flows evolved. To understand whether the evolution in EM and DM valuation gaps is consistent with shifts in capital flows, we study how its impact differs across development levels, sectors, and types of firms.

3. The sample of firms across countries and years.

To construct our dataset of non-US publicly listed firms around the world, we download the list of firms in a given country from Thomson Reuter's Worldscope country lists. Worldscope has data on over 81,000 active and inactive companies in 119 countries. It covers 99% of global market capitalization in any given year. We also download Worldscope data for a variety of firm characteristics from 2001 to 2018. We refer to 2001-2007 as the pre-GFC period and 2010-2018, as the post-GFC period. The pre-GFC period is chosen because Worldscope is reasonably comprehensive in those years and because the financial globalization wave of the 1990s led to a dramatic decrease in barriers to international investment. As a result, little change occurs in formal barriers during our pre-crisis period. Our post-crisis period covers all post-GFC years for which we have data available. For US publicly-listed firms, we download the list of firms in the Center for Research on Security Prices (CRSP) and its CRSP/S&P Compustat Merged Database. We drop firms not incorporated in the US.

We also drop 67 countries that do not have at least five years of sequential data with complete data on firm characteristics for at least 20 firms. To make our dataset comparable to earlier studies, we also drop Saudi Arabia. Firms must have at least $100 million in total assets, as measured in 2018 constant US dollars. Once a firm crosses the $100m threshold, it stays in the sample. Finally, we drop country-years that do not

have at least 20 firms with complete data on firm characteristics in a given year. The final sample includes 51 non-US countries and the US.

Table 1, Panel a shows counts of the number of firms by year from 2001 through 2018 for an unrestricted sample. This sample includes country-years that meet our criteria above and includes firms that have market cap data available in a given year. We divide countries into DMs and EMs following Morgan Stanley Capital International (MSCI) definitions as of 2018. We report the counts separately for all non-US countries, developed markets (DMs) only, emerging markets (EMs) only, and the US. The count of non-US firms increases steadily from 19,996 firms in 2001 to 32,910 firms in 2018. It increases each year except for 2012 and 2017. In DMs, the number of firms increases from 12,946 in 2001 to a peak of 16,272 in 2008. It then declines to 15,408 in 2018. EMs account for the increase in the number of non-US firms. The number of listed firms increases each year, from 7,050 in 2001 to 17,502 by 2018. In contrast, the pattern of listing counts is sharply different in the US. The number of firms declines from a peak of 5,752 in 2001 to 3,761 in 2018. At the bottom of each column, we report the total number of firm-year counts across the years and for the years we associate with the pre-GFC and post-GFC periods.

We use Tobin's *q* ratio as our valuation measure. For the numerator, we take the book value of short-term debt plus long-term debt and add the market value of equity. For the denominator, we use the book value of total assets. Therefore, we focus on a restricted subset of firms that have complete data on Tobin's *q* as well as data for variables we use to explain Tobin's *q*, namely sales growth, operating income, asset tangibility, financial leverage, and the log of assets. These variables are defined in the appendix. We further exclude financial firms (SIC Codes 6011 through 6799) and firms in public administration (SIC Codes 9111 through 9999).

Table 1, Panel b shows the number of listed firms for this restricted sample. The firm counts are smaller, typically by half, for the restricted sample relative to the unrestricted sample in each year for all non-US, DMs only, EMs only, and US groups. For the entire 2001 to 2018 period, we have 584,273 firm-year observations in the unrestricted sample and 306,561 in the restricted sample, which is about 52% of the total. Over the sample period, the percentage of firms in the restricted sample falls by a small amount in developed markets (50% to 48%) and increases for emerging markets (48% to 59%) and in the US (49% to

57%). There appears to be no special constraint imposed on data availability for EMs relative to DMs in this period of analysis.

Table 2 describes our restricted sample of firm-year counts by country. Panel a lists 21 countries classified as DM countries and Panel b, 31 EM countries. The counts are reported for the 2001 to 2018 period as well as for the separate pre- and post-GFC sub-periods. We also report the years in which the country is represented in the overall sample. This is important for a few EMs which do not qualify with sufficient numbers of firms or with sufficient fundamental data until years past the 2001 start date. The average number of firms per country is similar among DMs at 318 pre-GFC and 344 post-GFC. Among EMs, the counts are half as large before the GFC, but they increase dramatically from 172 pre-GFC to 318 post-GFC. This pattern in firm counts by country is similar for DMs and EMs in the unrestricted sample.

Table 3 presents summary statistics for firm attributes from Worldscope. We report means and medians across the count of firm-years for each of Tobin's *q*, sales growth, operating income, asset tangibility, financial leverage, and the log of assets for the full non-US sample of countries, DMs only, EMs only, and US only. Each year, we winsorize Tobin's *q*, sales growth, leverage, operating income, and asset tangibility at the 1st and 99th percentiles to reduce the impact of outliers. This is done for the full sample each year and not by non-US only, DMs only, EMs only, or US only groups.

Table 3 reports that the mean (median) Tobin's *q* for all non-US firms in Panel a increases from 1.142 (0.873) before the GFC to 1.273 (0.866) after the GFC. For the US, mean and medians are higher, both before and after the GFC. The mean (median) for US firms is 1.572 (1.219) before the GFC and 1.666 (1.235) after the GFC in Panel d. For non-US countries, the mean *q* increases from before to after the GFC, but the median falls slightly. Our first glimpse of the divergent evolution of DMs and EMs arises when we study the changes in mean (median) Tobin's *q* between DMs and EMs. The mean *q* among EM firms rises from 1.274 to 1.456 from before to after the GFC while that of DMs falls from 1.054 to 1.049. The table shows that DM firms experience a notable decline in annualized sales growth from 10.5% to 6.3% from pre- to post-GFC, but so do EM firms from 14.0% to 8.0%. Operating income also declines among DM firms from 4.4% to 4.0%, but the decline among EMs was even more dramatic, from 5.3% to 4.4%. These changes contrast with an increase in operating income among US firms from 3.7% to 4.4% from before to after the GFC. Leverage and the Log(Assets) are relatively stable from before to after the GFC among DM,

EM, and US firms. Asset tangibility is stable among DM and US firms, but declines among EM firms. However, asset tangibility and leverage ratios among US firms are lower than those among non-US firms.

4. Valuation convergence or divergence post-crisis?

As discussed in Section 2, the integration of global financial markets should foster a convergence over time of valuation ratios across markets. Following our hypothesis above, we rely on valuation differentials to quantify the extent to which firms from around the world integrate into the global environment. We choose to measure integration into the global environment in our setting by measuring integration of non-US firms with US markets. Our choice arises from the fact that US markets are the largest by capitalization in the world and are largely free of barriers to foreign investment. More precisely, we compare the Tobin's q valuation ratios of non-US firms to those of similar US firms annually during the years before and after the GFC. Under the null hypothesis of financial globalization outlined in Section 2, there should be no systematic valuation differences between non-US and similar US firms. Of course, perfect market integration does not hold in the data before the crisis and, as already mentioned, the literature discusses a number of reasons why valuations of non-US firms differ from valuations of US firms.

To assess the systematic differences in valuations between US and non-US firms, we estimate a panel regression model of Tobin's q across firm-years on a set of non-US year fixed effects, $\beta_t^{non\text{-}US}$, where t equals 2001 to 2018, and year fixed effects, η_t, where t equals 2002 to 2018 so that 2001 is the omitted year. We relate Tobin's q to fundamental variables, X_{it}, that are predictive of future firm cash flows. These variables include Sales growth, Operating income, Leverage, Asset tangibility, Log(Assets), country-level GDP growth (Z_{it}^c), and industry fixed effects, δ_i. We use the Fama-French 49 industry classification but we exclude industries 45 to 48, which are financials. Industry 1 is the omitted industry fixed effect. The regressions are estimated using OLS and the standard errors are clustered at the firm level, so that observations are assumed to be independent across firms but not within them. Specifically, we estimate:

$$q_{it} = \alpha + \beta_t^{non-US} + \gamma_1' X_{it} + \gamma_2' Z_{it}^c + \delta_i + \eta_t + \epsilon_{it}. \quad (1)$$

In Eq. (1), α is the mean value of Tobin's q for US firms in 2001 when the control variables equal zero (not reported in the tables). The year fixed effects, η_t, capture the valuation deviations for US firms relative to 2001. The non-US year fixed effects (β_t^{non-US}) estimate the difference in valuations between non-US and

US firms (i.e., non-US valuations minus US valuations) each year, after controlling for firm characteristics, GDP growth, and industry fixed effects (Z_{it}^{c}). The valuation gap each year equals the β_t^{non-US} estimate, multiplied by –1. Therefore, we report the valuation gap each year as a positive difference in the valuations of US firms and those of comparable non-US firms.[2] To account for the potential influence of outliers, we also estimate quantile regressions that use the median as the measure of central tendency. The expected loss minimization is solved as a linear programming problem and is implemented using simplex methods.

Figure 1 plots the valuation gap each year, estimated from the OLS and median regressions, that we call the OLS and median valuation gaps, respectively. The OLS valuation gap is positive and significant each year from 2001 to 2018. That is, US firms have higher valuations compared to non-US firms after controlling for fundamentals related to sales growth, profitability, leverage, tangibility, size, GDP growth, and for industry fixed effects. The median valuation gap is notably smaller in magnitude but is also positive and significant in each of the 18 years of our period of analysis. The years 2015 and 2016 exhibit a reversion of the relation between mean and median gap estimates as for these years the mean estimate is smaller than the median estimate.

To test whether the valuation gap is significantly different after the crisis, we drop the year fixed effects and non-US year fixed effects in Eq. (1) and replace them with what we call period fixed effects. The β_t^{non-US} are now defined as non-US *period* fixed effects, where *t* equals 1 to 3 and where Period 1 is the pre-crisis period (2001 to 2007), Period 2 is the crisis period (2008 to 2009), and Period 3 is the post-crisis period (2010 to 2018). The η_t are US period fixed effects where *t* equals 2 to 3 so that Period 1 is the omitted pre-GFC period for US firms.

Models (1) and (2) of Table 4, Panel a report the valuation gap estimates (β_t^{non-US} coefficients multiplied by –1) for each period along with the coefficients on the control variables and the R^2, adjusted R^2, and number of observations. Model (1) reports the OLS panel regression results and Model (2) reports

[2] Alternatively, in Eq. (1), we can estimate the valuation gap (US – non-US) directly by replacing the non-US year fixed effects, β_t^{non-US}, with US year fixed effects, β_t^{US}. If we do that, α is the mean value of Tobin's *q* for non-US firms in 2001 when the control variables equal zero and the year fixed effects, η_t, capture the valuation deviations for non-US firms relative to 2001. In this way, the US year fixed effects, β_t^{US}, would directly estimate the valuation gap each year. However, in later analysis, we need to estimate valuation gaps separately for non-US firms from DMs and from EMs. We cannot do that with US year fixed effects. For consistency, we estimate all of our regressions with non-US fixed effects that estimate the difference in valuations between non-US and US firms and multiply the coefficients by –1 to get the valuation gap.

the median regressions. The valuation gap is positive and significant in each period in both models. In Model (1), the valuation gap equals 0.361 in the pre-crisis period, 0.242 in the crisis period, and 0.347 in the post-crisis period. As noted in Figure 1, the gaps in the median regression are about one-third smaller: 0.233, 0.164, and 0.247 in the same periods. In both models, firms with higher sales growth and profitability have a significantly higher *q*, as confirmed in prior research, while larger firms, those with higher levels of leverage, and greater asset tangibility have a significantly lower *q*. Firms domiciled in countries with higher GDP growth have a significantly higher *q*. The *F*-tests in Panel b evaluate whether the valuation gap in the pre-crisis period equals the valuation gap in the post-crisis period. For the OLS regression, the difference is -0.014, but is not statistically significant as the *F*-statistic of 0.501 has a *p*-value of 0.475. Similarly, the difference is not significant in the median regression (*p*-value of 0.198). In these tests, there is neither evidence of convergence nor of divergence in valuations post-GFC. In other words, evidence for the world as a whole suggests financial globalization does not advance after the GFC, but it does not reverse either.

The next step in our analysis is to distinguish whether the evolution of valuation gaps differs for non-US firms from emerging markets (EMs) relative to those from developed markets (DMs). To estimate these valuation gaps separately, we modify Eq. (1). We replace non-US year fixed effects, or β_t^{non-US}, with year fixed effects separately for non-US DMs, β_t^{DM}, and for non-US EMs, β_t^{EM}. That is, we estimate the modified panel regression:

$$q_{it} = \alpha + \beta_t^{DM} + \beta_t^{EM} + \gamma_1' X_{it} + \gamma_2' Z_{it}^c + \delta_i + \eta_t + \epsilon_{it.} \quad (2)$$

As above, the β_t^{DM} and β_t^{EM} coefficient estimates are multiplied by –1 in order to report the positive valuation gap each year for firms from DMs and for firms from EMs. The coefficients on the firm- and country-level controls are not allowed to differ for firms from DM and EM countries. The year and industry fixed effects with firm-level clustering of standard errors remain in effect as before. And we estimate Eq. (2) using OLS and quantile regressions using the median.

In Panels b and c of Figure 1, we show estimates of OLS and median valuation gaps each year from 2001 to 2018 and, respectively, for non-US DMs and EMs. The figure shows a distinctly different pattern among EMs and DMs. The positive valuation gaps for the DMs are diverging away from zero, while those for the EMs are converging slightly toward zero. There is another noteworthy difference: the yearly median valuation gaps are always smaller in magnitude than the yearly OLS gaps among the DMs, and the same is

the case among EMs except for 2015 and 2016. The 2015 OLS valuation gap among EMs is actually negative (-0.166) and the gap for 2016 (0.177) is positive, but is much smaller in magnitude than the other post-GFC OLS gaps among EMs. These two years among EMs are influential as they explain the inversion in the overall non-US sample of the normal relation between the mean and the median gap estimates in Panel a of Figure 1.

In Models (3) and (4) of Table 4, we replace the DM-year, EM-year, and year fixed effects with period fixed effects and show the gaps for DMs and EMs in each of the three periods. The table confirms that these valuation gaps in the pre-GFC, GFC, and post-GFC periods are statistically significantly positive and further that the pattern is one of divergence among DMs and convergence among EMs. That is, the OLS valuation gap for DMs in the pre-GFC period is 0.328 and *widens* to 0.457 in the post-GFC period. The OLS valuation gap for EMs in the pre-GFC period is 0.374 and it *narrows* to 0.229 in the post-GFC period. Similar patterns of divergence among DMs and convergence among EMs arises for the median regressions. The coefficients on Sales growth, Operating income, Leverage, Asset tangibility, Log(Assets), as well as country-level GDP growth remain statistically significant with the same signs as in Models (1) and (2).[3]

In Panel b of Table 4, we present our *F*-statistics separately for EMs and DMs on the pre- and post-GFC differences in valuation gaps. For DMs, the average pre- and post-GFC difference of 0.129 (divergence) in the OLS regressions is associated with an *F*-statistic of 41.7 (and a *p*-value less than 0.001). For EMs, the average pre- and post-GFC difference of -0.145 (convergence) in the OLS regressions is associated with an *F*-statistic of 46.71 (*p*-value of less than 0.001). The respective *F*-statistics for divergence among DMs and convergence among EMs for the median regressions are associated with the same reliable statistical inference though the economic magnitudes implied by pre- and post-GFC differences are smaller.

These changes in valuation gaps among DMs and EMs are consistent with our expectations given the differing evolution in capital flows between DMs and EMs from before to after the GFC. Before the GFC, our evidence is consistent with the view that both direct (investment restrictions) and indirect (weaker institutions) barriers that segment financial markets are likely to be larger among EMs than among DMs.

[3] The adjusted R^2 in Models (3) and (4) are higher than those in Models (1) and (2), respectively, but not dramatically so. This implies that distinguishing among DM and EM period fixed effects, while statistically significant in their own differences, are overwhelmed by the overall variation among *q*'s across all firm-years beyond those and other fixed effects as well as the control variables.

While the valuation gaps for DMs and EMs are both reliably positive, the gap for DMs is about 14% smaller than the gap for EMs. After the GFC, the gap widens for DMs and narrows for EMs so that the gap for DMs is larger than the gap for EMs.

5. Understanding the differing evolution of valuation gaps post-crisis.

In Section 4, we show that the worldwide valuation gap does not change from pre- to post-GFC. We then show that this apparent stability hides divergent evolutions of the valuation gaps for DMs and EMs. Specifically, there is a significant increase in the gap for DMs and a significant decrease in the gap for EMs. The findings appear to be consistent with the different evolution in capital flows post-GFC in DMs and EMs. We next investigate possible explanations for these findings that are unrelated to broad changes in market integration brought about by the GFC.

