

## **Online Appendix**

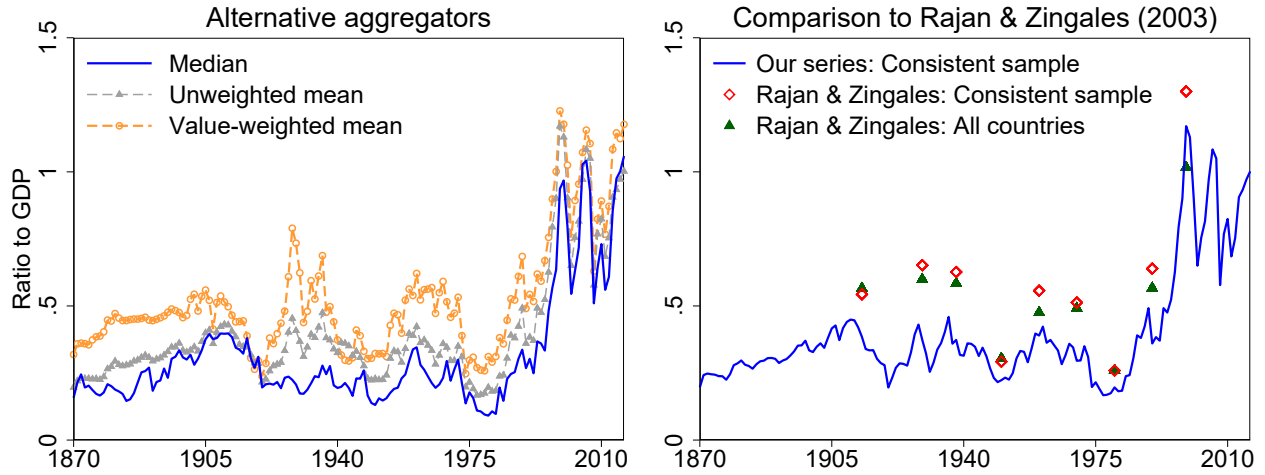
# **The Big Bang: Stock Market Capitalization in the Long Run**

Dmitry Kuvshinov and Kaspar Zimmermann

## ADDITIONAL RESULTS

### A. Trends in market capitalization: additional material

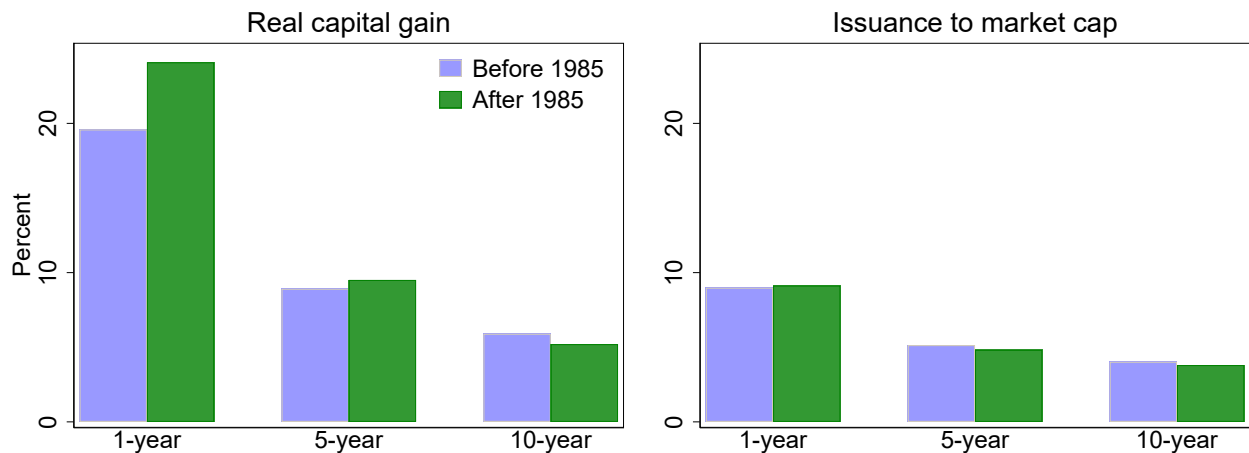
**Figure A.1:** *Alternative aggregators and comparison to alternative estimates*



Left-hand panel: value-weighted mean is calculated as the sum of market capitalization in all countries, converted to US dollars, divided by the sum of US dollar GDP for all countries with market cap data. Right-hand panel: Estimates in our data compared to those of [Rajan and Zingales \(2003\)](#), unweighted averages. The consistent sample includes all countries in our dataset apart from Finland, Portugal, and Spain.

### B. Trends in prices and quantities: additional material

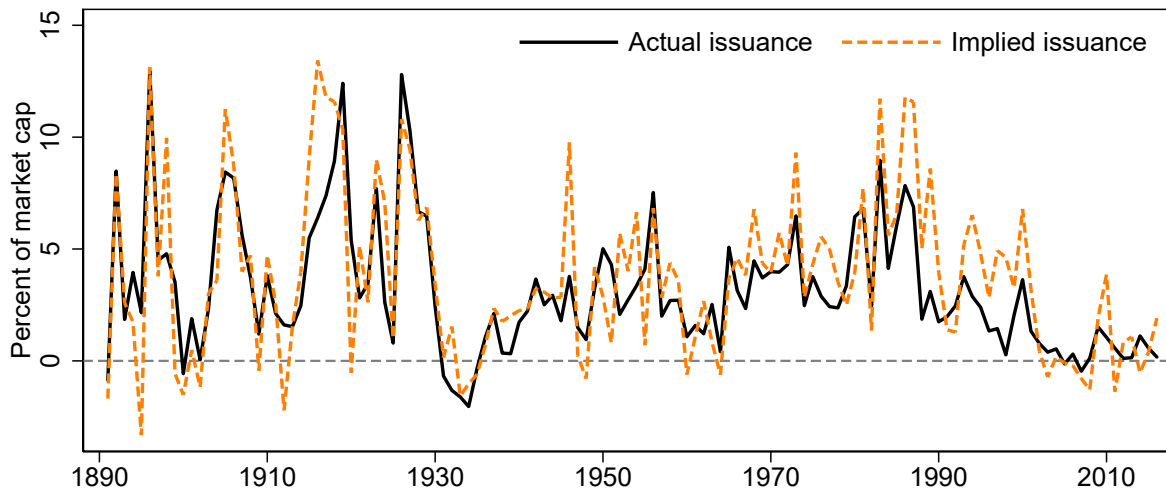
**Figure B.1:** *Volatility of the components of market cap growth*



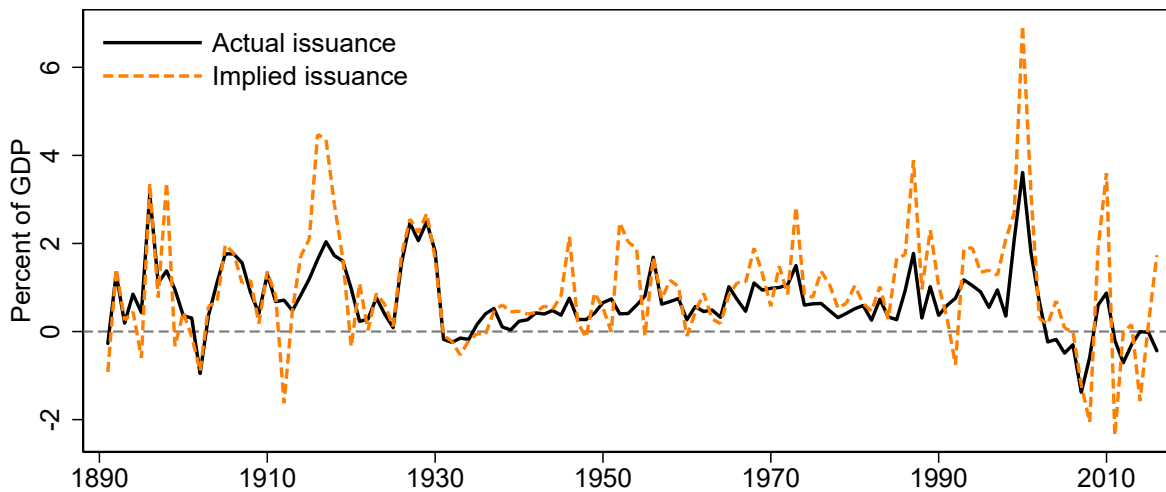
Standard deviation of annual, 5-year average, and 10-year average log real equity capital gain and log issuance relative to previous year's market cap, pooled cross-country data.