5.1. The China factor.

An issue with the sample of EM countries post-GFC is that it includes China. In contrast to most other countries in our sample, China has strong barriers to international investment throughout our sample period. A well-accepted index of barriers to international investment codes China at the highest level of restrictions to international investment.[4] That is, China is not really part of global financial markets. A second concern is that the number of Chinese firms in our sample increases from 955 in 2001 to 3,919 in 2018. Its weight in the sample is higher in the post-GFC period than in the pre-GFC period. By 2018, Chinese firms represent 38% of EM firms in our sample. It is therefore possible that our results are influenced by China. This problem is exacerbated by the fact that valuations in China during our sample period are extremely volatile. Carpenter and Whitelaw (2017) and Carpenter, Lu, and Whitelaw (2015) point to recent stock market volatility in China post-GFC as reflecting the expanding shadow banking sector (2010-2012 market decline) and the roll-out of a new deposit insurance program (2014 rally). The fact that China is not well integrated in the world financial markets and that there are important institutional shifts in China that may exacerbate

[4] Using *de jure* measures, Fernandez et al. (2016) classify China as a "wall" country, such that it has pervasive controls on all, or virtually all, assets in every year during their sample period. China reduced some restrictions in 2017 but is still classified as a wall country in the 2019 version of the dataset (updated through 2017).

volatility in firm valuations together imply that we have no clear prediction about how its firms should be valued compared to US firms. It makes a compelling case to exclude China from our sample.

Table 5 is the same as Table 4, except that we exclude Chinese firms from the sample. Models (1) and (2) are the OLS and median regressions with period fixed effects for non-US firms. Those in Models (3) and (4) separate out the non-US period fixed effects for DMs and EMs. The first thing to note is the drop in the number of observations from 306,561 firm-years in Table 4 to 267,363 firm-years in Table 5. These nearly 40,000 observations reflect the potential influence of Chinese firms in our sample period. Recall that in Table 4 there is no significant change in the gap for non-US firms. With the Chinese firms removed, there is now a divergence in non-US valuations post-GFC. Model (1) shows that the pre-GFC valuation gap is 0.367 and it widens to 0.433 in the post-GFC period. Panel b shows that this difference is statistically significant. The *F*-statistic is 11.5 with an associated *p*-value of 0.001. There is also evidence of a divergence in the median regressions. The pre-GFC period valuation gap is 0.249 compared 0.290 in the post-GFC period (*F*-statistic of 12.9, *p*-value of less than 0.001). The influence of Chinese firms in the sample in Table 4 mask this divergence in non-US valuations post-GFC among other non-US firms.

Our finding of the differing evolution of the valuation gaps of DM and EM firms from before to after the GFC remains without the Chinese firms, as shown in Models (3) and (4). For the OLS regression in Model (3), the valuation gap among DMs pre-GFC of 0.356 widens to 0.467, as in Table 4. However, without Chinese firms, the valuation gap among EMs now remains flat, without any apparent convergence toward zero. The pre-GFC valuation gap among EMs of 0.371 is statistically indistinguishable from the gap of 0.378 in the post-GFC period. The *F*-statistic associated with this pre- and post-GFC difference among EMs is only 0.104 (*p*-value of 0.747). There is only one interesting difference between Tables 4 and 5 among the coefficients on the fundamental variables of the panel regression, which is a much smaller coefficient on GDP growth when the Chinese firms are removed (6.125 in Model (3) of Table 4 and only 2.501 in Model (3) of Table 5).

Figure 2 reveals another fact about the China factor in the valuation gap among non-US and specifically among EM firms. As before, Panel a shows that the OLS valuation gap is larger than the median gap. Without the Chinese firms, the unexpected reversal in 2015 and 2016 in which the OLS gap is smaller than the median gap is now absent. As expected, Panel b of Figure 2 looks indistinguishable from that in Figure

1 among DMs, but Panel c of Figure 2 firms shows no unusual positive OLS coefficient in 2015 as in Figure 1. This shows the importance of the perturbing influence of the rally that took place in China in 2014-2015 in and around the new deposit-insurance and other financial reforms, as discussed by Carpenter, Lu, and Whitelaw (2015).

Given the influential role of Chinese firms in exacerbating the differences in the evolution in valuation gaps post-GFC among EMs and DMs, we exclude Chinese firms in the remainder of our analysis.

5.2. Capitalizing R&D.

One concern with our analysis so far is that accounting conventions differ across countries and that these differences could perturb our inferences about the evolution of valuation gaps post-crisis. Perhaps the most important of these differences is that the US tends to expense rather than capitalize research and development (R&D) investment much more than other countries. Such differences in standards could lead to a valuation gap with our valuation metric, as the denominator of Tobin's *q* (the book value of a firm's assets in our implementation) for firms in non-US countries likely includes R&D more so than for firms in the US. A simple way to address this issue is to capitalize R&D for US firms.

To capitalize R&D for US firms, we follow the procedure outlined in Peters and Taylor (2017). The main idea is to remove R&D from operating expenses and treat it as a capital expenditure, which results in the creation of an "R&D asset" that is amortized over time. We use annual data on R&D expenses from Compustat and set it to zero when it is missing. To operationalize the procedure, we need to make assumptions about the depreciation rate of the R&D asset and the value of the R&D asset for firms in their IPO year (R&D expense data for years prior to the IPO are not available in Compustat). Based on the results in Peters and Taylor, we make two simple assumptions: (1) the value of the R&D asset is zero in the first year a firm enters the Compustat database; and, (2) the depreciation rate is 20%, which implies a five-year straight-line amortization period.[5] That is, the unamortized value of the current year R&D expense is 100%, 80% for the prior year, and so on.

[5] Peters and Taylor (2017) interpret R&D spending as an investment in knowledge capital and they apply a perpetual-inventory method to a firm's past R&D to measure the replacement cost of its knowledge capital. They use industry specific depreciation rates, as well as rates of 10%, 15%, and 20%. They find that the choice of depreciation rate does not impact their results. A firm's first non-missing record in Compustat usually coincides with its IPO and we do not have R&D data for five years prior to a firm's IPO. We assume that the value of the R&D asset is zero in the first year

With these assumptions, we capitalize R&D expenses and adjust the book value of assets by the value of the R&D asset. To compute the value of the R&D asset for each firm each year, we sum the unamortized R&D expenses in the current year and over the previous four years (i.e., $\sum_{t=0}^{t=-4} R\&D\ expense_t \times \frac{t+5}{5}$). In year *t*, "Total assets-adjusted" equals total assets plus the value of the R&D asset. We also adjust operating income by the current year's R&D expense and the amortization of the R&D asset, which equals the sum of amortized value of R&D expense over the previous five years (i.e., $\sum_{t=-1}^{t=-5} R\&D\ expense_t \times 20\%$). "Operating income-adjusted" in year *t* equals operating income plus R&D expense minus the amortization of the R&D asset. Finally, we use total assets-adjusted to compute versions of *q*, leverage, asset tangibility, and Log(Assets) in which R&D expense is capitalized. With the exception of Log(Assets), we winsorize these variables at the 1st and 99th percentiles each year.

Table 6 presents our regression results on the valuation gaps among non-US firms in the pre- and post-GFC periods in Models (1) and (2) and among DM and EM firms separately in the pre- and post-GFC periods in Models (3) and (4). All of these specifications exclude Chinese firms, as in Table 5. There are several important differences between the findings in Tables 5 and 6. First, the valuation gaps for non-US firms in Models (1) and (2) of Table 6 are smaller in magnitude in each period. For example, the valuation gap pre-GFC in Model (1) is 0.206 compared to 0.367 in Table 5. Second, the coefficients on the control variables are mostly unchanged. One exception is that the negative coefficient on Asset tangibility in Table 5 is no longer reliably so in Table 6 in Model (1).

The most important finding in Table 6 is that our inferences about the differences in valuation gaps pre- versus post-GFC among non-US firms and about the differences in the evolution of valuation gaps between DMs and EMs is robust to capitalizing R&D. Panel b of Table 6 shows that for Model (1), the post-GFC valuation gap of 0.247 implies a significant divergence relative to the pre-GFC coefficient of 0.206 (*F*-statistic of 6.48, *p*-value of 0.011). The same obtains for the median regressions of Model (2). Further, the post-GFC divergence in valuation gaps among DMs, from 0.193 pre-GFC to 0.280 post-GFC is significant with an *F*-statistic of 26.78 (*p*-value less than 0.001), while the post-GFC valuation gap among EMs is

in which a firm enters the database. Peters and Taylor use a more complicated approach to estimate the initial value of the R&D asset. They conclude that assuming an initial value of zero is a reasonable proxy.

indistinguishable from that in the pre-GFC period (0.219 pre-GFC versus 0.196 post-GFC, *F*-statistic of 1.58, *p*-value of 0.21).

Figure 3 presents the year-by-year valuation gaps for the OLS and median regressions. Panel a shows that both the OLS and median valuation gaps for non-US firms are much smaller in magnitude compared to those in Figure 2. Moreover, the differences between the implied valuation gaps between OLS and median regressions are much smaller and are almost imperceptibly different. The same arises for Panels b and c for DMs and EMs, respectively. However, in comparison with the same panels in Figure 2, the trend toward greater divergence in valuation gaps for DMs and the admittedly more modest rate of convergence in valuation gaps for EMs is visible.

Capitalizing R&D in Tobin's *q* computations for US firms influences the assessed magnitudes of the valuation gaps for non-US firms in important ways. But our key inferences about the different evolution of valuation gaps from pre- to post-GFC among DMs and EMs are not altered by this adjustment. We proceed using only capitalized R&D adjustments in our remaining tests.

5.3. Shifting Industrial Composition of Firms across Countries.

We investigate next whether the differing changes in valuation gaps between DM and EM countries depend on how the industry composition of economic activity across countries changes over time. In the introduction, we argue that such an investigation is useful on several levels. First, it could be that some industries are better integrated globally. Firms that produce tradeable goods, for example, could have valuations that are easier to compare internationally, so that relative mis-valuations would be easier to discover across countries. Moreover, to the extent that greater integration of goods markets promotes greater financial integration, it is possible that the adverse impact of the GFC on international trade could lead to a reversal in the financial integration of firms concentrated in tradeable goods industries. Second, our overall result on different evolutions in valuation gaps could stem *not* from changes in financial globalization, but rather from changes in the sample's distribution of firms across sectors or among firms with a certain characteristic from before to after the GFC. We proceed by distinguishing between different key sectors among DMs and EMs toward understanding the very different experiences in their post-GFC valuation gaps.

The GFC was associated with a massive shock to international trade flows. Further, the level of trade flows stayed depressed for a number of years following the GFC. It could, therefore, be the case that financial integration falls because trade integration is lower. We explore potential differences in the evolution of firm valuations among DMs and EMs separately for tradeable goods and non-tradeable goods sectors. To define tradeable vs. non-tradeable sectors we use information in Mian and Sufi (2014, the Appendix Table 1 of their 2012 working paper). The tradable sector mostly includes manufacturing, e.g., motor vehicle parts, semiconductor and other electronics, aerospace product and parts, etc. The non-tradable sector includes the retail sector and restaurants, construction, and other sectors such as hospitals, traveler accommodation, and building services. Appendix Table 1 provides details.

To estimate valuation gaps for tradable and non-tradable sectors for DM and EM firms, we modify Eq. (2). We replace the period fixed effects, η_t, with period fixed effects for firms in Tradeable sectors (η_t^T) and for firms in Not Tradeable sectors (η_t^{NT}). We also replace the period fixed effects for non-US developed markets (β_t^{DM}) and for emerging markets (β_t^{EM}) with period fixed effects by type ($\beta_t^{DM,T}$, $\beta_t^{DM,NT}$, $\beta_t^{EM,T}$, $\beta_t^{EM,NT}$). We estimate:

$$q_{it} = \alpha + \beta_t^{DM,T} + \beta_t^{DM,NT} + \beta_t^{EM,T} + \beta_t^{EM,NT} + \gamma_1' X_{it} + \gamma_2' Z_{it}^c + \delta_i + \eta_t^T + \eta_t^{NT} + \epsilon_{it}. \quad (3)$$

Note that the coefficients on the firm- and country-level controls are not allowed to differ for firms from DM and EM countries or by type. The industry fixed effects plus firm-level clustering of standard errors remain in effect. The $\beta_t's$ estimate the valuation gap between US firms and non-US DM firms for each type and between US firms and EM firms for each type. The gaps are estimated each period, after controlling for firm characteristics, GDP growth, and industry fixed effects.

Model (1) in Table 7 presents the results on the pre- versus post-GFC valuation gaps for EMs versus DMs, separately for those firms in tradeable goods sectors and those in non-tradeable goods sectors. Here we only report OLS regressions. The sample excludes Chinese firms and R&D is capitalized for US firms. For firms in DMs, the valuation gap evolves similarly for firms in the tradeable and non-tradeable sectors. There is a statistically significant widening of the valuation gap among DM firms in tradeable good sectors (0.197 pre-GFC to 0.305 post-GFC) that is only somewhat more acute than that in non-tradeable good sectors (0.188 pre-GFC to 0.252 post GFC). The respective *F*-statistics on the pre- versus post-GFC differences imply both changes are significant. There is no significant change in the valuation gap among

EMs in the tradeable goods sectors (0.231 pre-GFC to 0.211 post-GFC) or the non-tradeable goods sectors (0.202 pre-GFC to 0.178 post-GFC). We conclude that the slowdown in global trade flows is not a key factor in understanding the shift in valuation gaps among DMs and EMs post-crisis.

The US also experiences a post-GFC boom in valuations of firms in technology-related sectors. Hence, it is plausible that the growth in valuations of technology firms in the US creates a greater valuation wedge. If this were the case, our results would hold for the technology sector and not for other industries. We investigate whether the valuation gap for the technology sector evolves differently from that for the other sectors. Firms in Industry 5 (Business equipment, computers, software and electronic equipment) in the Fama and French (1997) 10-industry classification scheme are defined as High-tech. We adapt the same approach as in Eq. (3) except that we define the two types of firms as "High-tech" versus "Not high-tech."

Model (2) in Table 7 presents the findings. We find that our results are concentrated among firms outside the high-tech sector. For firms in DM countries, the valuation gap does not change from before the GFC to after for firms in the high-tech sector. The valuation gap for DMs in the high-tech sector is 0.149 pre-GFC and this widens to 0.190 post-GFC but the difference is insignificant (*F*-statistic of 0.75, *p*-value of 0.39). Among DM firms that are outside the high-tech sector, there is a divergence in valuation the gap, as in previous tables: the pre-GFC valuation gap is 0.201 and it widens significantly to 0.297 post-GFC (*F*-statistic of 28.7, *p*-value less than 0.001). For EM countries, the valuation gap significantly widens for firms in the high-tech sector. The pre-GFC valuation gap among EMs in the high-tech sector is 0.144 and it almost doubles to 0.271 post-GFC. This difference is statistically significant (*F*-statistic of 7.22, *p*-value of 0.007). The narrowing in the valuation gaps among EM firms is concentrated among firms outside the high-tech sector (0.234 pre-GFC to 0.188 post-GFC).

5.4. Shifting Composition by Type of Firms across Countries.

Typically, young firms have growth opportunities and invest a lot. As they do so, some growth opportunities are used up, but new growth opportunities only infrequently replace the ones that are used up. As a result, Tobin's *q* falls with firm age (Loderer, Stulz, and Waelchli, 2016). As shown in Kahle and Stulz (2017), US firms become older during our sample period. To the extent that the population of firms ages

differently across countries, this could lead to a change in the valuation gap that would have nothing to do with the GFC. Below, we test how shifts in firm-age distributions matter for our changes in valuation gaps.

Another important change among US firms over time is that intangible assets have become more important (Kahle and Stulz, 2017). Though R&D is an important source of intangible assets for firms, other intangible assets, such as organizational capital, have grown in importance. As a result of this evolution, tangible assets are less important on balance sheets. In general, only a fraction of all intangible assets appear on a firm's balance sheet. As discussed earlier for R&D, countries can differ in how they allow firms to capitalize intangible investments such as R&D. In general, many forms of intangible assets are not capitalized at all across the world. If these forms of intangible assets have become more or less important in the US compared to non-US DMs and EMs, this could lead to a change in the valuation gap. Unfortunately, for a large, global sample like ours, there is no easy way to obtain reliable estimates of non-balance-sheet intangible assets. Instead, we investigate whether the valuation gap evolves differently for firms that differ in the importance on their balance sheet of tangible assets. We take the percentage of assets that are intangible assets as a proxy for the importance of intangible assets – firms with a low fraction of tangible assets on their balance sheet are generally intangible-asset-intensive firms.

Table 8 presents our findings examining the impact of possible changes in firm-age distribution and tangibility of assets across countries on our results. Our asset tangibility ratio equals net property, plan, and equipment (gross minus accumulated depreciation) divided by total assets. We define a firm as of high asset tangibility if its ratio exceeds the median value of asset tangibility in 2009 computed for all firms in the restricted sample. A firm is classified as old if it is listed for more than five years. Age is the current year minus the year of the first listing given by BDATE code in Datastream for non-US firms and by LINKDT in Compustat, the first effective link date between CRSP and Compustat for US firms.