**Figure B.2: Long-run trends in net equity issuance**

**(a) Net equity issuance relative to market cap**

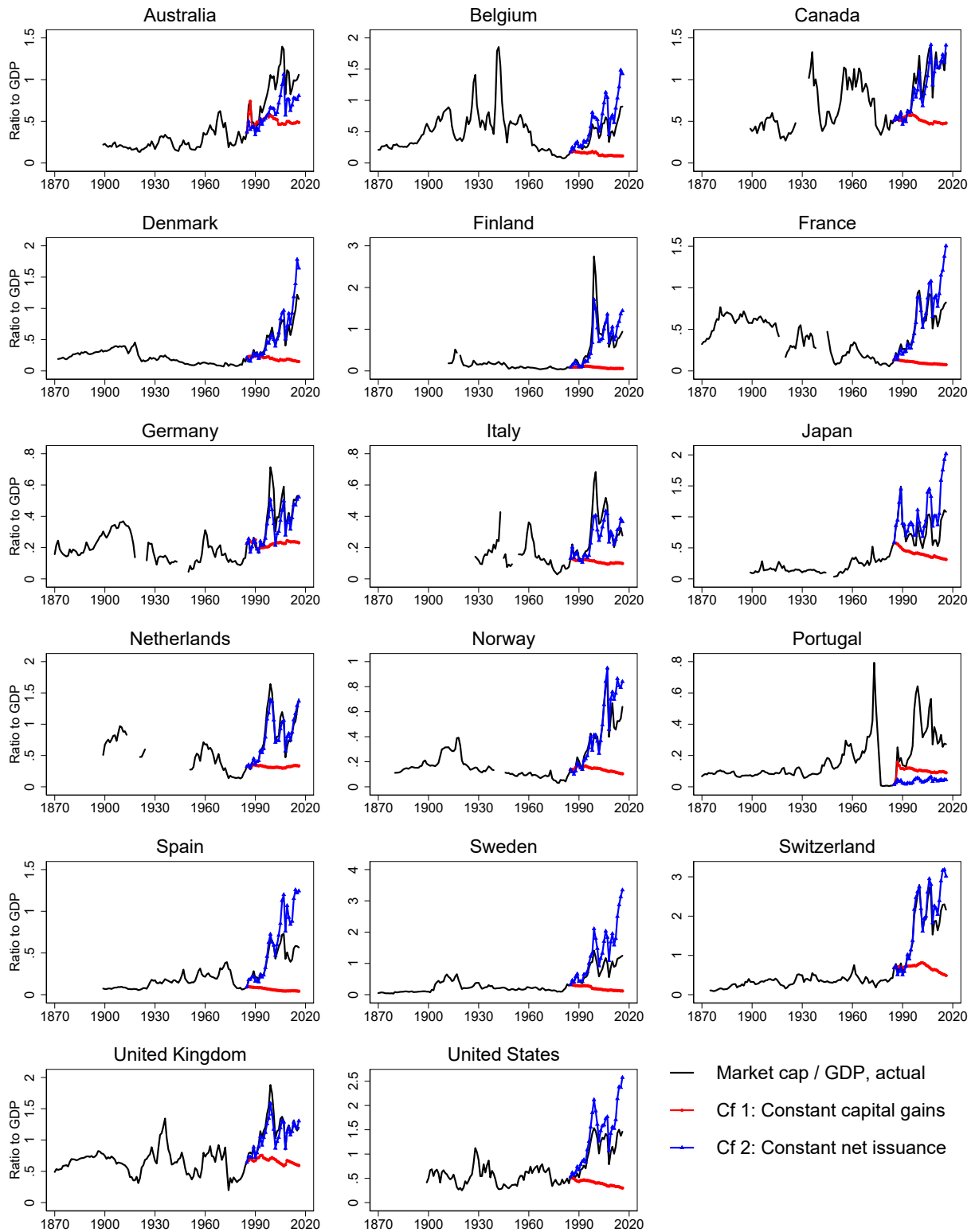


**(b) Net equity issuance relative to GDP**



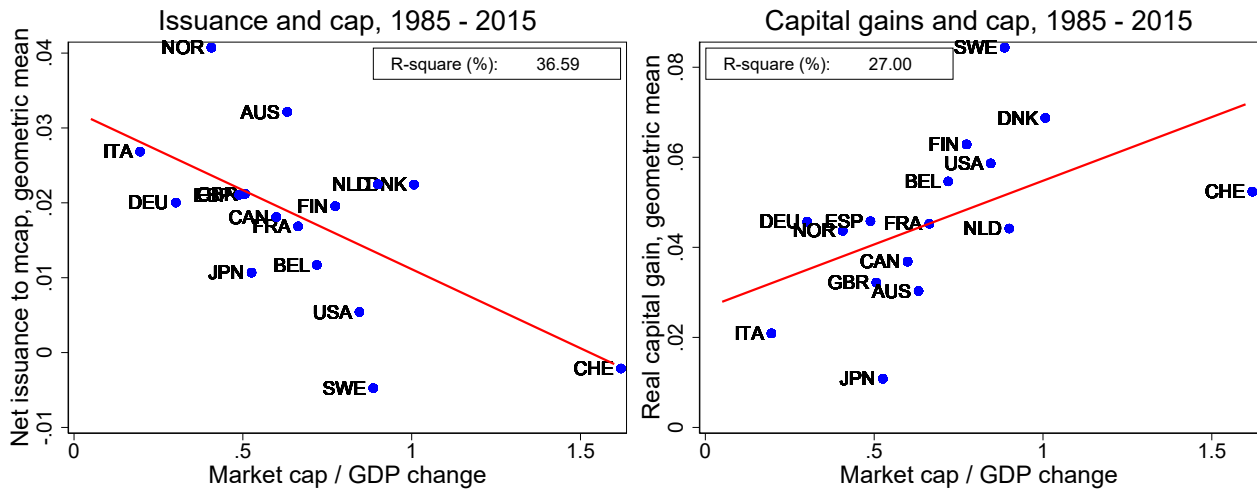
Net equity issuance during the year as percentage of previous year's market capitalization (top panel) and GDP (bottom panel). Unweighted averages of 9 countries: Canada, Germany, Finland, France, Portugal, Spain, Sweden, Switzerland, and US. Implied issuance is the difference between market cap growth and capital gain. Actual issuance is gross issues and new listings minus redemptions and delistings. Country-level data winsorized at 1%.

**Figure B.3:** Counterfactual evolution of market cap in individual countries



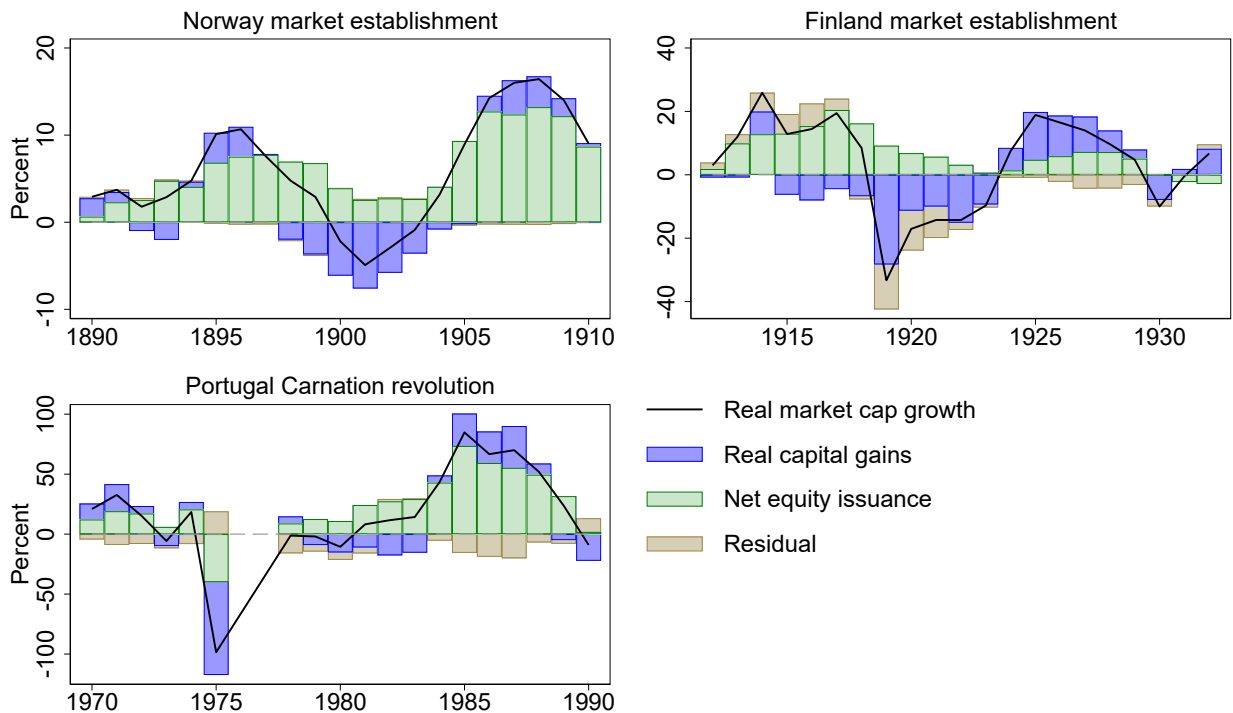
Counterfactual market cap to GDP ratio evolution during the big bang. Constant capital gains counterfactual forces the real capital gains during 1985–2016 to equal the pre-1985 average for the specific country. Constant net issuance counterfactual forces net issuance relative to market cap during 1985–2016 to equal the pre-1985 average. Data are benchmarked so that the combined growth of the two counterfactuals between 1985 and 2016 equals the actual growth in observed market cap data.

**Figure B.4:** Country-level growth in market cap, issuance and capital gains during the big bang



Country-level changes in market cap and average real capital gains and net issuance relative to previous year's market cap between 1985 and 2015. We omit Portugal for illustrative purposes due to its very high capitalization growth rates during the recovery from the Carnation Revolution, but including it in the graph does not change the correlations.

**Figure B.5:** Growth decomposition: individual country case studies



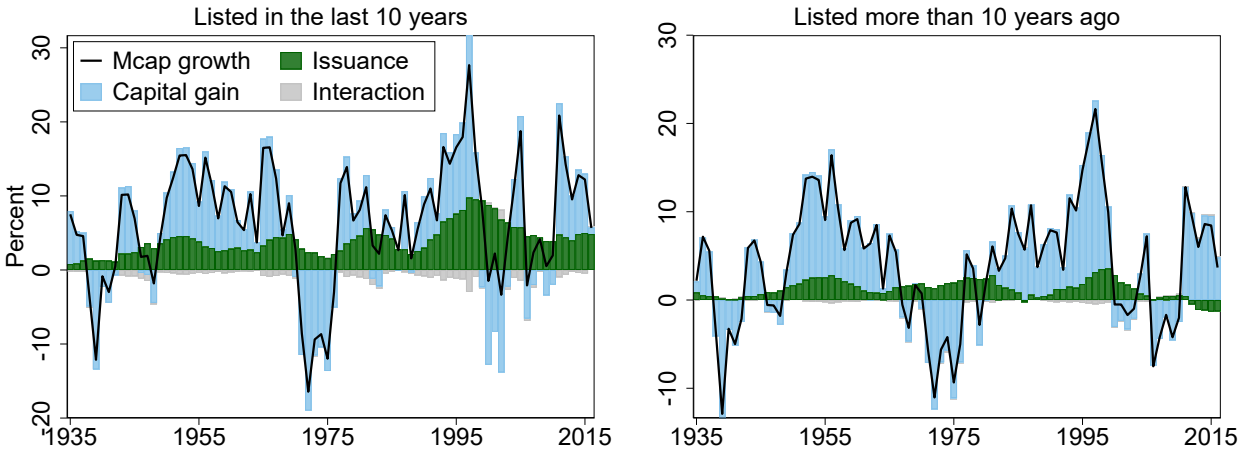
Decomposition of real market cap growth into real capital gains and net issuance relative to previous year's market cap. Centered five-year moving averages. The Portuguese market cap growth and its components for 1975 capture the whole Carnation Revolution period during which the market was closed (1975–1977)—using non-log growth rates for this period given the very large market decline—and the averages for other years exclude the revolution period.

**Table B.1:** Average market cap growth of newly listed and other firms in the US

	Pre 1985			Post 1985			Difference
	(1) New Listings	(2) Old Listings	(3) Difference (1) - (2)	(4) New Listings	(5) Old Listings	(6) Difference (4) - (5)	(7) Pre vs post (6) - (3)
Market cap growth $\approx$	5.02	3.03	1.99	9.32	6.26	3.06	1.07
Seasoned issuance	3.10	1.43	1.67***	5.47	0.93	4.55***	2.87***
+ Capital gains	2.50	1.77	0.73	4.33	5.53	-1.20	-1.93
+ Interaction	-0.41	-0.09	-0.32*	-0.56	-0.08	-0.48	-0.16
Observations	50	50		32	32		