Table 8 presents the findings for old versus young firms in Model (1) and for high- versus not-high-tangibility in Model (2) using the same specification of Eq. (3) and as exhibited in Table 7 for the sector splits. In Model (1), we see the familiar widening post-GFC of the valuation gaps among DM firms not only among the old firms, but also among the young firms. Both are statistically significant differences. What is surprising is the fact that the absolute magnitude of the valuation gaps among younger firms are smaller, but the economic magnitude of the change in the valuation gaps from before to after the GFC is

proportionately greater for those younger firms. The pre-GFC valuation gap of 0.094 doubles in magnitude to 0.189, while that for older firms widens from 0.222 pre-GFC to 0.283 post-GFC. For the EM firms, there is another stark difference in the evolution of valuation gaps between older and younger firms. The familiar narrowing of the valuation gaps arises for the older firms from 0.242 pre-GFC to 0.191 post-GFC and Panel b confirms the differences is statistically significant (*F*-statistic of 6.91, *p*-value of 0.009). For younger firms in EM markets, there even appears to be a *widening* of the valuation gaps from 0.151 pre-GFC to 0.214 post-GFC, though it is not significant (*p*-value of 0.144).

Model (2) reveals that the widening of the valuation gaps among DMs and the narrowing of the valuation gaps among EMs is concentrated among those firms with high asset-tangibility ratios. The pre-GFC valuation gap for DMs of 0.162 nearly doubles in magnitude to 0.292 post-GFC among DMs, a significant difference (*F*-statistic of 34.7, *p*-value less than 0.001), and the pre-GFC valuation gap for EMs of 0.213 narrows to 0.171 post-GFC, with a *p*-value of 0.078. Among not-high-asset-tangibility firms around the world, we do see a significant widening of the valuation gap among DMs from 0.214 pre-GFC to 0.267 post-GFC, but no significant difference post-GFC for EMs.

It is striking that our main findings on the differing evolution in the valuation gaps among DMs and EMs from pre- to post-crisis mostly concentrate among older firms and those that have proportionally more tangible assets. It affirms the findings in the previous sub-section at the sector level that the results are stronger among firms that are not in the high-tech sector. However, we perform one additional sector-level test as a result of these findings at the level of individual firm characteristics. One sector with disproportionately tangible assets that is outside the high-tech sector and that has well-established older firms is the resource sector. Consequently, we investigate separately the evolution of the gap for resource and non-resource firms using the same approach that we did using Eq. (3) with tradeable-versus-non-tradeable and high-tech versus non-high-tech firms. A resource firm is one defined to be in SIC Division B, Mining (or Metal mining, Coal mining, Oil and gas extraction, and Mining and quarrying of nonmetallic minerals except fuels).

These results are presented in Table 7 as Model (3). We find that the widening of the valuation gaps among DMs is dramatic for resource firms with a *negative* valuation gap of -0.077 in the pre-GFC period changing into a large valuation gap of 0.335 post-GFC. It is a significant difference (*F*-statistic of 52.3, *p*-

value less than 0.001). The widening of the valuation gap among non-resource DM firms from 0.204 pre-GFC to 0.275 post-GFC is also significant but much smaller in magnitude. Strikingly, among resource firms, we also see a dramatic *widening* of the valuation gaps from 0.104 (insignificantly different from zero) pre-GFC to 0.343 post-GFC among EMs. The flat or convergence pattern in valuation gaps among EMs that we observe in the overall sample appears to be concentrated in the non-resource sector stocks.

5.5. Instability in the Post-Global Financial Crisis Period?

One possible limitation of our regression analysis to now is the fact that we treat the post-crisis period from 2010 to 2018 as one period. The year-by-year fixed effects coefficients for non-US firms in Figures 2 and 3 reveal some meaningful differences in the valuation gaps in the immediate aftermath of the GFC (say, 2010 to 2012) and the longer-term post-GFC period starting from 2013 and beyond. Recall Figure 3, which excludes Chinese firms and capitalizing R&D for US firms, shows the average non-US valuation gap is around 0.16 in the 2010-2012 period and then shifts downward to around 0.25 for 2013-2018. There is a similar shift upward in the 2013-2018 period for both DMs and EMs in Panels b and c in Figure 3. To get a sense of the potential instability in the valuation gaps *within* the post-crisis period, we perform an additional test that breaks it into two sub-periods: 2010-2014 and 2014-2018. Table 9 uses the same model as in Eq. (2) but defines the periods as *t* equals 1 to 4 (period 1 is the pre-crisis period (2001 to 2007), period 2 is the crisis period (2008 to 2009), period 3 is the initial post-crisis period (2010 to 2014) and period 4 is the later post-crisis period (2015 to 2018).

Model (1) in Panel a reproduces the same findings from Model (3) in Table 5 so they can be juxtaposed against the findings in Model (2), which breaks up the post-crisis period into two sub-periods. Model (1) shows the familiar widening of the valuation gaps among DMs from a pre-GFC period of 0.194 to a post-crisis average of 0.280, while Model (2) indicates that the larger valuation gap in the post-crisis period is relatively stable in the 2010-2014 (0.268) and 2014-2018 (0.301) periods. The *F*-statistics that evaluate whether the valuation gaps for DMs are similar pre-GFC and post-GFC by sub-period are *both* statistically significant (20.05 with a *p*-value less than 0.001 for 2010-2014 and 25.07 with a *p*-value of less than 0.001 for 2015-2018). A more interesting picture emerges for the EM firms. Model (1) shows again the modest narrowing of the valuation gap from a pre-GFC period of 0.219 to 0.196 post-GFC. But Model (2) indicates

that there is a significant narrowing of the valuation gap among EMs in the first sub-period to 0.182 (*F*-statistic testing pre-GFC versus 2010-2014 of 5.95, *p*-value of 0.015), but a significant *reversal* in the 2015-2018 period to 0.234. Importantly, however, while the gap widens in the 2015-2018 period, the gap for that period is not significantly different from the pre-crisis gap. Consequently, even for the 2015-2018 period, our main result holds, namely that the gap widens for firms in DM countries compared to the pre-crisis period but does not widen for firms in EM countries.

6. Does financial globalization weaken for US cross-listed stocks as well?

Suppose that a firm's equity would be worth more if that firm were a US firm instead of a firm domiciled in its own country. Such an outcome could be possible for two different reasons. First, discount rates that apply to the firm's future expected cash flows could be lower in the US. Second, expected cash flows to equity could be higher in the US. A cross-listing on a US stock exchange would enable a non-US firm to increase its equity value if it gains some of the benefits that accrue to US firms (Stulz, 2005; Doidge, Karolyi, and Stulz, 2004). With a US cross-listing, a non-US firm's valuation would become closer to what its valuation would be if it were a US firm, which would lead to greater financial globalization. Non-US cross-listed firms would be valued more similarly to US firms. Further, the cross-listing of one firm could have spillover effects on the value of domestic peer firms from its country of domicile. For instance, access to institutions that protect shareholders better could help make a firm more competitive relative to its home country peers, which could put pressure on these firms to improve their governance as well. A long literature – see the review in Karolyi (2012) and more recent references in Karolyi and Wu (2018) – supports the view that cross-listings can lead to greater convergence in required expected returns for equity and in equity values. In this section, we investigate whether the role of cross-listings in fostering financial globalization has changed from before the GFC to after the GFC.

To perform this analysis, we identify non-US firms that are cross-listed on the major US stock exchanges via Level 2 or 3 American Depositary Receipts (ADRs), via direct listings, or via other means from a variety of sources.[6] These sources include: the ADR divisions at Bank of New York Mellon,

[6] Non-US firms can also secondarily list in US markets via Securities and Exchange Commission (SEC) Rule 144a private placements or in the over-the-counter (OTC) market, which includes in turn both Pink Sheet and OTC Bulletin Board issues. These firms are exempt from SEC registration and many disclosure requirements and therefore face few

Citibank, JP Morgan, websites at the New York Stock Exchange and Nasdaq, the Center for Research in Security Prices (CRSP), firms' annual reports, SEC Form 20-F filings, and Factiva searches. Information from the various data sets is manually cross-checked and verified. Data provided by Citibank and CRSP importantly allows us to keep track of both active and inactive issues for US listings. We keep track of listing dates and changes in firms' listing status, either through upgrades, downgrades, or de-listings. We set a dummy equal to one for the years in which a firm is listed on a US stock exchange at the end of the calendar year ("cross-listed"). All other firms are classified as local.

Table 10 presents the number of local and cross-listed firms from 2001 to 2018 for non-US countries (excluding China) and separately for DMs and EMs. It also shows the propensity to cross-list, which we define as the percentage of publicly-listed firms that are cross-listed on US stock exchanges. As before, the sample includes non-financial firms with at least $100 million in assets (inflation adjusted) and complete data on firm characteristics in Worldscope/Compustat. The column of counts of cross-listed firms reveals a distinct pattern of declines in counts from a peak in 2003 of 525 to a low of 358 in 2012. Overall, from peak to the final count of 368 in 2018 represents a 30% decline in the number of cross-listed firms. Of course, it is important to juxtapose this against the large increase in the number of locally-listed firms across all countries in our sample from 8,385 to 13,491, an increase of 61% over the same period of time. With the increase in non-US listed firms, it is not surprising that there has been a sharp drop in the propensity to cross-list. Non-US stocks cross-listed on major US exchanges now represent only 2.66% of all publicly-listed stocks whereas they represented more than double that percentage in 2001.

Table 10 further illustrates that the decline in counts almost exclusively takes place among DMs. The peak count of US cross-listed stocks was 403 in 2002. It falls to 256 in 2018, a 37% decline. Cross-listed firms now constitute only 3.46% of all DM stocks. The number of EM cross-listed firms is 112 at the start of our sample period and 112 at the end. Because the number of EM listed firms increases sharply over our

additional obligations when they list. Prior research finds that non-US firms cross-listed on US stock exchanges have higher valuations than domestic peers, and thus, have valuations that are closer to those of US firms. In contrast, there is no difference in valuations between non-US firms with Rule 144a cross-listings and domestic peers. Firms with OTC cross-listings have higher valuations in most years compared to domestic peers though their valuations are higher before cross-listing as well. (Doidge, Karolyi, and Stulz, 2004, 2009). As a result, we do not separately examine firms with Rule 144a and OTC cross-listings.

sample period, the propensity to cross-list falls from an average of 3.89% in the pre-GFC period to an average of 1.80% for the post-GFC period.

The sharp decrease in counts of cross-listed firms and in the propensity to cross-list suggests that the role of the cross-listing mechanism in fostering financial globalization is now less important and is associated, at least in part, with the weakening of financial globalization following the GFC. An obvious question is whether the decrease in the propensity to cross-list is due to a change in how valuations of cross-listed firms differ from the values of non-cross-listed firms *and* how they resemble the valuations of equivalent US firms. As mentioned in the introduction, the literature calls the difference in valuation of cross-listed firms and non-cross-listed firms the cross-listing premium. If that premium has disappeared, we would expect cross-listed firms to be valued more like home-country peer firms that are not cross-listed. In that case, the decrease in the propensity to cross-list would not be surprising.

The next step in our analysis is to estimate the valuation gaps each year from 2001 to 2018 for non-US countries (excluding China), but separately for firms that have a cross-listing on a US exchange ("Cross") and those that do not ("Local"). To estimate these gaps, we modify Eq. (1). We replace the year fixed effects for non-US countries (β_t^{non-US}) with year fixed effects for local firms (β_t^{Local}) and for cross-listed firms (β_t^{Cross}), where *t* equals 2001 to 2018. We estimate:

$$q_{it} = \alpha + \beta_t^{Local} + \beta_t^{Cross} + \gamma_1' X_{it} + \gamma_2' Z_{it}^c + \delta_i + \eta_t + \epsilon_{it.} \quad (4a)$$

We also estimate the valuation gaps separately for DMs and EMs:

$$q_{it} = \alpha + \beta_t^{DM,Local} + \beta_t^{DM,Cross} + \beta_t^{EM,Local} + \beta_t^{EM,Cross} + \gamma_1' X_{it} + \gamma_2' Z_{it}^c + \delta_i + \eta_t + \epsilon_{it.} \quad (4b)$$

The year and industry fixed effects plus firm-level clustering of standard errors remain in effect. As before, the valuation gap each year equals the β_t coefficients multiplied by –1.

Doidge, Karolyi, and Stulz (2004) provide the first tests of the valuation differences between non-US firms that have a cross-listing on a US exchange and those that do not. They test whether valuations of cross-listed firms are different than the valuations of local firms after controlling for firm and country characteristics. They find that cross-listed firms have Tobin's *q* valuation ratios that are higher than local firms, an economically and statistically robust result. They show that the cross-listing premium is higher among faster growing firms and for those from countries with weaker legal systems at home. Doidge, Karolyi, and Stulz (2009) in a follow-up study confirm the persistence of the cross-listing premium for US

cross-listings for most of the 1990s and early 2000s. Nevertheless, during the 2000s, a number of important regulatory changes took place with respect to cross-listings in US markets that have made it easier for such firms to delist and deregister from US markets to escape the regulatory burdens and to remove potential governance benefits. Ghosh and He (2017) point to a dissipation of the cross-listing premium following the passage of the Securities and Exchange Commission's Rule 12h-6. Gagnon and Karolyi (2018), by contrast, affirm a positive cross-listing valuation premium with a clinical study of another influential event; namely, the passage of the US Supreme Court's *Morrison v. National Australia Bank* ruling that restricts key fraud-related provisions to foreign firms cross-listed on US exchanges.

To estimate the cross-listing premium each year, from Eq. (4a), we take the difference between the coefficients for exchange listed firms, β_t^{Cross}, and local firms, β_t^{Local}.

Figure 4, Panel a shows the results of the regression for Eq. (4a) for non-US countries. Panel a shows estimates of the valuation gap for cross-listed and local firms. For cross-listed firms, the valuation gap is small, but mostly negative through 2012. After 2012 it becomes slightly positive or remains near zero through 2018. By contrast, the valuation gap for local firms is positive throughout the whole sample period. Panels b and c of Figure 4 repeat the same analysis per Eq. (4b) in which we estimate the valuation gaps separately for firms from DM and EM countries. For DMs, the valuation gap for cross-listed firms is negative through 2012. It stays around zero through 2018. There is no evidence that the post-GFC gap is positive. The valuation gap for local firms from DM countries is reliably positive and appears to widen post-GFC. The evolution of the valuation gap for cross-listed firms from EM countries in Panel c evolves differently as it is positive in most years following the GFC. However, it is also positive early in our sample period before turning negative during 2009-2012. Similar to DMs, the valuation gap for local firms in EMs is positive in each year of our sample period. The size of the valuation gap is as large post-GFC as in the early 2000s. A widening valuation gap trend is less visible among EMs than among DMs.

In Figure 5, Panel a, we show that the cross-listing premium estimated from Eq. (4a) for non-US firms is stable across the sample period. It lies within a range of 0.25 to 0.40, with only one year's notable decline during the GFC (2008). These estimates are similar in magnitude with those reported in Doidge, Karolyi, and Stulz (2004, 2009) for earlier periods in the 1990s and early 2000s. Panel b of Figure 5 presents the estimates of the cross-listing premium separately for cross-listed firms (relative to their local counterparts)

from DMs and EMs. The magnitude of the premium is consistently higher for DMs with only one year's exception (2008) during the GFC. The cross-listing premium does not appear to be declining post-GFC for DMs, but it does appear to be declining for EMs.

In Table 11, Model (1) shows estimates of the valuation gaps for non-US countries when we replace the year fixed effects in Eq. (4a) with period fixed effects. We find no evidence of a significant positive valuation gap for cross-listed firms. In the pre-GFC period, cross-listed firms have a negative valuation gap. The gap becomes insignificant after the crisis. The difference between the pre- and post-GFC valuation gaps is not significantly different from zero. Model (2) has separate estimates of the gaps for DM and EM countries. In the pre-GFC period, cross-listed firms from DM countries have a negative valuation gap (-0.121, with *t*-statistic of -3.62) and it becomes insignificant (-0.055) post-GFC. The cross-listed firms from EM countries never have a valuation gap that is significantly different from zero. The difference between the pre- and post-GFC valuation gap for DMs and for EMs is not significantly different from zero. This evidence shows that, in contrast to local firms, cross-listed firms appear to be valued like US firms after the GFC, which is consistent with the view that cross-listing is a mechanism that fosters financial globalization.

We turn next to the cross-listing premium. For non-US countries, in Model (1), the premium is positive and significant both before (0.313), during (0.188), and after the GFC (0.283). There is no significant change in the cross-listing premium from before to after the GFC. Similarly, with Model (2), the premium is positive and significant both before, during, and after the GFC for cross-listed firms from DMs and from EMs,[7] so that the cross-listing premium did not change at all for DM firms and EM firms from before the GFC to after the GFC.