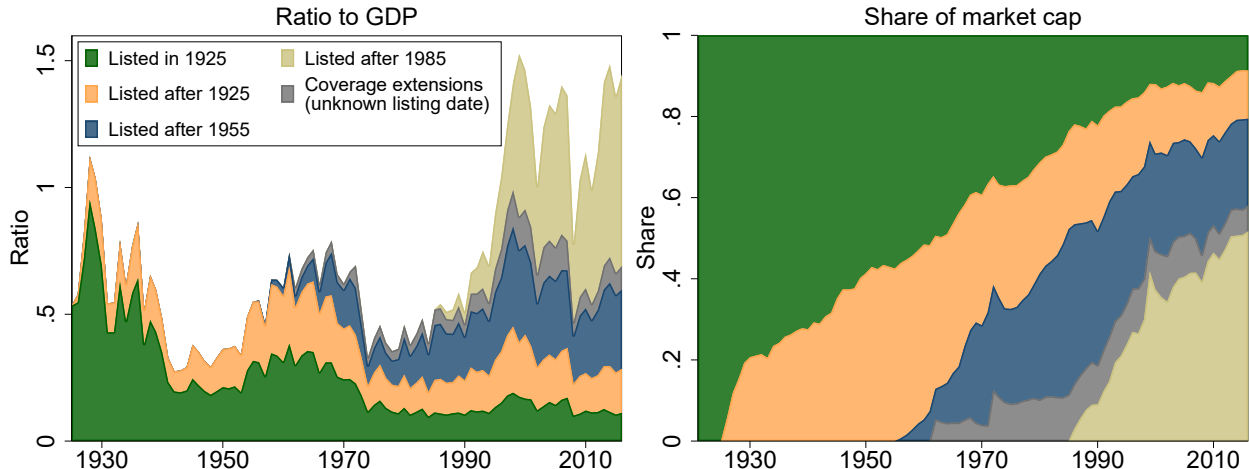
This table shows the average annual real market cap growth for new listings (shares of firms listed within the last 10 years) and old listings (shares of all other firms), decomposed into issuance and real capital gains. To calculate the growth rates, we collapse the CRSP microdata to value-weighted annual observations (e.g., new listing market cap growth is the sum of the market cap of all newly listed firms in year  $t$  relative to market cap of the same firms at  $t - 1$ , net of inflation). \*, \*\*, and \*\*\* denote significance at the 10%, 5% and 1% levels, respectively.

**Figure B.6:** Market cap growth and its components, US newly listed vs. other firms



Data for the US sourced from CRSP and aggregated across individual firms. New listings are firms that are newly listed within the last 10 years, old listings are all other firms.

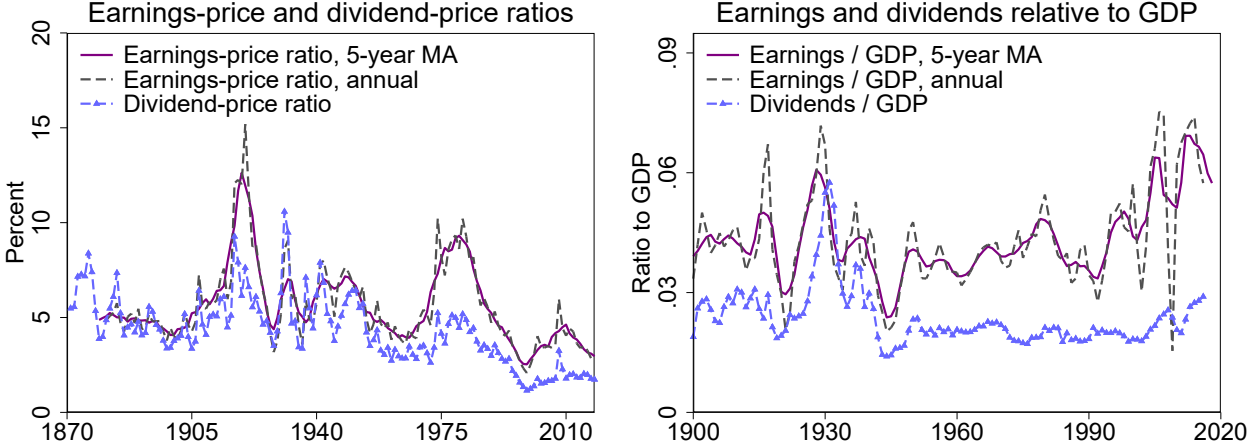
**Figure B.7:** US market capitalization by listing date



Market capitalization of firms listed on or before the specific date, as a share of GDP (left panel)—with aggregate CRSP capitalization scaled up to match our US total—and as share of total market cap (right panel).

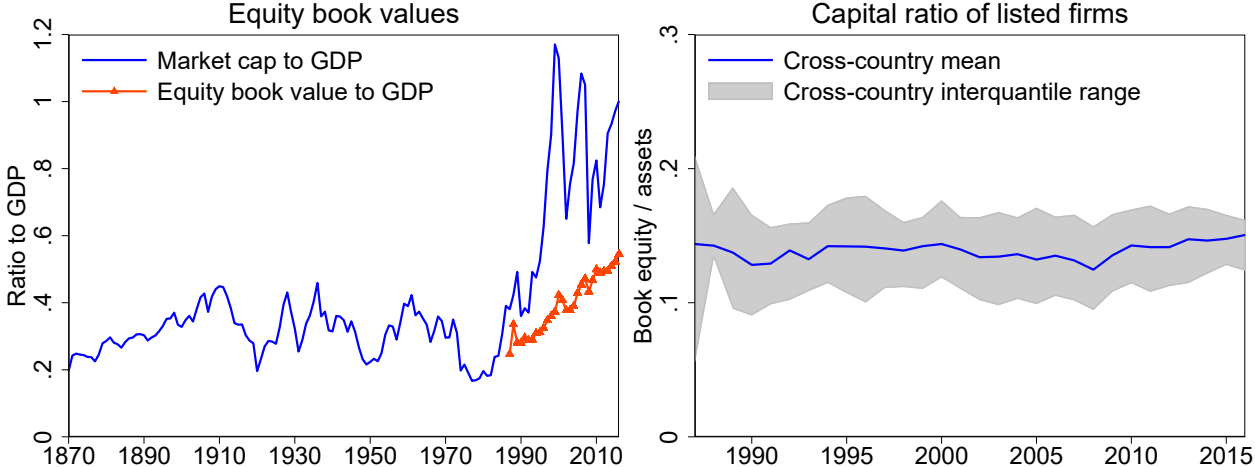
### C. Drivers of the post-1980s market expansion: additional material

**Figure C.1:** *Earnings and dividends of listed firms in the US*



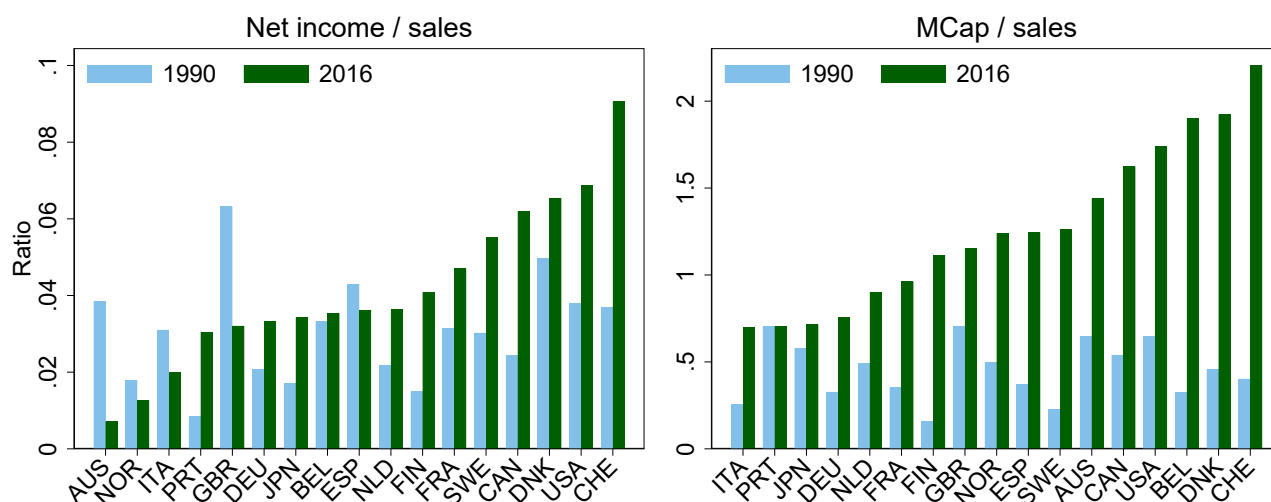
Left-hand panel: dividend-price ratio and the cyclically adjusted total return earnings-price ratio (inverse of P/E10 CAPE) from Shiller (2015), December values. Right-hand panel: earnings to GDP calculated as market cap to GDP times the earnings-price ratio.