The results we have shown exclude China. Though we do not tabulate the results, we estimate the models reported in Table 11 with China in the sample. We do so for comparison purposes since other papers in the literature typically include China in their sample. Including China leads to different results because Chinese firms generally have a negative cross-listing premium, the exact reasons for which are not well

[7] Though the earlier work uncovering the cross-listing premium by Doidge, Karolyi, and Stulz (2004, 2009) did not evaluate its sensitivity to whether the country is an emerging or developed market, it did evaluate several correlates, including (log of) Gross National Product (GDP), stock market capitalization relative to GDP, liquidity ratio of value of shares traded to average market capitalization from the IFC Emerging Stock Markets Handbook, as well as anti-director rights, accounting standards, and judicial efficiency from La Porta, Lopez-de-Silanes, and Shleifer (1998).

understood.[8] As a result, when we include China, the EM average cross-listing premium after the GFC is -0.244 and is significant. Not surprisingly, therefore, EM cross-listed firms have a significant valuation gap of 0.285. This gap is significantly higher than the valuation gap of non-cross-listed firms from EM countries, which is 0.041. For EM countries, when China is included in the sample, cross-listed firms have a significantly higher valuation gap than non-cross-listed firms. A plausible explanation for these findings is that valuations of Chinese firms are excessively high during the post-GFC period relative to valuations of non-Chinese firms. Given the existence of strong barriers to international investment for China, there is no mechanism to anchor these valuations to the level of non-Chinese firms. However, cross-listed firms are valued more like other firms, so that their valuation is lower than the valuation of Chinese firms that are not-cross-listed. Further investigation of the negative cross-listing premium of Chinese firms is beyond the scope of this paper.

7. Conclusions.

If the world were flat because of financial globalization, we would expect that it does not matter where a firm is located for its valuation. The same firm, located in different countries, would still be valued the same. It is well-known that before the GFC non-US firms were, on average, valued at a discount relative to US firms. We call this discount the valuation gap. We show that, for firms from DM countries, the valuation gap is worse after the crisis than before. By contrast, the valuation gap of firms from EM countries becomes narrower. We investigate extensively whether the contrasting evolutions of the valuation gap for firms from DM countries compared to those from EM countries is due to a shift in industry composition or in firm characteristics. We find that the valuation gap of EM and DM firms evolves more similarly for young firms and firms with less tangible assets. So, the differing evolution of the valuation gaps between EM and DM firms is concentrated among old economy firms – older firms in industries that have a high ratio of tangible assets to total assets.

[8] Two important exceptions are the studies by Arquette, Brown, and Burdekin (2008) and Doukas and Yang (2014). The Arquette et al. study, in particular, shows how the discounts attached to Chinese securities – whether trading as ADRs on US exchanges of as H-shares on the Hong Kong market – relative to their home market shares on the Shanghai Stock Exchange appear to be significantly influenced by changes in both exchange rate expectations and market-wide investor sentiment.

Is financial globalization in reverse after the 2008 global financial crisis? Our evidence says it is. As discussed in the introduction, such a result is to be expected in light of the sharp reduction in gross capital flows after the crisis since capital flows are a mechanism that is expected to foster convergence in valuations. We find that another mechanism that is expected to facilitate convergence in valuations – namely the cross-listing of foreign firms on major US exchanges - loses its importance after the crisis. The propensity of foreign firms to cross-list falls sharply. Such a decrease is puzzling since, at the same time, it is clear that cross-listed firms continue to be valued similarly to US firms after the GFC and that the previously-documented cross-listing valuation premium is unchanged after the GFC. US-cross-listed firms from around the world continue to be valued more highly than their non-cross-listed peer firms.

References

Aggarwal, R., Erel, I., Stulz, R., Williamson, R., 2010. Differences in governance practices between US and foreign firms: Measurement, causes, and consequences. Review of Financial Studies 23, 3131-3169.

Akbari, A., Carrieri, F., Malkhozov, A., 2019. Can cross-border funding frictions explain financial integration reversals? McGill University working paper, Montreal, PQ.

Alexander, G., Eun, C., Janakiramanan, S., 1987. Asset pricing and dual listing on foreign capital markets: A note. Journal of Finance 42, 151-158.

Alexander, G., Eun, C., Janakiramanan, S., 1988. International listings and stock returns: Some empirical evidence. Journal of Financial and Quantitative Analysis 23, 35-151.

Arquette, G. C., Brown. W., Burdekin, R., 2008. US ADR and Hong Kong H-share discounts of Shanghai-listed firms. Journal of Banking and Finance 32, 1916-1927.

Bekaert, G., Harvey, C., 1995. Time-varying world market integration. Journal of Finance 50, 403-444.

Bekaert, G., Harvey, C., Kiguel, A., Wang, X., 2016. Globalization and asset returns. Annual Review of Financial Economics 8, 221-288.

Bekaert, G., Harvey, C., Lundblad, C., Siegel, S., 2007. Global growth opportunities and market integration. Journal of Finance 62, 1081-1137.

Bekaert, G., Harvey, C., Lundblad, C., Siegel, S., 2011. What segments equity markets? Review of Financial Studies 24, 3841-3890.

Bekaert, G., C.R. Harvey, C.T. Lundblad, and S. Siegel, 2016. Political risk and international valuation. Journal of Corporate Finance *37*, pp.1-23.

Bekaert, G., Mehl, A., 2019. On the global financial market integration 'swoosh' and the trilemma. Journal of International Money and Finance 94, 227-245.

Bergin, P., Glick, R., 2007. Global price dispersion: Are prices converging or diverging? Journal of International Money and Finance 26, 703-729.

Carpenter, J., Lu, F., Whitelaw, R., 2015. The real value of China's stock market. New York University working paper, New York, NY.

Carpenter, J., Whitelaw, R., 2017. The development of China's stock market and stakes for the global economy. Annual Review of Financial Economics 9, 233-257.

Carrieri, F., Chaieb, I., Errunza, V., 2013. Do implicit barriers matter for globalization? Review of Financial Studies 26, 1694-1739.

Carrieri, F., Errunza, V., Hogan, K., 2007. Characterizing world market integration through time. Journal of Financial and Quantitative Analysis 42, 915-940.

Claessens, S., Laeven, L., 2003. Financial development, property rights, and growth. Journal of Finance 58, 2401-2436.

Doidge, C., Karolyi, G.A., Stulz, R., 2004. Why are foreign firms listed in the US worth more? Journal of Financial Economics 71, 025-238.

Doidge, C., Karolyi, G.A., Stulz, R., 2009. Has New York become less competitive than London in global markets? Evaluating foreign listing choices over time. Journal of Financial Economics 110, 253-277.

Doukas, J., Wang, L., 2014. Does the bonding effect matter in a more integrated capital market world? Journal of International Money and Finance 47, 162-184.

Fama, E., French, K., 1997. Industry costs of equity. Journal of Financial Economics 43, 153-193.

Fernandes, N., 2009. Market liberalizations at the firm level: Spillovers from ADRs and implications for local markets. Journal of International Money and Finance 28, 293-321.

Fernandez, A., Klein, M.W., Rebucci, A., Schinkler, M., Uribe, M., 2016. Capital control measures: A new dataset. IMF Economic Review 64, 548-574.

Foda, K., and E. Prasad, 2018. 10 years after the financial crisis: Uneven progress and some structural disconnects. Brookings Institution, Washington, D.C.

Foerster, S., Karolyi, G.A., 1993. International listings of stocks: The case of Canada and the U.S. Journal of International Business Studies 24, 763-784.

Foerster, S., Karolyi, G.A., 1999. The effects of market segmentation and investor recognition on asset prices: Evidence from foreign stocks listing in the United States. Journal of Finance 54, 981-1013.

Fresard, L., Salva, C., 2012. To what extent do cross-listing firms integrate into the US environment? University of Maryland working paper, College Park, MD.

Gagnon, L., Karolyi, G.A., 2018, An unexpected test of the bonding hypothesis. Review of Corporate Financial Studies 7, 101-156.

Hail, L., Leuz, C., 2006. International differences in cost of capital: Do legal institutions and securities regulation matter? Journal of Accounting Research 44, 485-531.

Ghosh, C., He, F., 2017, The diminishing benefits of US cross-listing: Economic consequences of SEC Rule 12h-6. Journal of Financial and Quantitative Analysis 53, 1143-1209.

Jensen, M., Meckling, W, 1976, Theory of the firm: Managerial behavior, agency costs, and ownership structure, 3, 305-360.

Kahle, K., Stulz, R., 2017. Is the public corporation in trouble? Journal of Economic Perspectives 3, 67-88.

Karolyi, G.A., 2004. The role of ADRs in the development and integration of emerging equity markets, Review of Economics and Statistics 86, 670-690.

Karolyi, G.A., 2012. Corporate governance, agency problems, and international cross-listings: A defense of the bonding hypothesis, Emerging Markets Review 13, 516-547.

Karolyi, G.A., Wu, Y., 2018. A new partial-segmentation approach to modeling international stock returns, Journal of Financial and Quantitative Analysis 53, 507-546.

La Porta, R., Lopez-de-Silanes, F., Shleifer, A., Vishny, R., 1998. Law and finance. Journal of Political Economy 106, 1113-1155.

La Porta, R., Lopez-de-Silanes, F., Shleifer, A., Vishny, R., 2002. Investor protection and corporate valuation. Journal of Finance 54, 1147-1170.

Lane, P., Milesi-Ferretti, G.M., 2017. International financial integration in the aftermath of the global financial crisis. International Monetary Fund working paper, Washington, DC.

Lemmon, M., Lins, K., 2003. Ownership structure, corporate governance, and firm value: Evidence from the East Asian financial crisis. Journal of Finance 58, 1445-1468.

Lewis, K., 2011. Global asset pricing. Annual Review of Financial Economics 3, 435-466.

Loderer, C., Stulz, R.M., Waelchli, U., 2016. Firm rigidities and the decline in growth opportunities. Management Science 63, 2773-3145

Mian, A., Sufi, A., 2014. What explains the 2007-2009 drop in employment? Econometrica 82, 2197-2223.

Peters, R., Taylor, L, 2017, Intangible capital and the investment-*q* relation, Journal of Financial Economics 123, 251-272.

Pukthuanthong, K., Roll, R., 2009. Global market integration: An alternative measure and its application. Journal of Financial Economics 21, 1403-1449.

Shleifer, A., Wolfenzon, D., 2002. Investor protection and equity markets. Journal of Financial Economics 66, 3-27.

Stulz, R., 2005. The limits of financial globalization. Journal of Finance 60, 1595-1630.

Table 1. Number of firms by year.

This table shows the number of firms in the sample for non-US countries and for the US. The sample includes 52 countries that have at least five years of sequential data with complete data on firm characteristics for at least 20 firms. We drop country-years that do not have at least 20 firms with complete data in a given year (see Section 3). For this set of country-years, Panel a shows the number of non-US (US) firms in Worldscope (Compustat) that have data on market cap in a given year. non-US countries are divided into developed and emerging countries based on MSCI classifications ("Unrestricted sample"). The period before the global financial crisis, Pre-GFC, includes 2001 to 2007. The period after the crisis, Post-GFC, includes 2010 to 2018. Panel b shows the number of non-financial firms with at least $100 million in assets (inflation adjusted) and complete data on firm characteristics (Tobin's *q*, sales growth, operating income, leverage, asset tangibility, and assets) ("Restricted sample").

Panel a. Unrestricted sample

Year	All non-US	Developed markets	Emerging markets	US
2001	19,996	12,946	7,050	5,752
2002	20,473	13,007	7,466	5,319
2003	20,882	12,971	7,911	5,000
2004	21,941	13,324	8,617	4,965
2005	25,312	14,979	10,333	4,888
2006	27,802	15,672	12,130	4,802
2007	29,349	16,312	13,037	4,717
2008	29,891	16,272	13,619	4,467
2009	29,650	15,802	13,848	4,231
2010	30,134	15,622	14,512	4,092
2011	30,509	15,433	15,076	3,963
2012	30,463	15,108	15,355	3,866
2013	30,534	14,990	15,544	3,893
2014	30,688	14,935	15,753	4,023
2015	31,029	14,948	16,081	3,980
2016	31,269	14,855	16,414	3,858
2017	32,058	15,002	17,056	3,806
2018	32,910	15,408	17,502	3,761
Total	504,890	267,586	237,304	79,383
Total Pre-GFC	165,755	99,211	66,544	35,443
Total Post-GFC	279,594	136,301	143,293	35,242

Panel b. Restricted sample

Year	All non-US	Developed Markets	Emerging Markets	US
2001	9,854	6,491	3,363	2,822
2002	10,428	6,645	3,783	2,879
2003	10,940	6,760	4,180	2,791
2004	11,473	6,897	4,576	2,773
2005	12,015	7,108	4,907	2,671
2006	12,707	7,379	5,328	2,644
2007	13,996	7,740	6,256	2,579
2008	14,664	7,779	6,885	2,535
2009	14,847	7,688	7,159	2,520
2010	15,522	7,707	7,815	2,439
2011	16,156	7,714	8,442	2,368
2012	16,366	7,619	8,747	2,312
2013	16,572	7,579	8,993	2,280
2014	16,745	7,569	9,176	2,263
2015	16,972	7,546	9,426	2,250
2016	17,106	7,459	9,647	2,244
2017	17,715	7,466	10,249	2,196
2018	17,778	7,395	10,383	2,139
Total	261,856	132,541	129,315	44,705
Total Pre-GFC	81,413	49,020	32,393	19,159
Total Post-GFC	150,932	68,054	82,878	20,491

Table 2. Average number of firms by country.

This table shows the average number of firms in each country. The sample includes non-financial firms from 52 countries with at least $100 million in assets (inflation adjusted) and complete data on firm characteristics in a given year. Non-US countries are divided into developed and emerging countries based on MSCI classifications. For developed markets, Panel a shows the years in which a country is included in the sample, the average number of firms in the country over the full period from 2001 to 2018, the period before the global financial crisis, Pre-GFC, from 2001 to 2007, and the period after the crisis, Post-GFC, from 2010 to 2018. Panels b and c show the same for the US and for emerging markets.

Panel a. Developed markets

Nation	Years in sample	Full Period	Pre-GFC	Post-GFC
Australia	2001-2018	370	260	445
Austria	2001-2018	53	52	51
Belgium	2001-2018	74	76	71
Canada	2001-2018	498	468	508
Denmark	2001-2018	74	76	72
Finland	2001-2018	84	77	88
France	2001-2018	368	378	355
Germany	2001-2018	367	390	344
Hong Kong	2001-2018	656	456	810
Ireland-Rep	2001-2018	40	42	39
Israel	2001-2018	157	87	205
Italy	2001-2018	184	180	183
Japan	2001-2018	2,811	2,882	2,738
Netherlands	2001-2018	108	119	98
New Zealand	2001-2018	54	41	65
Norway	2001-2018	101	88	108
Portugal	2001-2018	42	42	40
Singapore	2001-2018	287	222	335
Spain	2001-2018	102	101	102
Sweden	2001-2018	159	137	177
Switzerland	2001-2018	154	156	151
United Kingdom	2001-2018	620	671	574
Average		335	318	344

Panel b. US

Nation	Years in sample	Full period	Pre-GFC	Post-GFC
US	2001-2018	2,484	2,737	2,277

Panel c. Emerging markets

Nation	Years in sample	Full Period	Pre-GFC	Post-GFC
Argentina	2001-2018	45	42	47
Brazil	2001-2018	213	197	223
Bulgaria	2007-2018	30	24	30
Chile	2001-2018	104	94	110
China	2001-2018	2,178	1,227	3,024
Colombia	2003-2018	25	19	29
Croatia	2007-2018	60	65	58
Czech Republic	2001-2018	16	24	10
Egypt	2004-2018	67	38	76
Greece	2001-2018	155	167	140
India	2001-2018	713	307	1,008
Indonesia	2001-2018	205	129	269
Jordan	2007-2018	26	20	27
Luxembourg	2003-2018	27	21	31
Malaysia	2001-2018	401	342	443
Mexico	2001-2018	89	88	90
Nigeria	2008-2018	31	.	33
Pakistan	2001-2018	83	49	108
Peru	2001-2018	55	34	69
Philippines	2001-2018	89	70	105
Poland	2001-2018	129	69	172
Romania	2007-2018	36	32	36
Russian Fed	2001-2018	182	89	219
South Africa	2001-2018	143	125	158
South Korea	2001-2018	919	612	1,165
Taiwan	2001-2018	848	638	1,015
Thailand	2001-2018	228	160	282
Turkey	2001-2018	155	111	188
Ukraine	2007-2018	40	22	43
Average		251	172	318

Table 3. Summary statistics.

This table shows firm-level summary statistics. The sample includes non-financial firms from 52 countries with at least $100 million in assets (inflation adjusted) and complete data on firm characteristics in a given year. Variable definitions are in Appendix Table 1. Non-US countries are divided into developed and emerging countries based on MSCI classifications. Panels a, b, c, and d show summary statistics for all non-US countries, for developed markets, for emerging markets, and for the US, respectively. Summary statistics are provided for the full period from 2001 to 2018, the period before the global financial crisis, Pre-GFC, from 2001 to 2007, and the period after the crisis, Post-GFC, from 2010 to 2018.

	N	Tobin's *q*	Sales Growth	Operating Income	Asset Tangibility	Leverage	Log(Assets)
				Panel a. All non-US			
Full period	261,856						
Mean		1.200	0.090	0.044	0.323	0.304	13.118
Median		0.852	0.039	0.046	0.289	0.248	12.832
Pre-GFC	81,413						
Mean		1.142	0.119	0.048	0.346	0.308	13.093
Median		0.873	0.057	0.048	0.319	0.257	12.787
Post-GFC	150,932						
Mean		1.273	0.072	0.042	0.309	0.293	13.140
Median		0.866	0.030	0.045	0.269	0.232	12.872
				Panel b. Developed markets			
Full period	132,541						
Mean		1.027	0.082	0.041	0.302	0.304	13.252
Median		0.776	0.029	0.045	0.260	0.253	12.945
Pre-GFC	49,020						
Mean		1.054	0.105	0.044	0.318	0.306	13.244
Median		0.825	0.043	0.046	0.285	0.257	12.925
Post-GFC	68,054						
Mean		1.049	0.063	0.040	0.290	0.292	13.263
Median		0.768	0.021	0.045	0.241	0.237	12.970
				Panel c. Emerging markets			
Full period	129,315						
Mean		1.376	0.098	0.047	0.346	0.304	12.981
Median		0.950	0.054	0.046	0.320	0.242	12.729
Pre-GFC	32,393						
Mean		1.274	0.140	0.053	0.389	0.312	12.866
Median		0.966	0.090	0.051	0.373	0.257	12.620
Post-GFC	82,878						
Mean		1.456	0.080	0.044	0.325	0.294	13.039
Median		0.967	0.042	0.044	0.294	0.226	12.798
				Panel d. US			
Full period	44,705						
Mean		1.577	0.083	0.040	0.275	0.229	13.790
Median		1.191	0.040	0.067	0.188	0.162	13.640
Pre-GFC	19,159						
Mean		1.572	0.101	0.037	0.272	0.220	13.584
Median		1.219	0.053	0.066	0.196	0.146	13.395
Post-GFC	20,491						
Mean		1.666	0.073	0.044	0.276	0.227	13.999
Median		1.235	0.033	0.067	0.180	0.168	13.917

Table 4. The valuation gap before and after the global financial crisis.

Panel a shows estimates of the valuation gap each period. We estimate regressions from 2001 to 2018 in which the dependent variable is Tobin's *q*. The sample includes non-financial firms from 52 countries with at least $100 million in assets (inflation adjusted) and complete data on firm characteristics in a given year. Variable definitions are in Appendix Table 1. β_t^{non-US}, from Eq. (1), are estimates of the difference in valuations between non-US and US firms in each period *t*. Similarly, β_t^{DM} and β_t^{EM}, from Eq. (2), are estimates of the difference in valuations between non-US firms from developed and emerging markets and US firms each period *t*. The β_t estimates are multiplied by –1 in order to report the valuation gap ("Gap") as the positive difference in the valuations of US firms and those of comparable non-US firms. Pre-GFC is from 2001 to 2007, GFC is from 2008 to 2009, and Post-GFC is from 2010 to 2018. A constant is estimated but not reported. Models 1 and 3 (2 and 4) are OLS (median) regressions. *t*-statistics are adjusted for clustering by firm. Panel b shows *F*-tests that test whether the valuation gaps are significantly different in the pre- and post-GFC periods and whether the gaps for DMs and EMs are significantly different each period. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

Panel a. Regressions	(1) OLS	(2) Median	(3) OLS	(4) Median
$\text{Gap}_{\text{Pre-GFC}}^{\text{non-US}}$	0.361***	0.233***		
	(24.45)	(25.53)		
$\text{Gap}_{\text{GFC}}^{\text{non-US}}$	0.242***	0.164***		
	(15.56)	(17.69)		
$\text{Gap}_{\text{Post-GFC}}^{\text{non-US}}$	0.347***	0.247***		
	(18.02)	(22.09)		
$\text{Gap}_{\text{Pre-GFC}}^{\text{DM}}$			0.328***	0.216***
			(21.63)	(22.80)
$\text{Gap}_{\text{GFC}}^{\text{DM}}$			0.207***	0.165***
			(12.93)	(16.76)
$\text{Gap}_{\text{Post-GFC}}^{\text{DM}}$			0.457***	0.300***
			(22.94)	(25.98)
$\text{Gap}_{\text{Pre-GFC}}^{\text{EM}}$			0.374***	0.238***
			(22.11)	(22.53)
$\text{Gap}_{\text{GFC}}^{\text{EM}}$			0.241***	0.144***
			(13.71)	(13.19)
$\text{Gap}_{\text{Post-GFC}}^{\text{EM}}$			0.229***	0.181***
			(11.20)	(15.18)
Sales growth	0.245***	0.152***	0.246***	0.153***
	(23.34)	(28.18)	(23.51)	(25.57)
Operating income	1.135***	1.139***	1.127***	1.137***
	(15.61)	(27.34)	(15.45)	(26.43)
Leverage	-1.295***	-0.713***	-1.302***	-0.717***
	(-75.36)	(-63.16)	(-75.69)	(-62.90)
Asset tangibility	-0.068***	0.071***	-0.082***	0.060***
	(-3.33)	(6.18)	(-4.00)	(5.15)
Log(Assets)	-0.039***	0.006***	-0.037***	0.007***
	(-13.47)	(3.62)	(-12.70)	(4.07)
GDP growth	6.825***	4.028***	6.125***	3.582***
	(49.60)	(49.93)	(42.92)	(40.47)
Period FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
Observations	306,561	306,561	306,561	306,561
R-squared	0.254	0.237	0.258	0.242
Adjusted R-squared	0.254		0.258	

Table 4, continued.

Panel b. F-tests	(1) OLS	(2) Median	(3) OLS	(4) Median
Non-US, DMs, and EMs				
Gap^{non-US}: Post-GFC – Pre-GFC	-0.014	0.014		
F-statistic	0.509	1.660		
p-value	(0.475)	(0.198)		
Gap^{DM}: Post-GFC – Pre-GFC			0.129***	0.085***
F-statistic			41.700	54.514
p-value			(0.000)	(0.000)
Gap^{EM}: Post-GFC – Pre-GFC			-0.145***	-0.057***
F-statistic			46.710	22.662
p-value			(0.000)	(0.000)
Difference between DMs and EMs				
$Gap^{DM} - Gap^{EM}$: Pre-GFC			-0.046***	-0.022***
F-statistic			14.965	8.600
p-value			(0.000)	(0.003)
$Gap^{DM} - Gap^{EM}$: Post-GFC			0.228***	0.120***
F-statistic			355.248	312.283
p-value			(0.000)	(0.000)
$Gap^{DM} - Gap^{EM}$: Post-GFC – Pre-GFC			0.274***	0.142***
F-statistic			431.745	368.221
p-value			(0.000)	(0.000)

Table 5. The valuation gap before and after the global financial crisis: Excluding China.
Panel a shows estimates of the valuation gap each period. We estimate regressions from 2001 to 2018 in which the dependent variable is Tobin's *q*. The sample includes non-financial firms from 51 countries with at least $100 million in assets (inflation adjusted) and complete data on firm characteristics in a given year. China is excluded. Variable definitions are in Appendix Table 1. β_t^{non-US}, from Eq. (1), is the estimate of the difference in valuations between non-US and US firms in each period *t*. Similarly, β_t^{DM} and β_t^{EM}, from Eq. (2), are estimates of the difference in valuations between non-US firms from developed and emerging markets and US firms each period *t*. The β_t estimates are multiplied by –1 in order to report the valuation gap ("Gap") as the positive difference in the valuations of US firms and those of comparable non-US firms. Pre-GFC is from 2001 to 2007, GFC is from 2008 to 2009, and Post-GFC is from 2010 to 2018. A constant is estimated but not reported. Models 1 and 3 (2 and 4) are OLS (median) regressions. *t*-statistics are adjusted for clustering by firm. Panel b shows *F*-tests that test whether the estimates are significantly different in the pre- and post-GFC periods and whether the estimates for DMs and EMs are significantly different each period. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

Panel a. Regressions	(1) OLS	(2) Median	(3) OLS	(4) Median
$\text{Gap}_{\text{Pre-GFC}}^{\text{non-US}}$	0.367***	0.249***		
	(24.63)	(24.22)		
$\text{Gap}_{\text{GFC}}^{\text{non-US}}$	0.228***	0.166***		
	(14.93)	(18.65)		
$\text{Gap}_{\text{Post-GFC}}^{\text{non-US}}$	0.433***	0.290***		
	(22.36)	(25.53)		
$\text{Gap}_{\text{Pre-GFC}}^{\text{DM}}$			0.356***	0.240***
			(23.43)	(23.39)
$\text{Gap}_{\text{GFC}}^{\text{DM}}$			0.236***	0.183***
			(14.99)	(19.07)
$\text{Gap}_{\text{Post-GFC}}^{\text{DM}}$			0.467***	0.319***
			(23.43)	(28.32)
$\text{Gap}_{\text{Pre-GFC}}^{\text{EM}}$			0.371***	0.253***
			(21.86)	(22.48)
$\text{Gap}_{\text{GFC}}^{\text{EM}}$			0.201***	0.132***
			(11.80)	(12.85)
$\text{Gap}_{\text{Post-GFC}}^{\text{EM}}$			0.378***	0.246***
			(18.30)	(21.23)
Sales growth	0.256***	0.150***	0.259***	0.150***
	(23.77)	(26.49)	(24.07)	(26.86)
Operating income	1.312***	1.296***	1.301***	1.285***
	(16.85)	(31.62)	(16.72)	(31.33)
Leverage	-0.999***	-0.525***	-1.005***	-0.531***
	(-59.60)	(-50.83)	(-59.90)	(-51.13)
Asset tangibility	-0.046**	0.075***	-0.057***	0.071***
	(-2.32)	(6.48)	(-2.86)	(6.20)
Log(Assets)	-0.023***	0.010***	-0.021***	0.012***
	(-7.91)	(6.59)	(-7.18)	(7.60)
GDP growth	2.814***	1.528***	2.501***	1.237***
	(18.88)	(19.89)	(17.38)	(16.73)
Period FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
Observations	267,363	267,363	267,363	267,363
R-squared	0.239	0.222	0.240	0.223
Adjusted R-squared	0.239		0.240	

Table 5, continued.

Panel b. F-tests	(1) OLS	(2) Median	(3) OLS	(4) Median
Non-US, DMs, and EMs				
$\text{Gap}^{\text{non-US}}$: Post-GFC – Pre-GFC	0.066***	0.042***		
F-statistic	11.497	12.869		
p-value	(0.001)	(0.000)		
Gap^{DM}: Post-GFC – Pre-GFC			0.111***	0.078***
F-statistic			30.409	30.409
p-value			(0.000)	(0.000)
Gap^{EM}: Post-GFC – Pre-GFC			0.007	-0.007
F-statistic			0.104	0.357
p-value			(0.747)	(0.550)**
Difference between DMs and EMs				
$\text{Gap}^{\text{DM}} - \text{Gap}^{\text{EM}}$: Pre-GFC			-0.015	-0.013*
F-statistic			1.655	3.393
p-value			(0.198)	(0.065)
$\text{Gap}^{\text{DM}} - \text{Gap}^{\text{EM}}$: Post-GFC			0.089***	0.073***
F-statistic			54.052	137.151
p-value			(0.000)	(0.000)
$\text{Gap}^{\text{DM}} - \text{Gap}^{\text{EM}}$: Post-GFC – Pre-GFC			0.104***	0.085***
F-statistic			63.993	153.202
p-value			(0.000)	(0.000)

Table 6. The valuation gap before and after the global financial crisis: R&D capitalized for US firms.
Panel a shows estimates of the valuation gap each period. We estimate regressions from 2001 to 2018 in which the dependent variable is Tobin's *q*. The sample includes non-financial firms from 51 countries with at least $100 million in assets (inflation adjusted) and complete data on firm characteristics in a given year. China is excluded. R&D is capitalized for US firms. Variable definitions are in Appendix Table 1. β_t^{non-US}, from Eq. (1), is the estimate of the difference in valuations between non-US and US firms in each period *t*. Similarly, β_t^{DM} and β_t^{EM}, from Eq. (2), are estimates of the difference in valuations between non-US firms from developed and emerging markets and US firms each period *t*. The β_t estimates are multiplied by –1 in order to report the valuation gap ("Gap") as the positive difference in the valuations of US firms and those of comparable non-US firms. Pre-GFC is from 2001 to 2007, GFC is from 2008 to 2009, and Post-GFC is from 2010 to 2018. A constant is estimated but not reported. Models 1 and 3 (2 and 4) are OLS (median) regressions. *t*-statistics are adjusted for clustering by firm. Panel b shows *F*-tests that test whether the estimates are significantly different in the pre- and post-GFC periods and whether the estimates for DMs and EMs are significantly different each period. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

Panel a. Regressions	(1) OLS	(2) Median	(3) OLS	(4) Median
$\text{Gap}_{\text{Pre-GFC}}^{\text{non-US}}$	0.206***	0.165***		
	(16.05)	(21.04)		
$\text{Gap}_{\text{GFC}}^{\text{non-US}}$	0.094***	0.098***		
	(7.12)	(11.23)		
$\text{Gap}_{\text{Post-GFC}}^{\text{non-US}}$	0.247***	0.206***		
	(15.07)	(20.71)		
$\text{Gap}_{\text{Pre-GFC}}^{\text{DM}}$			0.193***	0.156***
			(14.63)	(19.32)
$\text{Gap}_{\text{GFC}}^{\text{DM}}$			0.100***	0.111***
			(7.23)	(12.03)
$\text{Gap}_{\text{Post-GFC}}^{\text{DM}}$			0.280***	0.234***
			(16.45)	(22.82)
$\text{Gap}_{\text{Pre-GFC}}^{\text{EM}}$			0.219***	0.169***
			(14.55)	(18.41)
$\text{Gap}_{\text{GFC}}^{\text{EM}}$			0.074***	0.064***
			(4.90)	(6.41)
$\text{Gap}_{\text{Post-GFC}}^{\text{EM}}$			0.196***	0.163***
			(10.95)	(15.13)
Sales growth	0.210***	0.136***	0.212***	0.137***
	(21.31)	(26.35)	(21.61)	(25.46)
Operating income	1.986***	1.677***	1.977***	1.665***
	(25.09)	(38.73)	(25.00)	(38.29)
Leverage	-0.900***	-0.488***	-0.905***	-0.494***
	(-55.96)	(-48.47)	(-56.31)	(-49.47)
Asset tangibility	-0.014	0.090***	-0.023	0.083***
	(-0.74)	(7.87)	(-1.22)	(7.34)
Log(Assets)	-0.021***	0.010***	-0.020***	0.012***
	(-7.93)	(6.90)	(-7.23)	(7.81)
GDP growth	2.691***	1.483***	2.439***	1.196***
	(18.65)	(19.37)	(17.37)	(17.07)
Period FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
Observations	268,382	268,382	268,382	268,382
R-squared	0.232	0.217	0.233	0.218
Adjusted R-squared	0.232		0.233	

Table 6, continued.