**Figure C.2:** *Book equity values and firm leverage*



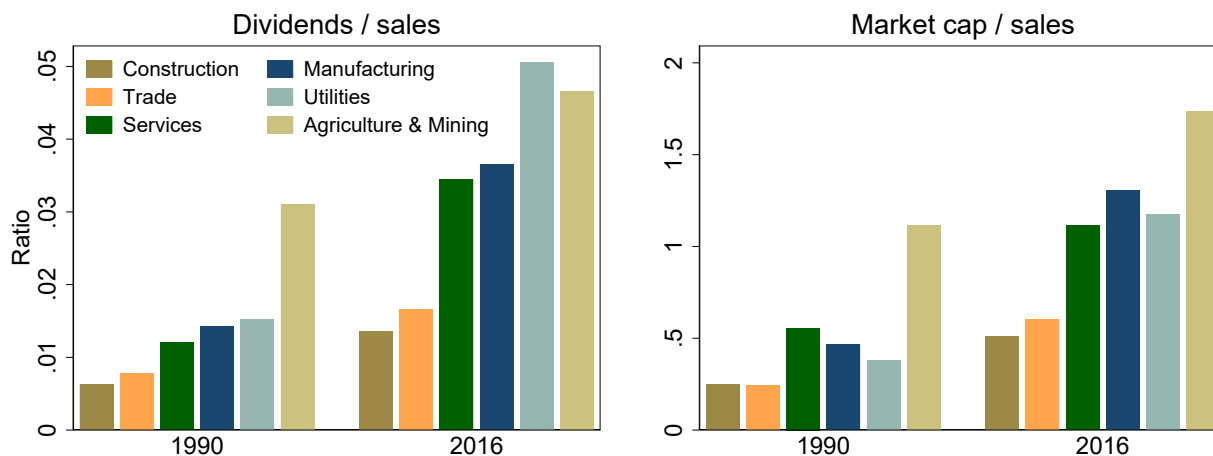
Left-hand panel: market and book value of listed firm equity, unweighted average of 17 countries. Right-hand panel: capital ratio of listed firms. The capital ratio is calculated by dividing book equity by total assets. Book equity and total assets data are aggregated up from Compustat Global and Compustat North America and cover all listed firms with non-missing values for market cap, dividends and earnings, scaled up to match our aggregate market cap data where necessary. We drop country-year observations at the beginning of the sample with less than 30% of market cap covered. The data include both financial and non-financial firms. To arrive at the country-level mean, firm-level observations are weighted by total assets.

**Figure C.3:** Alternative listed firm profitability measures in 1990 and 2016



The figure shows sales-weighted profit (net income) per unit of sales and market cap per unit of sales in 1990 and 2016, computed from firm level data in Compustat Global and Compustat North America. The Compustat coverage in Italy, Portugal, Spain, and Sweden is still low in 1990, meaning that the 1990 figures for these countries should be interpreted with caution. For Portugal, we use 1994 data instead of 1990 as it is the first year with meaningful coverage.

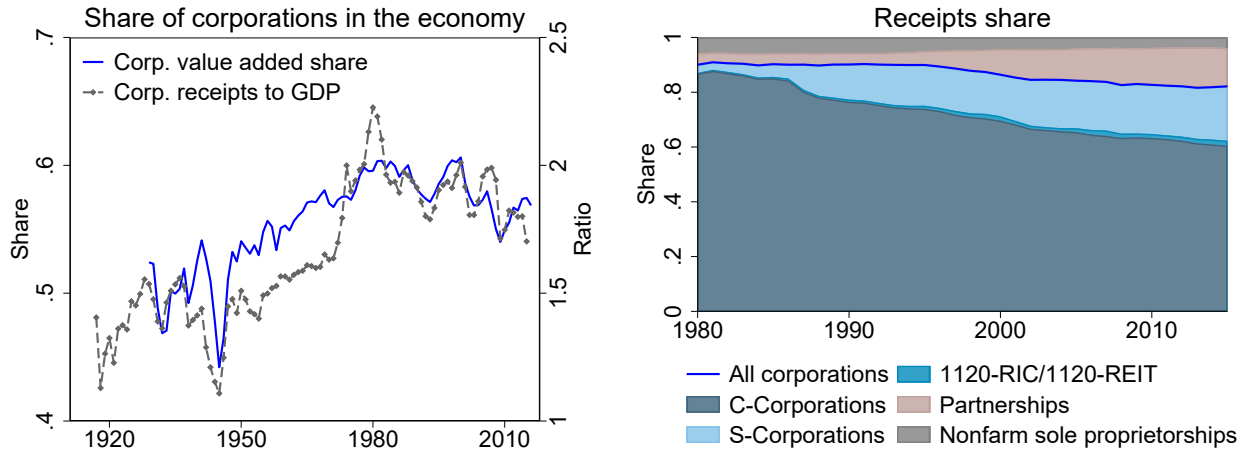
**Figure C.4:** Changes in profitability of listed firms in different sectors



The figure shows the ratio of dividends to sales and market cap to sales across different economic sectors in 1990 and 2016. Sectors are sorted by the dividend to sales ratio in 1990. Compustat firm level data are aggregated to the sector level using SIC industry codes and sales weights in each country. Bars show the median level across the 17 countries.

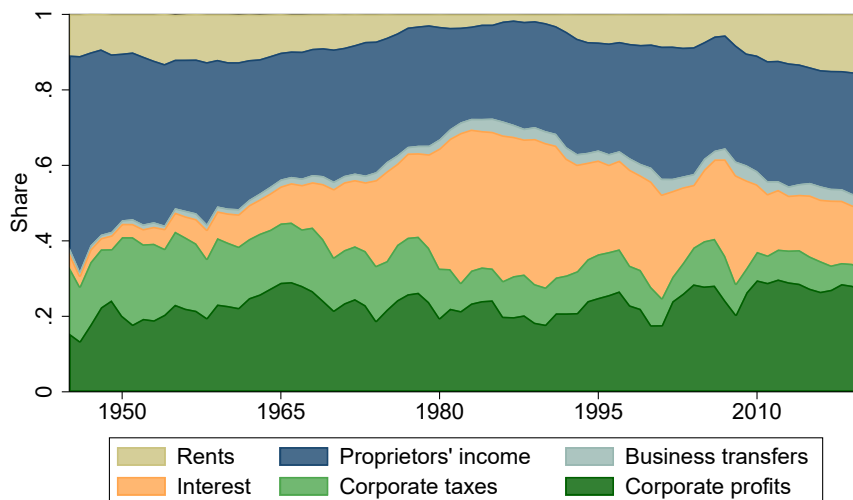


**Figure C.5:** Market shares by form of business in the United States



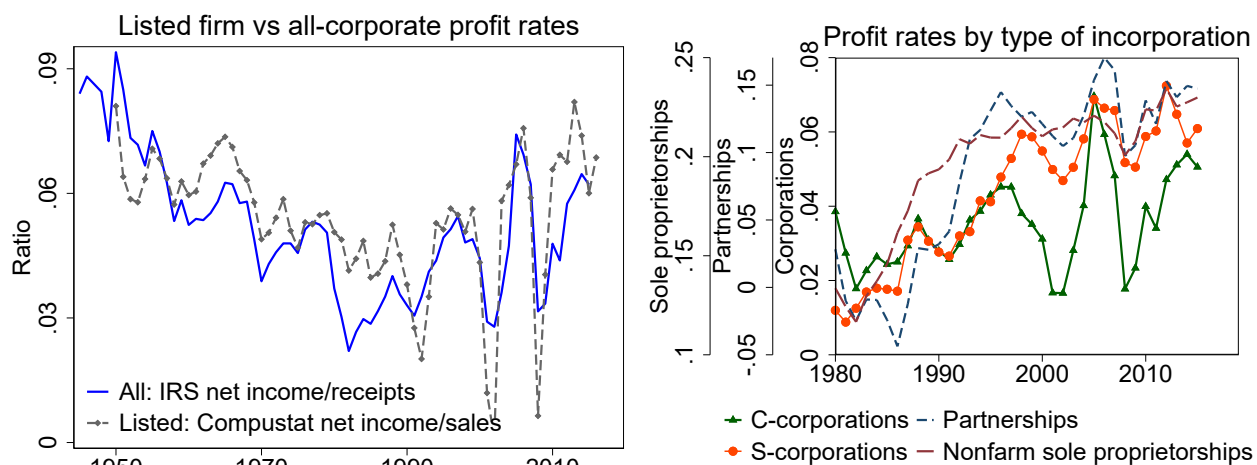
Left-hand panel shows the value added share of corporations (left axis) and the ratio of corporate receipts to GDP (right axis). Right-hand panel shows total receipt shares by form of business in the US. Corporate value added data come from the BEA. Receipts data are from the IRS Statistics of Income.

**Figure C.6:** Capital income decomposition in the US



Capital income components are sourced from the BEA NIPA Table 1.10.

**Figure C.7:** Profitability of listed firms relative to other business types in the United States



The left-hand panel displays the profit rates of listed corporations and of all corporations. The blue solid line shows the ratio of after-tax net income to total receipts by all corporations in the US. Data come from IRS Statistics of Income Reports. The grey dashed line (diamonds) shows the net income per unit of sales of listed firms in CRSP-Compustat Merged database. The right-hand panel shows the ratio of net income to total receipts. We use different scales for each business type to abstract from level differences due to the differential treatment of capital and labor income in partnerships and sole proprietorships. Data are from the IRS and cover 1980–2015.

## DATA APPENDIX

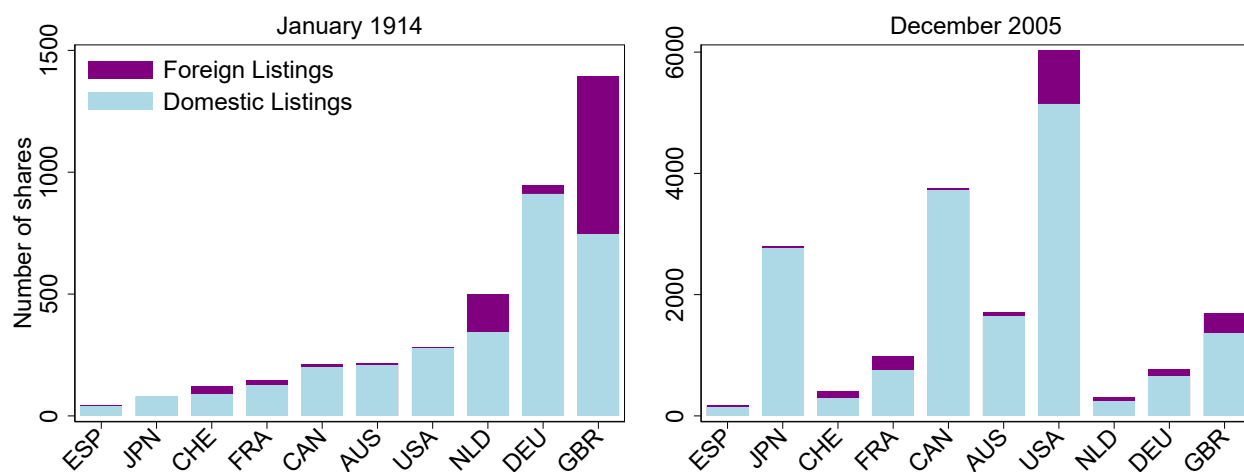
In this section, we provide the details for the sources for our stock market data, and discuss potential data quality issues alongside a comparison to alternative estimates of stock market capitalization. In Section D, we analyze the impact of two important definitional concepts on our data: excluding foreign listings, and the impact of the switch from buybacks to dividends on our market capitalization growth decomposition. In Section E, we provide the details of the data sources for each country and compares them to other existing estimates.

### D. Further data quality checks

#### D.1 Foreign listings

Companies in countries with smaller or less developed capital markets may choose to raise funds in a global financial centre rather than the home country. This means that our domestic market capitalization figures may underestimate the size of listed equity finance for those smaller countries, and underestimate the market share of financial centres in global market cap. To see how much of an issue this might pose, Figure D.1 shows the number of foreign and domestic listed shares across the major exchanges in our dataset at two benchmark years: the pre-WW I market peak in 1913, and the post-big-bang peak in the 2000s, compiled using data in Moore (2010b), Campbell, Grossman, and Turner (2021), and reports of the World Federation of Exchanges. Foreign listings are relatively unimportant for the vast majority of stock exchanges including those in a number of large economies with deep financial markets, such as the US, Germany, and France.<sup>14</sup> The big

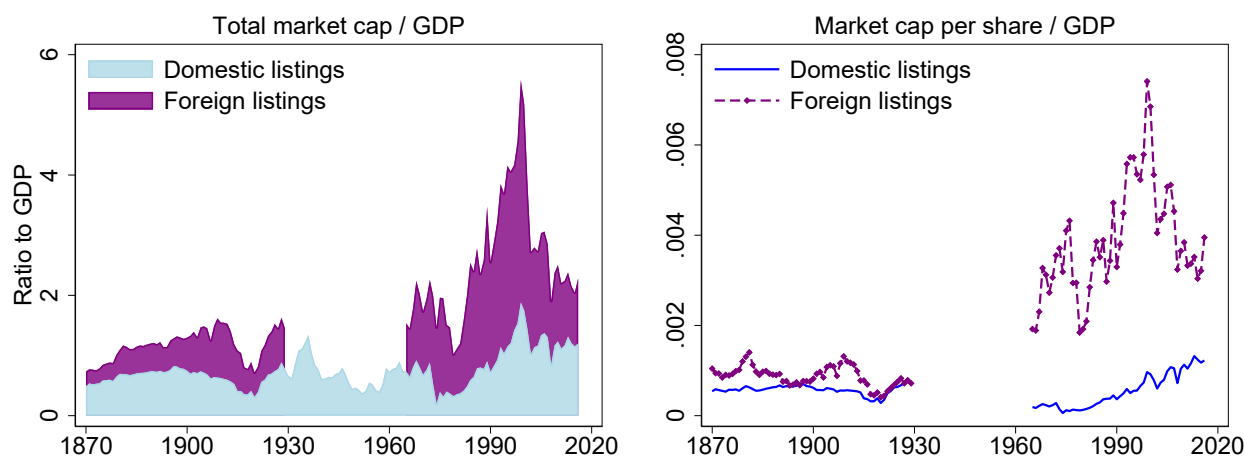
Figure D.1: Foreign and domestic listings



Number of listed shares issued by companies domiciled in the home country and abroad. If one firm issues multiple shares, these are all counted as separate listings. Data for 1914 are from Campbell et al. (2021) for the UK and Moore (2010b) for other countries, and cover the main stock exchange (e.g., NYSE) only. Data for 2005 are from reports of the World Federation of Exchanges and cover all major stock exchanges, with additional data used to attribute the relevant Euronext listings to Netherlands, Spain, and France.