Panel b. F-tests	(1) OLS	(2) Median	(3) OLS	(4) Median
Non-US, DMs, and EMs				
Gap^{non-US}: Post-GFC – Pre-GFC	0.041**	0.041***		
F-statistic	6.483	17.630		
p-value	(0.011)	(0.000)		
Gap^{DM}: Post-GFC – Pre-GFC			0.087***	0.078***
F-statistic			26.788	58.878
p-value			(0.000)	(0.000)
Gap^{EM}: Post-GFC – Pre-GFC			-0.023	-0.006
F-statistic			1.583	0.320
p-value			(0.208)	(0.572)
Difference between DMs and EMs				
$Gap^{DM} - Gap^{EM}$: Pre-GFC			-0.026**	-0.013*
F-statistic			5.440	3.661
p-value			(0.020)	(0.056)
$Gap^{DM} - Gap^{EM}$: Post-GFC			0.084***	0.072***
F-statistic			50.924	136.108
p-value			(0.000)	(0.000)
$Gap^{DM} - Gap^{EM}$: Post-GFC – Pre-GFC			0.110***	0.085***
F-statistic			75.466	153.561
p-value			(0.000)	(0.000)

Table 7. The valuation gap before and after the global financial crisis: By sector.
Panel a shows estimates of the valuation gap each period. We estimate regressions from 2001 to 2018 in which the dependent variable is Tobin's *q*. The sample includes non-financial firms from 51 countries with at least $100 million in assets (inflation adjusted) and complete data on firm characteristics in a given year. China is excluded. R&D is capitalized for US firms. Variable definitions are in Appendix Table 1. β_t^{DM} and β_t^{EM}, from Eq. (3), are estimates of the difference in valuations between non-US firms from developed and emerging markets and US firms each period *t*. Coefficients are estimated separately for firms in traded vs. not traded industries (model 1), high-tech vs. not high-tech industries (model 2), and resources vs. not resources industries (model 3). The β_t estimates are multiplied by –1 in order to report the valuation gap ("Gap") as the positive difference in the valuations of US firms and those of comparable non-US firms. Pre-GFC is from 2001 to 2007, GFC is from 2008 to 2009, and Post-GFC is from 2010 to 2018. A constant is estimated but not reported. *t*-statistics are adjusted for clustering by firm. Panel b shows *F*-tests that test whether the estimates are significantly different in the pre- and post-GFC periods and whether the estimates for DMs and EMs are significantly different each period. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

Panel a. Regressions	(1)		(2)		(3)	
	Traded	Not traded	High-tech	Not high-tech	Resource	Not resource
$\text{Gap}^{\text{DM}}_{\text{Pre-GFC}}$	0.197***	0.188***	0.149***	0.201***	-0.077	0.204***
	(10.94)	(9.89)	(4.40)	(14.27)	(-1.63)	(15.05)
$\text{Gap}^{\text{DM}}_{\text{GFC}}$	0.078***	0.125***	0.089***	0.117***	0.170***	0.096***
	(4.15)	(6.38)	(2.61)	(7.91)	(3.17)	(6.78)
$\text{Gap}^{\text{DM}}_{\text{Post-GFC}}$	0.305***	0.252***	0.190***	0.297***	0.335***	0.275***
	(13.21)	(10.07)	(4.11)	(16.35)	(8.46)	(15.31)
$\text{Gap}^{\text{EM}}_{\text{Pre-GFC}}$	0.231***	0.202***	0.144***	0.234***	0.104	0.218***
	(11.75)	(9.23)	(3.71)	(14.74)	(1.54)	(14.13)
$\text{Gap}^{\text{EM}}_{\text{GFC}}$	0.049**	0.108***	-0.026	0.109***	0.225***	0.059***
	(2.42)	(4.98)	(-0.73)	(6.66)	(3.16)	(3.81)
$\text{Gap}^{\text{EM}}_{\text{Post-GFC}}$	0.211***	0.178***	0.271***	0.188***	0.343***	0.188***
	(8.89)	(6.69)	(6.29)	(9.68)	(6.90)	(10.04)
Sales growth	0.212***		0.208***		0.205***	
	(21.63)		(21.41)		(20.92)	
Operating income	1.979***		2.005***		1.974***	
	(25.01)		(25.64)		(24.84)	
Leverage	-0.905***		-0.897***		-0.901***	
	(-55.95)		(-56.57)		(-56.01)	
Asset tangibility	-0.022		-0.016		-0.032	
	(-1.16)		(-0.84)		(-1.64)	
Log(Assets)	-0.020***		-0.020***		-0.019***	
	(-7.23)		(-7.32)		(-6.80)	
GDP growth	2.439***		2.438***		2.413***	
	(17.43)		(17.38)		(17.20)	
Period FE	Yes		Yes			
Industry FE	Yes		Yes			
Observations	268,382		268,382		268,382	
R-squared	0.233		0.236		0.234	
Adjusted R-squared	0.233		0.236		0.234	

Table 7, continued.

Panel b. F-tests	(1)		(2)		(3)	
	Traded	Not traded	High-tech	Not high-tech	Resource	Not resource
DMs and EMs						
Gap^{DM}: Post-GFC – Pre-GFC	0.108***	0.064***	0.041	0.095***	0.413***	0.071***
F-statistic	21.475	6.868	0.746	28.738	52.329	16.252
p-value	(0.000)	(0.009)	(0.388)	(0.000)	(0.000)	(0.000)
Gap^{EM}: Post-GFC – Pre-GFC	-0.020	-0.024	0.126***	-0.047**	0.239***	-0.030
F-statistic	0.721	0.809	7.217	5.855	10.943	2.532
p-value	(0.396)	(0.369)	(0.007)	(0.016)	(0.001)	(0.112)
Difference between DMs and EMs						
$Gap^{DM} - Gap^{EM}$: Pre-GFC	-0.034**	-0.015	0.004	-0.033***	-0.182***	-0.014
F-statistic	5.309	0.812	0.015	8.437	7.703	1.511
p-value	(0.021)	(0.368)	(0.903)	(0.004)	(0.006)	(0.219)
$Gap^{DM} - Gap^{EM}$: Post-GFC	0.094***	0.074***	-0.081**	0.109***	0.008	0.087***
F-statistic	32.571	18.793	4.489	78.988	0.033	50.337
p-value	(0.000)	(0.000)	(0.034)	(0.000)	(0.855)	(0.000)
$Gap^{DM} - Gap^{EM}$: Post-GFC – Pre-GFC	0.128***	0.088***	-0.085**	0.142***	0.174**	0.101***
F-statistic	59.199	20.912	4.229	119.080	6.435	60.812
p-value	(0.000)	(0.000)	(0.040)	(0.000)	(0.011)	(0.000)

Table 8. The valuation gap before and after the global financial crisis: By firm characteristics.
Panel a shows estimates of the valuation gap each period. We estimate regressions from 2001 to 2018 in which the dependent variable is Tobin's *q*. The sample includes non-financial firms from 51 countries with at least $100 million in assets (inflation adjusted) and complete data on firm characteristics in a given year. China is excluded. R&D is capitalized for US firms. Variable definitions are in Appendix Table 1. β_t^{DM} and β_t^{EM}, from Eq. (3), are estimates of the difference in valuations between non-US firms from developed and emerging markets and US firms each period *t*. Coefficients are estimated separately for firms that are old vs. young (model 1) and firms with high asset tangibility vs. low asset tangibility (model 2). The β_t estimates are multiplied by –1 in order to report the valuation gap ("Gap") as the positive difference in the valuations of US firms and those of comparable non-US firms. Pre-GFC is from 2001 to 2007, GFC is from 2008 to 2009, and Post-GFC is from 2010 to 2018. A constant is estimated but not reported. *t*-statistics are adjusted for clustering by firm. Panel b shows *F*-tests that test whether the estimates are significantly different in the pre- and post-GFC periods and whether the estimates for DMs and EMs are significantly different each period. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

Panel a. Regressions	(1)		(2)	
	Old	Young	High tangibility	Low tangibility
$\text{Gap}^{\text{DM}}_{\text{Pre-GFC}}$	0.222***	0.094***	0.162***	0.214***
	(15.78)	(3.68)	(9.83)	(11.85)
$\text{Gap}^{\text{DM}}_{\text{GFC}}$	0.100***	0.096***	0.136***	0.098***
	(6.75)	(2.87)	(7.84)	(5.24)
$\text{Gap}^{\text{DM}}_{\text{Post-GFC}}$	0.283***	0.189***	0.292***	0.267***
	(15.41)	(5.26)	(13.30)	(11.69)
$\text{Gap}^{\text{EM}}_{\text{Pre-GFC}}$	0.242***	0.151***	0.213***	0.207***
	(15.15)	(5.29)	(11.85)	(9.21)
$\text{Gap}^{\text{EM}}_{\text{GFC}}$	0.067***	0.115***	0.152***	0.055**
	(4.06)	(3.41)	(8.16)	(2.48)
$\text{Gap}^{\text{EM}}_{\text{Post-GFC}}$	0.191***	0.214***	0.171***	0.210***
	(9.81)	(6.32)	(7.41)	(8.52)
Sales growth	0.189***		0.212***	
	(19.32)		(21.57)	
Operating income	1.978***		1.978***	
	(24.86)		(24.96)	
Leverage	-0.902***		-0.904***	
	(-56.16)		(-56.18)	
Asset tangibility	-0.020		0.018	
	(-1.07)		(0.75)	
Log(Assets)	-0.017***		-0.020***	
	(-6.30)		(-7.24)	
GDP growth	2.410***		2.437***	
	(17.16)		(17.35)	
Period FE	Yes		Yes	
Industry FE	Yes		Yes	
Observations	268,382		268,382	
R-squared	0.236		0.234	
Adjusted R-squared	0.236		0.233	

Table 8, continued.

Panel b. F-tests	(1)		(2)	
	Old	Young	High tangibility	Low tangibility
DMs and EMs				
Gap^{DM}: Post-GFC – Pre-GFC	0.061***	0.095**	0.130***	0.052**
F-statistic	11.706	4.800	34.678	5.061
p-value	(0.001)	(0.028)	(0.000)	(0.024)
Gap^{EM}: Post-GFC – Pre-GFC	-0.051***	0.062	-0.041*	0.003
F-statistic	6.910	2.134	3.101	0.015
p-value	(0.009)	(0.144)	(0.078)	(0.902)
Difference between DMs and EMs				
$Gap^{DM} - Gap^{EM}$: Pre-GFC	-0.020*	-0.057**	-0.051***	0.007
F-statistic	3.000	6.510	17.051	0.149
p-value	(0.083)	(0.011)	(0.000)	(0.699)
$Gap^{DM} - Gap^{EM}$: Post-GFC	0.092***	-0.025	0.120***	0.056***
F-statistic	53.449	0.844	83.796	9.596
p-value	(0.000)	(0.358)	(0.000)	(0.002)
$Gap^{DM} - Gap^{EM}$: Post-GFC – Pre-GFC	0.112***	0.032	0.171***	0.049**
F-statistic	70.010	0.893	140.512	5.339
p-value	(0.000)	(0.345)	(0.000)	(0.021)

Table 9. The valuation gap before and after the global financial crisis: Splitting post-GFC period.
Panel a shows estimates of the valuation gap each period. We estimate regressions from 2001 to 2018 in which the dependent variable is Tobin's *q*. The sample includes non-financial firms from 51 countries with at least $100 million in assets (inflation adjusted) and complete data on firm characteristics in a given year. China is excluded. R&D is capitalized for US firms. Variable definitions are in Appendix Table 1. β_t^{DM} and β_t^{EM}, from Eq. (2), are estimates of the difference in valuations between non-US firms from developed and emerging markets and US firms each period *t*. The β_t estimates are multiplied by –1 in order to report the valuation gap ("Gap") as the positive difference in the valuations of US firms and those of comparable non-US firms. Model (1) reproduces model (3) from Table 6, where Pre-GFC is from 2001 to 2007, GFC is from 2008 to 2009, and Post-GFC is from 2010 to 2018. In model (2), Pre-GFC is from 2001 to 2007, GFC is from 2008 to 2009, Post-GFC 1 is from 2010 to 2014, and Post-GFC 2 is from 2015 to 2018. A constant is estimated but not reported. *t*-statistics are adjusted for clustering by firm. Panel b shows *F*-tests that test whether the estimates are significantly different in the pre- and post-GFC periods and whether the estimates for DMs and EMs are significantly different each period. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

Panel a. Regressions	(1)	(2)
$\text{Gap}^{\text{DM}}_{\text{Pre-GFC}}$	0.193***	0.194***
	(14.63)	(14.68)
$\text{Gap}^{\text{DM}}_{\text{GFC}}$	0.100***	0.100***
	(7.23)	(7.25)
$\text{Gap}^{\text{DM}}_{\text{Post-GFC}}$	0.280***	
	(16.45)	
$\text{Gap}^{\text{DM}}_{\text{Post-GFC 1}}$		0.268***
		(15.77)
$\text{Gap}^{\text{DM}}_{\text{Post-GFC 2}}$		0.301***
		(14.05)
$\text{Gap}^{\text{EM}}_{\text{Pre-GFC}}$	0.219***	0.225***
	(14.55)	(14.94)
$\text{Gap}^{\text{EM}}_{\text{GFC}}$	0.074***	0.081***
	(4.90)	(5.30)
$\text{Gap}^{\text{EM}}_{\text{Post-GFC}}$	0.196***	
	(10.95)	
$\text{Gap}^{\text{EM}}_{\text{Post-GFC 1}}$		0.182***
		(10.13)
$\text{Gap}^{\text{EM}}_{\text{Post-GFC 2}}$		0.234***
		(10.57)
Sales growth	0.212***	0.212***
	(21.61)	(21.67)
Operating income	1.977***	1.995***
	(25.00)	(25.20)
Leverage	-0.905***	-0.897***
	(-56.31)	(-55.96)
Asset tangibility	-0.023	-0.018
	(-1.22)	(-0.96)
Log(Assets)	-0.020***	-0.020***
	(-7.23)	(-7.35)
GDP growth	2.439***	2.585***
	(17.37)	(18.24)
Period FE	Yes	Yes
Industry FE	Yes	Yes
Observations	268,382	268,382
R-squared	0.233	0.237
Adjusted R-squared	0.233	0.237

Table 9, continued.

Panel b. F-tests	(1)	(2)
DMs and EMs		
Gap^{DM}: Post-GFC – Pre-GFC	0.087***	
F-statistic	26.788	
p-value	(0.000)	
Gap^{DM}: Post-GFC 1 – Pre-GFC		0.074***
F-statistic		20.048
p-value		(0.000)
Gap^{DM}: Post-GFC 2 – Pre-GFC		0.108***
F-statistic		25.067
p-value		(0.000)
Gap^{DM}: Post-GFC 2 – Post-GFC 1		0.033*
F-statistic		3.753
p-value		(0.053)
Gap^{EM}: Post-GFC – Pre-GFC	-0.023	
F-statistic	1.583	
p-value	(0.208)	
Gap^{EM}: Post-GFC 1 – Pre-GFC		-0.043**
F-statistic		5.949
p-value		(0.015)
Gap^{EM}: Post-GFC 2 – Pre-GFC		0.009
F-statistic		0.164
p-value		(0.685)
Gap^{EM}: Post-GFC 2 – Post-GFC 1		0.052***
F-statistic		8.640
p-value		(0.003)
Difference between DMs and EMs		
$Gap^{DM} - Gap^{EM}$: Pre-GFC	-0.026**	-0.031***
F-statistic	5.440	7.949
p-value	(0.020)	(0.005)
$Gap^{DM} - Gap^{EM}$: Post-GFC	0.084***	
F-statistic	50.924	
p-value	(0.000)	
$Gap^{DM} - Gap^{EM}$: Post-GFC 1		0.086***
F-statistic		55.946
p-value		(0.000)
$Gap^{DM} - Gap^{EM}$: Post-GFC 2		0.067***
F-statistic		19.537
p-value		(0.000)
$Gap^{DM} - Gap^{EM}$: Post-GFC – Pre-GFC	0.110***	
F-statistic	75.466	
p-value	(0.000)	
$Gap^{DM} - Gap^{EM}$: Post-GFC 1 – Pre-GFC		0.117***
F-statistic		97.934
p-value		(0.000)
$Gap^{DM} - Gap^{EM}$: Post-GFC 2 – Pre-GFC		0.098***
F-statistic		36.164
p-value		(0.000)
$Gap^{DM} - Gap^{EM}$: Post-GFC 2 – Post-GFC 1		-0.019
F-statistic		2.352
p-value		(0.125)

Table 10. Number of local non-US and cross-listed firms.

This table shows counts of local non-US firms and non-US firms cross-listed on US stock exchanges from 2001 to 2018. The sample includes non-financial firms from 51 countries with at least $100 million in assets (inflation adjusted) and complete data on firm characteristics in a given year. China is excluded. R&D is capitalized for US firms. Counts are shown for non-US countries and separately for DMs and EMs (based on MSCI classifications). China is excluded. The sample includes non-financial firms with at least $100 million in assets (inflation adjusted) and complete data on firm characteristics in Worldscope / Compustat. Non-US firms that are cross-listed on a US stock exchange in a given year are classified as cross-listed that year. All other firms are classified as local. Propensity to cross-list is the percentage of all publicly-listed firms that are cross-listed on US stock exchanges in a given year.