<sup>14</sup>Coincidentally, the same is not true for government bond markets: for example, Moore (2010b) shows that in January 1914, out of the 171 government bonds listed on the Amsterdam Stock Exchange, 168 were those of foreign countries.

**Figure D.2:** Foreign and domestic market capitalization in the UK



Left-hand panel: Total capitalization of foreign and domestic stocks relative to GDP. Right-hand panel: Market cap per share to GDP is calculated as total market capitalization divided by the number of shares and divided again by GDP. Data for both panels are from [Campbell et al. \(2021\)](#) for the pre-1930 period (both foreign and domestic listings are scaled up to match the [Moore \(2010b\)](#) aggregate, see Appendix C and Figure E.16 for more detail), and from the statistical reports and historical statistics of the London Stock Exchange for the post-1970 period.

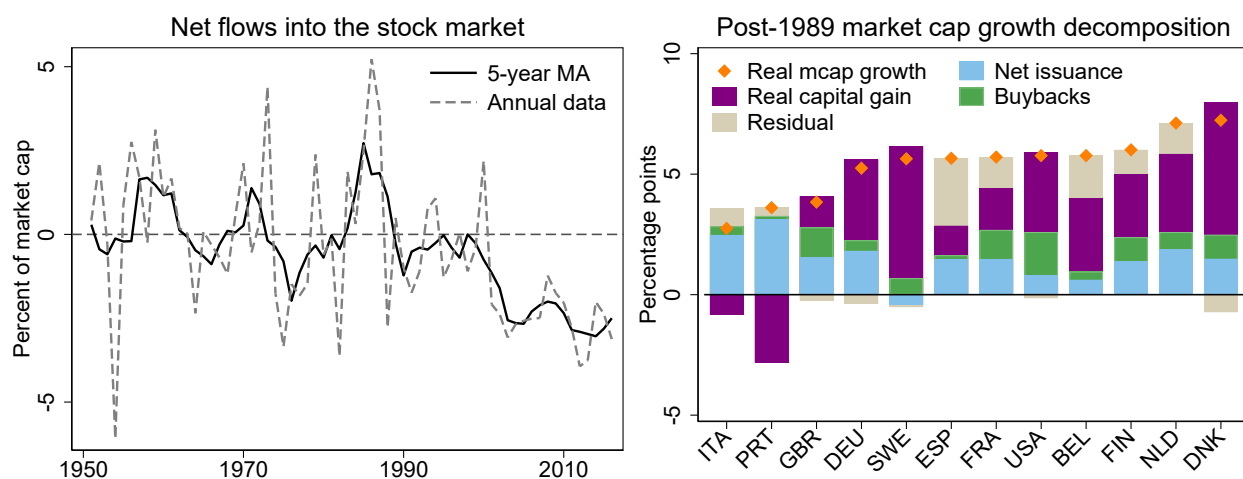
exception is the pre World War I London Stock Exchange, where almost half of listed shares were issued by foreign companies.

In Figure D.2, we look at the long-run trends in the market capitalization of foreign equity listed in the UK in more detail, and shows that the capitalization of foreign companies was comparable to that of domestic companies in both the early 20th century and mid to late 20th century, even exceeding the domestic market capitalization during the big bang. But whereas foreign companies listing in London during the pre World War I era of the first financial globalization were relatively small, companies which list in London today are relatively large, with the average market capitalization of a foreign share 3–10 times that of an average British share. While historically these smaller foreign companies may have used the London Stock Exchange as their only source of equity finance, the foreign stocks listed on the LSE today belong to large companies, which are likely to be also listed on their corresponding domestic exchanges. Altogether, this evidence suggests that the global market capitalization shares in Figure 4 understate the importance of London as a global financial center, particularly in the early 20th century.

## D.2 Buybacks

Recent decades saw an increasing use of share buybacks as means of shareholder compensation in the US ([Grullon and Michaely, 2002](#)). Even though the use of buybacks outside of the US was limited during the 1980s and early 1990s, thereafter this method of compensating shareholders has also grown in importance in other countries ([Megginson and Von Eije, 2008](#)). From the perspective of the shareholder, the switch from dividends to buybacks is relatively neutral (tax advantages and disadvantages aside): they either get cash as dividend or in the form of a company-funded share repurchase scheme. But from the perspective of the market cap growth decomposition, this switch is not neutral: whereas dividend payments reduce the share price, buybacks reduce net issuance. It

**Figure D.3:** *The impact of buybacks on market cap growth decomposition*



Left-hand panel: net flows into the stock market is net issuance minus dividends paid by listed firms, relative to previous year's market cap; unweighted average of the 17 countries in our sample. Right-hand panel: averages of log growth rates for each country after 1989. We subtract buybacks (relative to previous year's market cap) from capital gains and leave net issuance the same as in our baseline decomposition. Buyback data for the US are from [Boudoukh et al. \(2007\)](#) and [Zeng and Luk \(2020\)](#). Buybacks for EU countries are from [Megginson and Von Eije \(2008\)](#), scaled up based on the ratio of dividends in the [Megginson and Von Eije \(2008\)](#) sample to total dividends paid in our sample. Since the [Megginson and Von Eije \(2008\)](#) data stop in 2005, European data after 2005 are a scaled version of the US data.

is therefore important to ascertain the role of this switch in shareholder compensation in driving the post-1980s net issuance slowdown documented in Figures 7 and B.2.

We do this in two ways. First, we calculate a measure of net capital flows into the stock market that—unlike net issuance—is unaffected by the switch from dividends to buybacks. This measure is the negative of the net payout yield in [Boudoukh, Michaely, Richardson, and Roberts \(2007\)](#), and is calculated as net issuance minus the dividend yield. It measures the net inflow of funds into the equity market: the amount of funds committed to new issuance minus the funds distributed in the form of dividends. The switch from dividends to buybacks has no effect on this broader measure, merely reducing one of its subcomponents at the expense of another. The left-hand panel of Figure D.3 shows the time trend in the net flows into the equity market after 1950, using simple unweighted cross-country averages. One can see that like net equity issuance, net flows of funds into the equity market declined materially over recent decades. This means that even according to this broader measure, the amount of funds raised through the stock market has decreased at the time that market cap growth accelerated rapidly.

Another way of assessing the impact of buybacks on our trends is to calculate the buyback yield—the ratio of stock buybacks to previous year's market cap and subtract it from the capital gain, identifying this as the third component of the market cap growth decomposition. For the US, we use the buyback yield data from [Boudoukh et al. \(2007\)](#), which is calculated as the change in Treasury holdings in Compustat data to proxy for buyback cashflows not earmarked for employee compensation, and switch to S & P data after 2007, with the S & P data scaled down slightly to match the series in [Boudoukh et al. \(2007\)](#) for overlapping years (since the S & P series likely include preference share buybacks and cashflows from employee compensation schemes). For the EU, we use the buyback estimates in [Megginson and Von Eije \(2008\)](#). However, the data in

Meggison and Von Eije (2008) only include industrial companies and may therefore underestimate total buybacks, therefore we scale them up based on the ratio of total dividends paid across all countries in the Meggison and Von Eije (2008) sample to dividends paid for these countries in our data at benchmark years, resulting in a scaling up by a factor close to 2. We do not scale up the data for Finland since this would result in buyback yields similar or greater than those in the US, which given the limited use of buybacks in this country (see, for example Högholm and Högholm, 2017) appears unrealistic. Since the Meggison and Von Eije (2008) data cover 1989 to 2005, after 2005 we assume that the buybacks in each country evolve proportionately to the US, using the 2000–2005 period to compute the ratio by which to adjust the US buyback data.