	Non-US countries				Developed markets				Emerging markets			
Year	Local	Cross-listed	Total	Propensity	Local	Cross-listed	Total	Propensity	Local	Cross-listed	Total	Propensity
2001	8,385	514	8,899	5.78%	6,089	402	6,491	6.19%	2,296	112	2,408	4.65%
2002	8,840	523	9,363	5.59%	6,242	403	6,645	6.06%	2,598	120	2,718	4.42%
2003	9,308	525	9,833	5.34%	6,361	399	6,760	5.90%	2,947	126	3,073	4.10%
2004	9,733	517	10,250	5.04%	6,508	389	6,897	5.64%	3,225	128	3,353	3.82%
2005	10,225	499	10,724	4.65%	6,733	375	7,108	5.28%	3,492	124	3,616	3.43%
2006	10,825	478	11,303	4.23%	7,022	357	7,379	4.84%	3,803	121	3,924	3.08%
2007	12,041	413	12,454	3.32%	7,454	286	7,740	3.70%	4,587	127	4,714	2.69%
2008	12,646	392	13,038	3.01%	7,513	266	7,779	3.42%	5,133	126	5,259	2.40%
2009	12,700	380	13,080	2.91%	7,428	260	7,688	3.38%	5,272	120	5,392	2.23%
2010	13,080	369	13,449	2.74%	7,451	256	7,707	3.32%	5,629	113	5,742	1.97%
2011	13,340	364	13,704	2.66%	7,462	252	7,714	3.27%	5,878	112	5,990	1.87%
2012	13,345	358	13,703	2.61%	7,370	249	7,619	3.27%	5,975	109	6,084	1.79%
2013	13,412	362	13,774	2.63%	7,326	253	7,579	3.34%	6,086	109	6,195	1.76%
2014	13,414	366	13,780	2.66%	7,310	259	7,569	3.42%	6,104	107	6,211	1.72%
2015	13,414	370	13,784	2.68%	7,282	264	7,546	3.50%	6,132	106	6,238	1.70%
2016	13,364	369	13,733	2.69%	7,195	264	7,459	3.54%	6,169	105	6,274	1.67%
2017	13,559	369	13,928	2.65%	7,207	259	7,466	3.47%	6,352	110	6,462	1.70%
2018	13,491	368	13,859	2.66%	7,139	256	7,395	3.46%	6,352	112	6,464	1.73%
Total	215,122	7,536	222,658		127,092	5,449	132,541		88,030	2,087	90,117	
Average	11,951	419	12,370	3.55%	7,061	303	7,363	4.17%	4,891	116	5,007	2.60%

Table 11. The valuation gap before and after the global financial crisis: Local vs. cross-listed firms.
Panel a shows estimates of the valuation gap each period. We estimate regressions from 2001 to 2018 in which the dependent variable is Tobin's *q*. The sample includes non-financial firms from 51 countries with at least $100 million in assets (inflation adjusted) and complete data on firm characteristics in a given year. China is excluded. R&D is capitalized for US firms. Variable definitions are in Appendix Table 1. Model (1) shows estimates for non-US countries. β_t^{Local} and β_t^{Cross}, from Eq. (4a), are estimates of the difference in valuations between non-US local firms and US firms in each period *t* and between non-US firms cross-listed on US stock exchanges and US firms. $\beta_t^{DM,Local}$, $\beta_t^{EM,Local}$, $\beta_t^{DM,Cross}$, $\beta_t^{EM,Cross}$, from Eq. (4a) provide the same estimates, separately for non-US firms from developed and emerging markets and US firms in each period *t*. The β_t estimates are multiplied by –1 in order to report the valuation gap ("Gap") as the positive difference in the valuations of US firms and those of comparable non-US firms. Pre-GFC is from 2001 to 2007, GFC is from 2008 to 2009, and Post-GFC is from 2010 to 2018. A constant is estimated but not reported. The cross-listing premium each period equals $\beta_t^{Cross} - \beta_t^{Local}$ in model (1) and $\beta_t^{DM,Cross} - \beta_t^{DM,Local}$ for DMs and $\beta_t^{EM,Cross} - \beta_t^{EM,Local}$ for EMs in model (2). *t*-statistics are adjusted for clustering by firm. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively. Panel b shows *F*-tests that test whether the valuation gaps and premium are significantly different in the pre- and post-GFC periods.

Panel a. Regressions	(1)			(2)		
	Local	Cross listed	Cross-listing premium	Local	Cross listed	Cross-listing premium
$\text{Gap}^{\text{non-US}}_{\text{Pre-GFC}}$	0.227	-0.075	0.301			
	(34.69)***	(-2.50)**	(10.59)***			
$\text{Gap}^{\text{non-US}}_{\text{GFC}}$	0.108	-0.075	0.183			
	(8.06)***	(-2.29)**	(5.77)***			
$\text{Gap}^{\text{non-US}}_{\text{Post-GFC}}$	0.264	-0.016	0.279			
	(16.01)***	(-0.37)	(7.03)***			
$\text{Gap}^{\text{DM}}_{\text{Pre-GFC}}$				0.216***	-0.121***	0.337***
				(16.32)	(-3.62)	(10.417)
$\text{Gap}^{\text{DM}}_{\text{GFC}}$				0.113***	-0.091**	0.204***
				(8.13)	(-2.19)	(4.984)
$\text{Gap}^{\text{DM}}_{\text{Post-GFC}}$				0.299***	-0.055	0.354***
				(17.54)	(-1.02)	(6.802)
$\text{Gap}^{\text{EM}}_{\text{Pre-GFC}}$				0.232***	0.066	0.166***
				(15.37)	(1.19)	(2.984)
$\text{Gap}^{\text{EM}}_{\text{GFC}}$				0.086***	-0.045	0.131***
				(5.62)	(-0.99)	(2.937)
$\text{Gap}^{\text{EM}}_{\text{Post-GFC}}$				0.209***	0.081	0.128***
				(11.58)	(1.64)	(2.669)
Sales growth	0.211			0.213***		
	(21.45)***			(21.79)		
Operating income	2.011			2.003***		
	(25.48)***			(25.41)		
Leverage	-0.889			-0.894***		
	(-55.46)***			(-55.79)		
Asset tangibility	-0.016			-0.025		
	(-0.837)			(-1.30)		
Log(Assets)	-0.028			-0.026***		
	(-10.16)***			(-9.37)		
GDP growth	2.702			2.407***		
	(18.76)***			(17.08)		
Period FE	Yes			Yes		
Industry FE	Yes			Yes		
Observations	268,382			268,382		
R-squared	0.234			0.235		
Adjusted R-squared	0.234			0.235		

Table 11, continued.

Panel b. F-tests	(1)			(2)		
	Local	Cross-listed	Cross-listing premium	Local	Cross-listed	Cross-listing premium
Non-US, DMs and EMs						
$\text{Gap}^{\text{non-US}}$: Post-GFC – Pre-GFC	0.037**	0.059	-0.022			
F-statistic	5.171	1.866	0.293			
p-value	(0.023)	(0.172)	(0.588)			
Gap^{DM}: Post-GFC – Pre-GFC				0.083***	0.066	0.017
F-statistic				24.126	1.439	0.098
p-value				(0.000)	(0.230)	(0.754)
Gap^{EM}: Post-GFC – Pre-GFC				-0.024	0.014	-0.038
F-statistic				1.686	0.064	0.468
p-value				(0.194)	(0.801)	(0.494)
Difference between DMs and EMs						
$\text{Gap}^{\text{DM}} - \text{Gap}^{\text{EM}}$: Pre-GFC				-0.016	-0.187***	0.171***
F-statistic				2.018	8.932	7.243
p-value				(0.155)	(0.003)	(0.007)
$\text{Gap}^{\text{DM}} - \text{Gap}^{\text{EM}}$: Post-GFC				0.090***	-0.135**	0.226***
F-statistic				57.622	3.890	10.512
p-value				(0.000)	(0.049)	(0.001)
$\text{Gap}^{\text{DM}} - \text{Gap}^{\text{EM}}$: Post-GFC – Pre-GFC				0.106***	0.052	0.055
F-statistic				69.801	0.463	0.503
p-value				(0.000)	(0.496)	(0.478)

Figure 1. The valuation gap.
This figure shows the valuation gap each year from 2001 to 2018 estimated from OLS and median regressions in which the dependent variable is Tobin's q. The sample includes non-financial firms from 51 countries with at least $100 million in assets (inflation adjusted) and complete data on firm characteristics in a given year. Variable definitions are in Appendix Table 1. β_t^{non-US}, from Eq. (1), is the estimate of the difference in valuations between non-US and US firms each year. Similarly, β_t^{DM} and β_t^{EM}, from Eq. (2), are estimates of the difference in valuations between non-US firms from DMs and EMs and US firms. The β_t estimates are multiplied by –1 in order to report the valuation gap as the positive difference in the valuations of US firms and those of comparable non-US firms. Panel a shows the valuation gap for non-US countries. Panels b and c show the valuation gap for DMs and EMs.

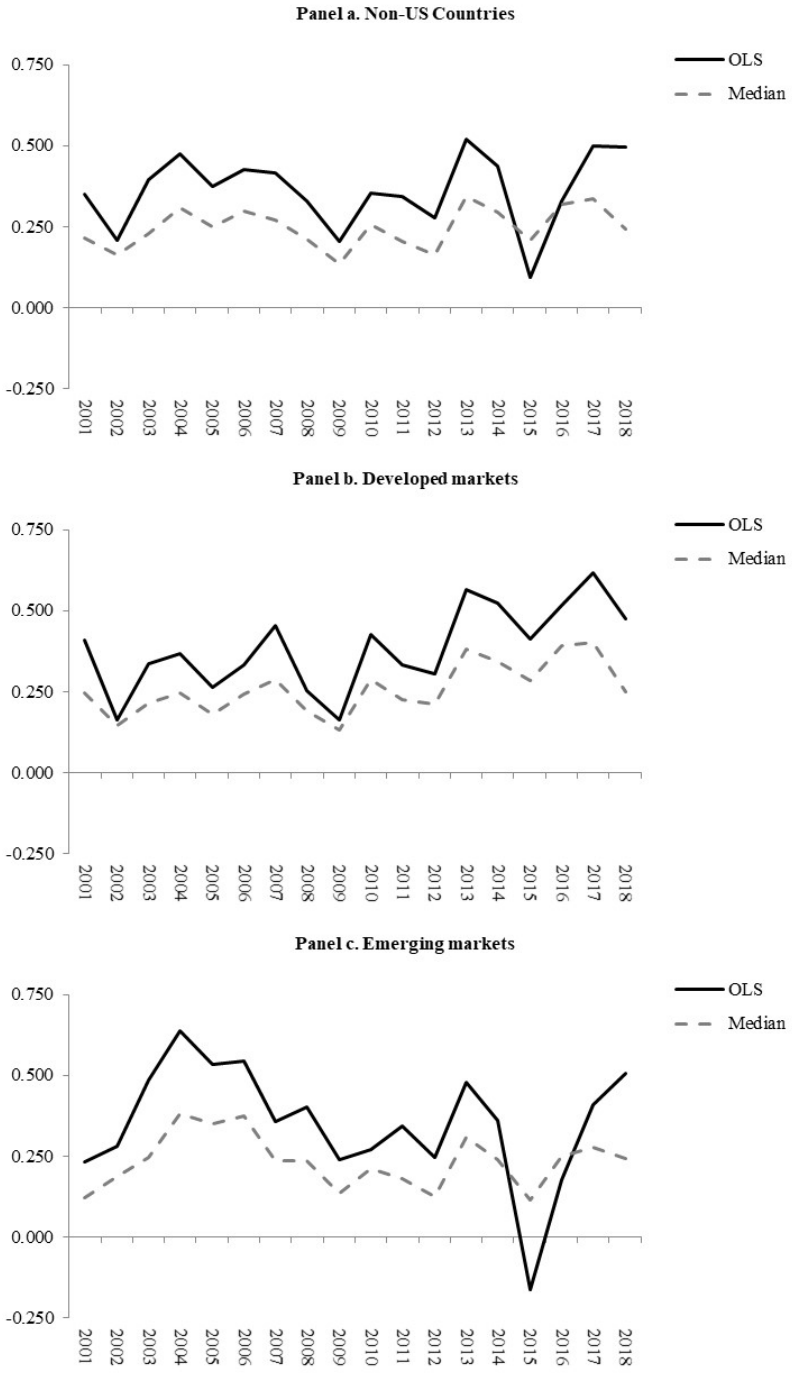


Figure 2. The valuation gap: Excluding China.
This figure shows the valuation gap each year from 2001 to 2018 estimated from OLS and median regressions in which the dependent variable is Tobin's q. The sample includes non-financial firms from 51 countries with at least $100 million in assets (inflation adjusted) and complete data on firm characteristics in a given year. China is excluded. Variable definitions are in Appendix Table 1. β_t^{non-US}, from Eq. (1), is the estimate of the difference in valuations between non-US and US firms each year. Similarly, β_t^{DM} and β_t^{EM}, from Eq. (2), are estimates of the difference in valuations between non-US firms from DMs and EMs and US firms. The β_t estimates are multiplied by –1 in order to report the valuation gap as the positive difference in the valuations of US firms and those of comparable non-US firms. Panel a shows the valuation gap for non-US countries. Panels b and c show the valuation gap for DMs and EMs.

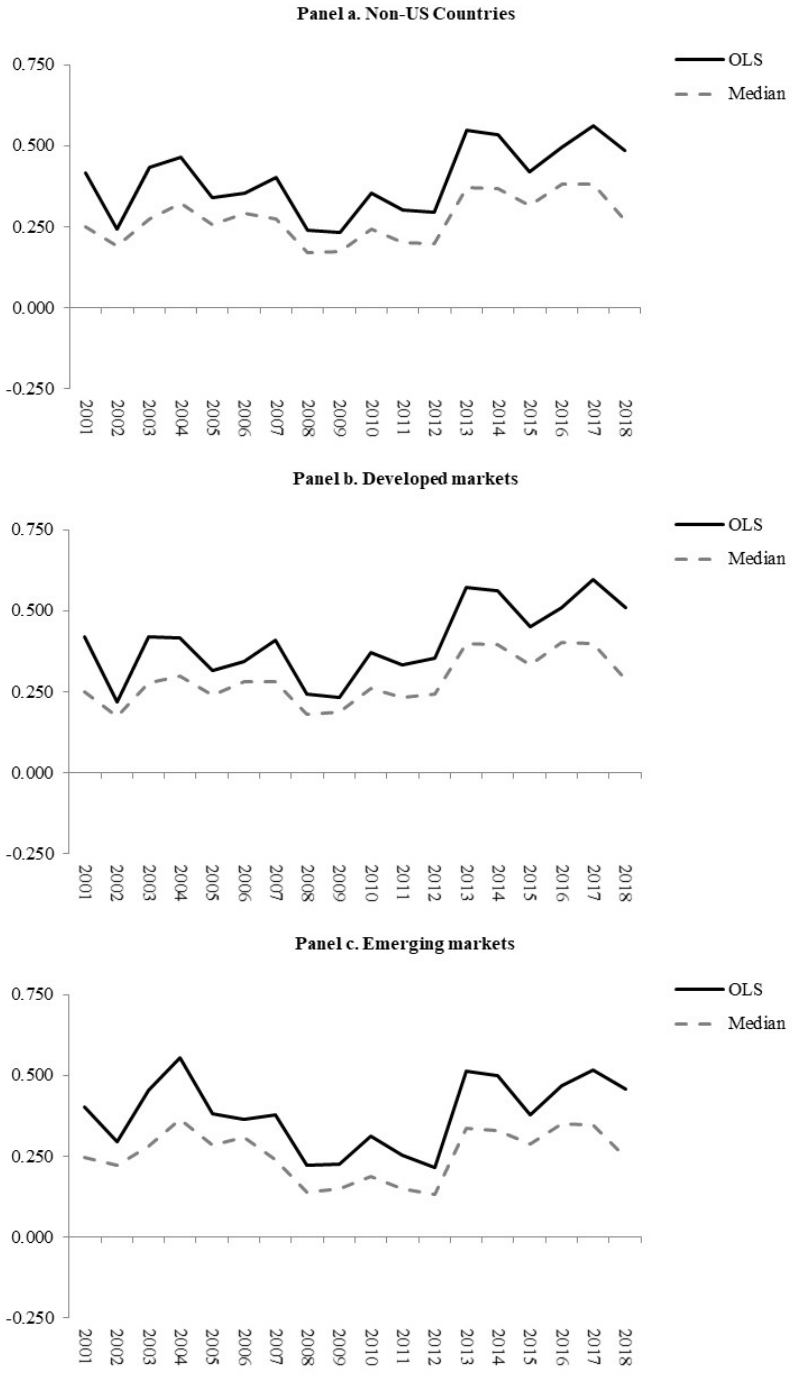


Figure 3. The valuation gap: R&D capitalized for US firms.
This figure shows the valuation gap each year from 2001 to 2018 estimated from OLS and median regressions in which the dependent variable is Tobin's *q*. The sample includes non-financial firms from 51 countries with at least $100 million in assets (inflation adjusted) and complete data on firm characteristics in a given year. China is excluded. R&D is capitalized for US firms. Variable definitions are in Appendix Table 1. β_t^{non-US}, from Eq. (1), is the estimate of the difference in valuations between non-US and US firms each year. Similarly, β_t^{DM} and β_t^{EM}, from Eq. (2), are estimates of the difference in valuations between non-US firms from DMs and EMs and US firms. The β_t estimates are multiplied by –1 in order to report the valuation gap as the positive difference in the valuations of US firms and those of comparable non-US firms. Panel a shows the valuation gap for non-US countries. Panels b and c show the valuation gap for DMs and EMs.

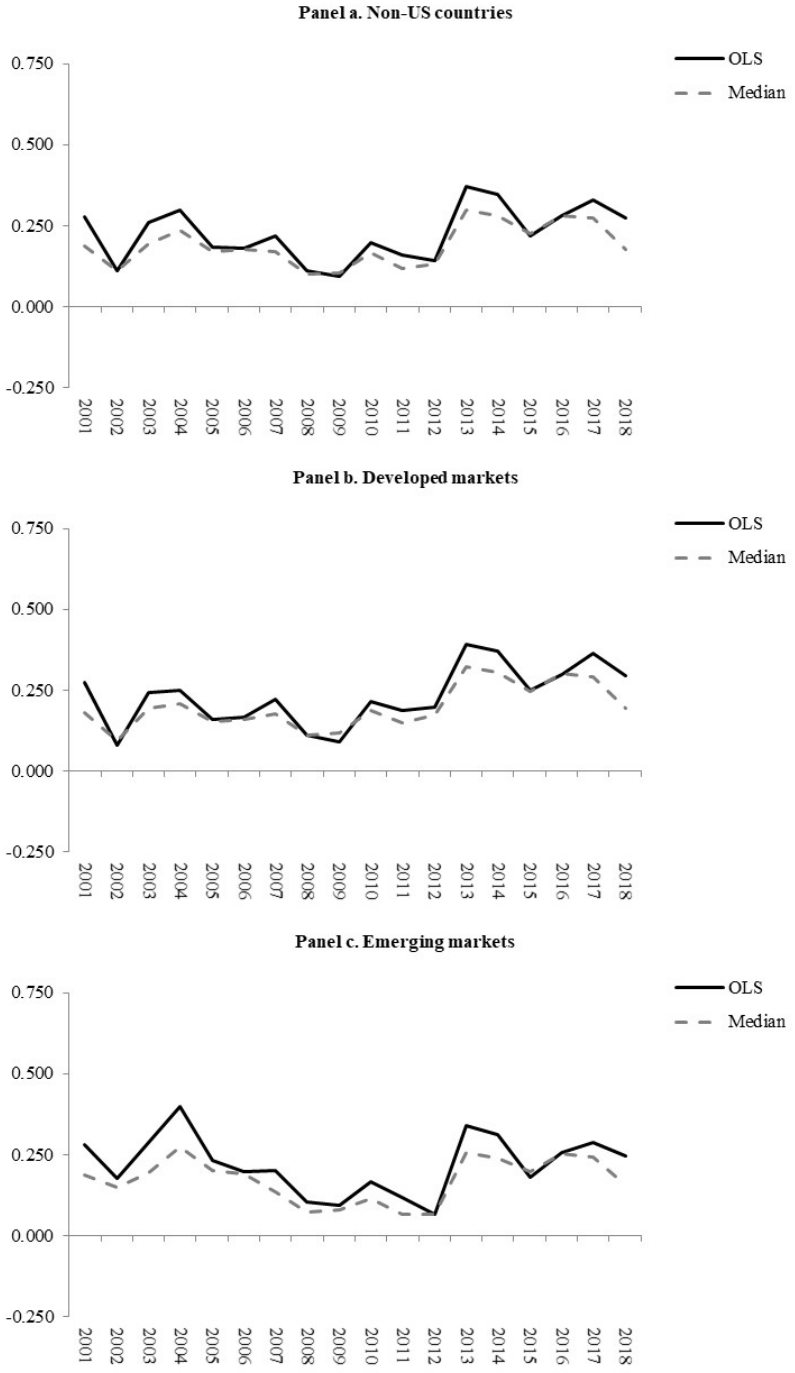


Figure 4. The valuation gap for local and cross-listed firms.
This figure shows the valuation gap each year from 2001 to 2018 estimated from OLS and median regressions in which the dependent variable is Tobin's *q*. The sample includes non-financial firms from 51 countries with at least $100 million in assets (inflation adjusted) and complete data on firm characteristics in a given year. China is excluded. R&D is capitalized for US firms. Variable definitions are in Appendix Table 1. β_t^{Local} and β_t^{Cross}, from Eq. (4a), are estimates of the difference in valuations between non-US local firms and US firms in each period *t* and between non-US firms cross-listed on US stock exchanges and US firms. $\beta_t^{DM,Local}$, $\beta_t^{EM,Local}$, $\beta_t^{DM,Cross}$, $\beta_t^{EM,Cross}$, from Eq. (4b) provide the same estimates, but separately for non-US firms from developed and emerging markets. The β_t estimates are multiplied by –1 in order to report the valuation gap as the positive difference in the valuations of US firms and those of comparable non-US firms. Panel a shows the valuation gaps for non-US countries; Panels b and c show the gaps for developed and emerging markets (excluding China), respectively.

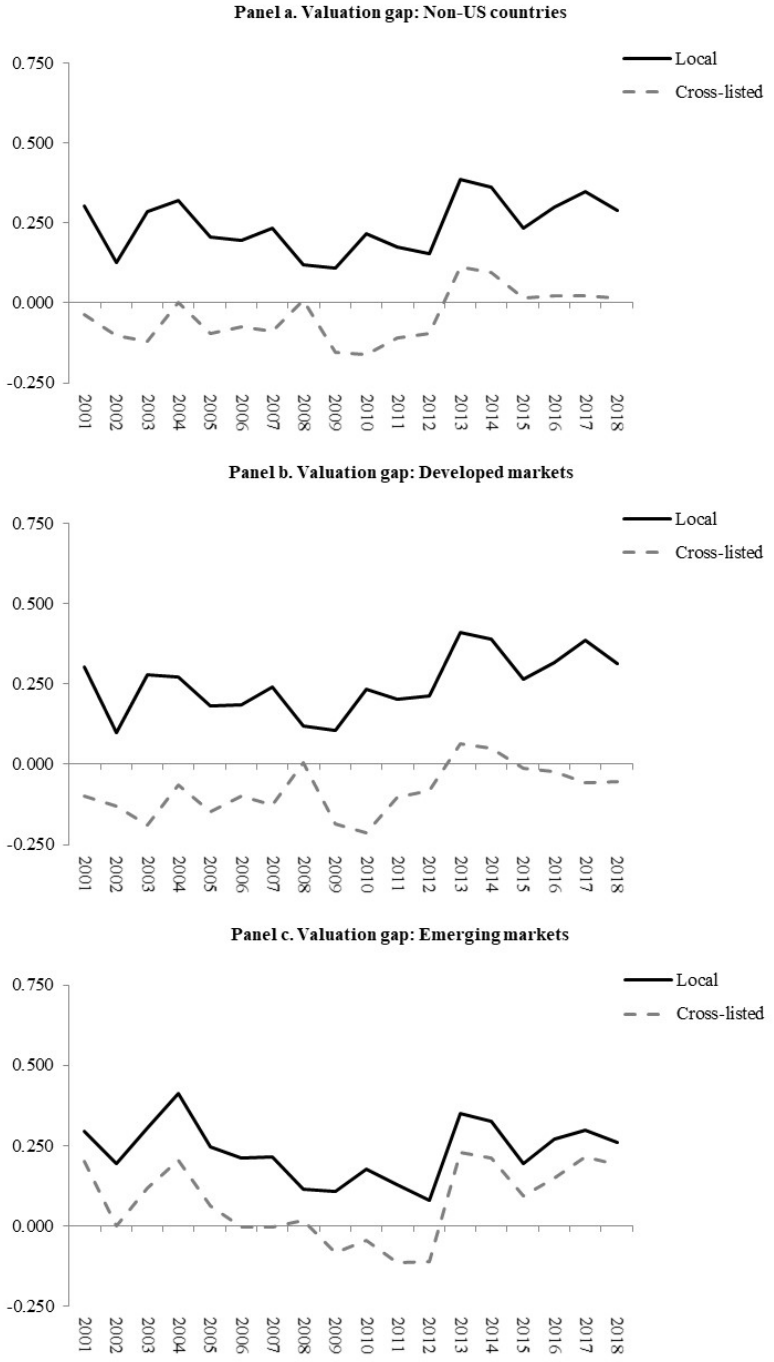
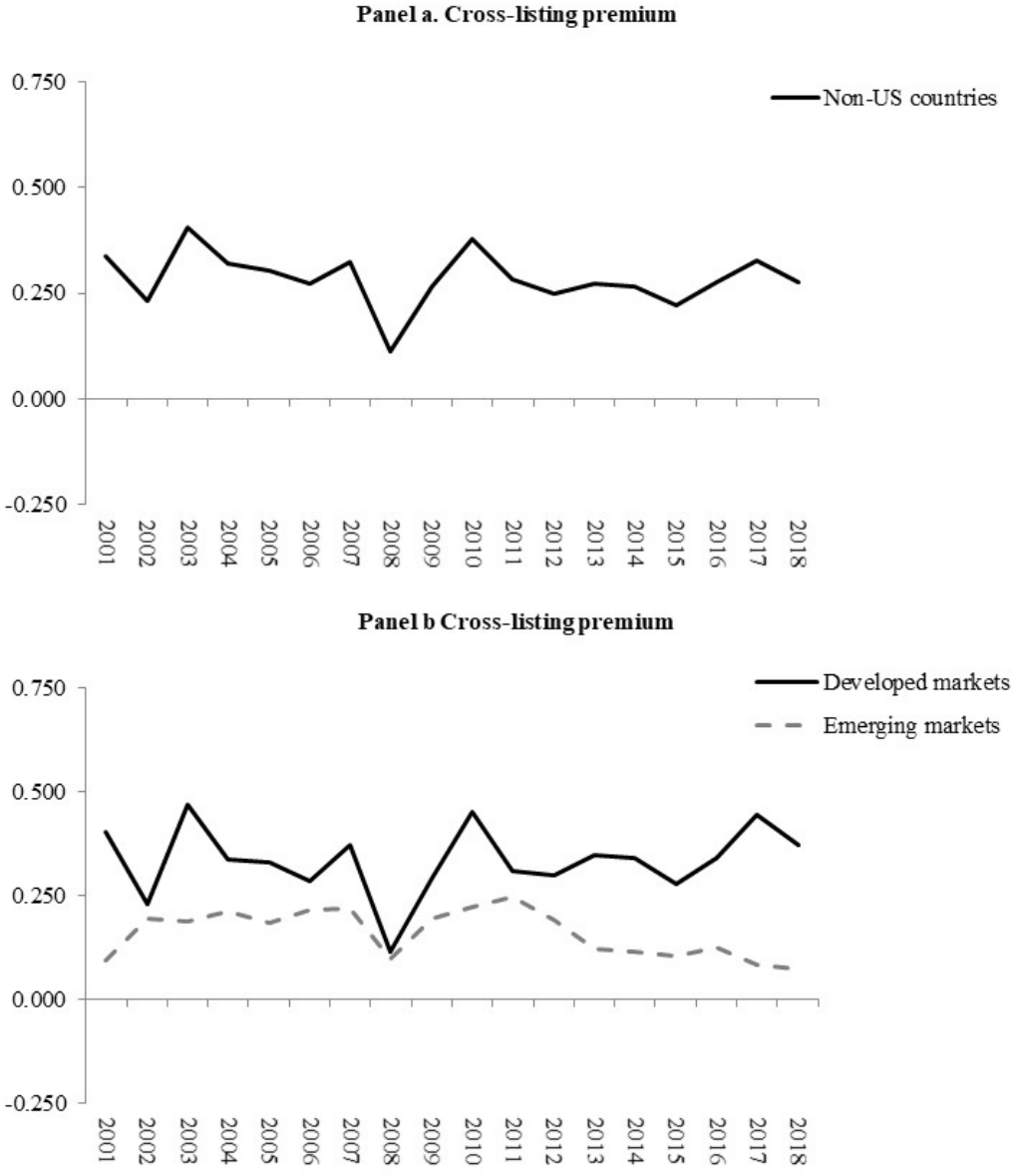


Figure 5. The cross-listing premium.
This figure shows the cross-listing premium each year from 2001 to 2018 estimated from OLS and median regressions in which the dependent variable is Tobin's q. The sample includes non-financial firms from 51 countries with at least $100 million in assets (inflation adjusted) and complete data on firm characteristics in a given year. China is excluded. R&D is capitalized for US firms. Variable definitions are in Appendix Table 1. β_t^{Local} and β_t^{Cross}, from Eq. (4a), are estimates of the difference in valuations between non-US local firms and US firms in each period t and between non-US firms cross-listed on US stock exchanges and US firms. $\beta_t^{DM,Local}$, $\beta_t^{EM,Local}$, $\beta_t^{DM,Cross}$, $\beta_t^{EM,Cross}$, from Eq. (4b) provide the same estimates, but separately for non-US firms from developed and emerging markets. The cross-listing premium each period equals $\beta_t^{Cross} - \beta_t^{Local}$ in Panel a and $\beta_t^{DM,Cross} - \beta_t^{DM,Local}$ for DMs and $\beta_t^{EM,Cross} - \beta_t^{EM,Local}$ for EMs in Panel b.



APPENDIX

Table A.I. Variable Definitions.

This table lists data sources and provides definitions of the variables used in the paper.

Variable	Definition and data source
Asset tangibility	Equals net property, plant, and equipment divided by total assets. Net property, plant, and equipment equals gross property, plant, and equipment minus accumulated depreciation (Sources: Worldscope and Compustat).
Developed market	Equals 1 if the country is classified as a developed market by MSCI. Equals 0 otherwise. (Source: https://www.msci.com/market-classification).
Emerging market	Equals 1 if the country is not classified as a developed market by MSCI. Equals 0 otherwise. (Source: https://www.msci.com/market-classification).
Exchange listed firm	Equals 1 if a firm is listed on an exchange in the United States (AMEX, NYSE or NASDAQ) in a given year via Level 2 or 3 American Depositary Receipts, direct listings, or by other means. Equals 0 otherwise. (Sources: Bank of New York, Citibank, JP Morgan, the NYSE, NASDAQ, CRSP, SEC filings, annual reports, Factiva).
GDP growth	Annual percentage growth rate of GDP at market prices based on constant local currency. (Source: World Bank's WDI Database and Statistics Bureau, Republic of China (Taiwan)).
High asset tangibility (low asset tangibility)	Equals 1 if a firm's asset tangibility is greater than the median value of asset tangibility in 2009 computed for all firms in the restricted sample. Equals 0 otherwise. Low asset tangibility equals 1 if high asset tangibility equals 0. (Sources: Worldscope and Compustat).
High-tech (not high-tech)	Equals 1 if a firm is in industry 5 (Business equipment – computers, software, and electronic equipment) in the Fama-French 10 industry classification scheme. Equals 0 otherwise. Not high-tech equals 1 if high-tech equals 0. (Source: https://mba.tuck.dartmouth.edu/pages/faculty/ken.french/Data_Library/det_10_ind_port.html).
Leverage	Equals the book value of short-term debt plus long-term debt divided by the sum of the market value of equal, short-term debt, and long-term debt. (Sources: Worldscope and Compustat).
Local firm	Equals 1 if a firm is not listed on an exchange in the United States (AMEX, NYSE or NASDAQ) in a given year via Level 2 or 3 American Depositary Receipts, direct listings, or by other means. Equals 0 otherwise. (Sources: Bank of New York, Citibank, JP Morgan, the NYSE, NASDAQ, CRSP, SEC filings, annual reports, Factiva).
Log(Assets)	Equals the log of total assets (in millions of US dollars). Total assets are adjusted for CPI inflation where 2018 is the base year. CPI inflation equals the annual percentage change in the consumer price index for each country. (Sources: Worldscope, Compustat, the World Bank's WDI Database, and Statistics Bureau, Taiwan).
Old (young)	A firm is classified as old if is listed for more than 5 years. Age equals year minus the year in which a firm is first listed. To identify the first year of listing, we use the BDATE code in Datastream for non-US firms (first date for which price data is available for a company's equity series). For US firms we use LINKDT in Compustat, the first effective link date between CRSP and Compustat. Equals 0 otherwise. Young equals 1 if old equals 0. (Sources: Datastream and Compustat).
Operating income	Equals operating income (total revenue minus total operating expenses) divided by total assets. (Sources: Worldscope and Compustat).
Resource (not resource)	Equals 1 if a firm is in SIC Division B, Mining (metal mining, coal mining, Oil and gas extraction, and mining and quarrying of nonmetallic minerals except fuels). Equals 0 otherwise. Not resource equals 1 if resource equals 0. (Source: Worldscope and Compustat).
Sales growth	Equals the two-year geometric average of annual inflation-adjusted growth in sales. CPI inflation equals the annual percentage change in the consumer price index (CPI) for each country. (Sources: Worldscope, Compustat, the World Bank's WDI Database, and Statistics Bureau, Republic of China (Taiwan)).
Tobin's q	For the numerator, we use the book value of short-term debt plus long-term debt and add the market value of equity. For the denominator, we use the book value of total assets. (Sources: Worldscope and Compustat).
Traded (not traded)	Equals 1 for firms classified as traded by Mian and Sufi (2014). Equals 0 otherwise. Not traded equals 1 if traded equals 0 (includes non-tradeable industries, construction, and other). We use mappings from the US Census Bureau and the NAICS to SIC crosswalk to convert NAICS codes to SIC codes (Worldscope does not have SIC codes). (Sources: Appendix Table 1 from the 2012 working paper version of Mian and Sufi (2014), Worldscope and Compustat, https://www.census.gov/eos/www/naics/concordances/concordances.html, and https://www.naics.com/naics-to-sic-crosswalk-2/).