The right-hand panel of Figure D.3 shows that buybacks accounted for close to 2% of market cap growth in the US, and between 0.5% and 1% of market cap growth in most other countries. Removing buybacks from capital gains and adding them to equity issuance—a possible counterfactual evolution of the growth components had the switch from dividends to buybacks not occurred—would have reduced the contribution of capital gains and increased the contribution of issuance to the big bang, but the general patterns of the issuance slowdown and the historically high and persistent capital gains would have remained in place.

## E. Country-level data sources

In this section, we detail the sources for our estimates of market capitalization, net equity issuance, and new listings data, and compares our market capitalization estimates to alternatives in previous studies. These alternative estimates are country specific, but we always compare our data to those of [Goldsmith \(1985\)](#) (sourced from [La Porta et al., 2008](#)) and [Rajan and Zingales \(2003\)](#) when available. Unless otherwise stated, all the annual market capitalization estimates reflect end-of-year values, while issuance and new listings cover the entire calendar year.

### Australia

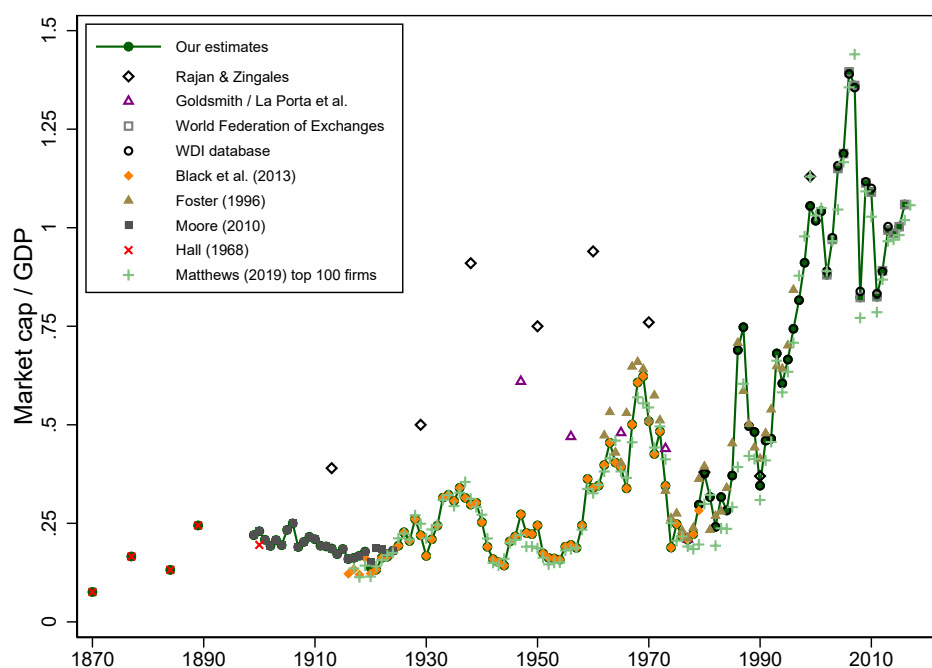
**Table E.1:** *Data sources: Australia*

Year	Data source
<i>Stock market capitalization:</i>	
1870–1889	Total capitalization of the Melbourne Stock Exchange, from <a href="#">Hall (1968)</a> .
1899–1924	Total capitalization of the Sydney Stock Exchange, from <a href="#">Moore (2010b)</a> . Converted to AUD using the exchange rates in <a href="#">Jordà et al. (2016)</a> .
1925–1978	Total capitalization of the Sydney Stock Exchange, from <a href="#">Black, Kirkwood, Williams, and Rai (2013)</a> .
1979–2013	Total capitalization of all Australian listed firms, shares listed on Australian exchanges. Source: World Bank WDI database. Almost identical to the Sydney cap in the 1970s; spliced with <a href="#">Black et al. (2013)</a> data in 1979.
2014–2016	Total capitalization of all Australian listed firms, shares on Australian exchanges. Source: World Federation of Exchanges (WFE) <i>Statistical Reports</i> , various years.
<i>Net equity issuance:</i>	
1989–2016	Net flows of listed equity shares, all sectors, from the Australian Bureau of Statistics National Accounts: Finance and Wealth, Table 48.

Table E.1 documents the sources of our data for Australia, and Figure E.1 shows the resulting market capitalization series alongside alternative existing estimates. The Australian securities market has generally been dominated by two major stock exchanges, located in Sydney and Melbourne. [Hall \(1968\)](#) argued that the Melbourne stock exchange was dominant in the late 19th century, largely because of large capitalizations of stocks of mining companies, and the data in [Black et al. \(2013\)](#) and [Lamberton \(1958\)](#) suggest that the Sydney stock exchange became dominant in the early 20th century. Based on this, we use the [Hall \(1968\)](#) estimates of the Melbourne stock market capitalization for the 19th century data, and switch to the Sydney exchange in the 20th century, using estimates of [Moore \(2010b\)](#) and [Black et al. \(2013\)](#), which are also consistent with the RBA Historical Statistics data in [Foster \(1996\)](#) and the [Mathews \(2019\)](#) estimates of the capitalization of the top 100 firms on the Sydney stock exchange. From the 1970s onwards we switch to the total Australian firm capitalization estimates provided by the World Federation of Exchanges reports and the World Bank WDI database.

The main potential bias in the data for Australia comes from two sources: the fact that until the 1970s, we only have data for either the Sydney or the Melbourne exchange, not both; and the fact that these data include both foreign and domestic companies (again, up to the 1970s). These two biases

Figure E.1: Australia: Alternative stock market cap estimates



do, however, largely seem to balance each other out: the total Australian exchange capitalization in the 1970s is very similar to that of the Sydney stock exchange, and [Lamberton \(1958\)](#) indicates that the Sydney stock exchange became the most important center for financial activity much earlier. Therefore we do not make any further adjustments to the early Australian data, which focus mostly on the Sydney exchange, including both domestic and foreign companies.<sup>15</sup>

Our approach of focusing on the Melbourne cap in the late 19th century, and the Sydney cap in the 20th century is in line with that of [Rajan and Zingales \(2003\)](#). As [Figure E.1](#) shows, however, our estimates of market capitalization are somewhat below those of both [Rajan and Zingales \(2003\)](#) and [Goldsmith \(1985\)](#), largely due to better available up-to-date statistics, for example from [Moore \(2010b\)](#) and [Black et al. \(2013\)](#).

We are grateful to the Reserve Bank of Australia, Anna Nietschke and Thomas Matthews for sharing data and providing helpful comments.

<sup>15</sup>As a side note, adding up the [Hall \(1968\)](#) and [Moore \(2010b\)](#) estimates for 1899 would grossly overestimate the total cap of Australian firms because it does not adjust for cross-listings.



# Belgium

**Table E.2:** Data sources: Belgium

Year	Data source
<i>Stock market capitalization:</i>	
1870–2002	Total capitalization of all Belgian companies on the Brussels Stock Exchange, SCOB Database. Data shared by Frans Buelens. See <a href="#">Annaert, Buelens, and De Ceuster (2012)</a> for details.
2003–2016	Market capitalization of all Belgian companies listed in Belgium, from the ECB Statistical Data Warehouse, Security issues statistics.
<i>Net equity issuance:</i>	
1990–2016	Net equity issuance by all Belgian companies listed in Belgium, from the ECB Statistical Data Warehouse, Security issues statistics.

**Figure E.2:** Belgium: Alternative stock market cap estimates

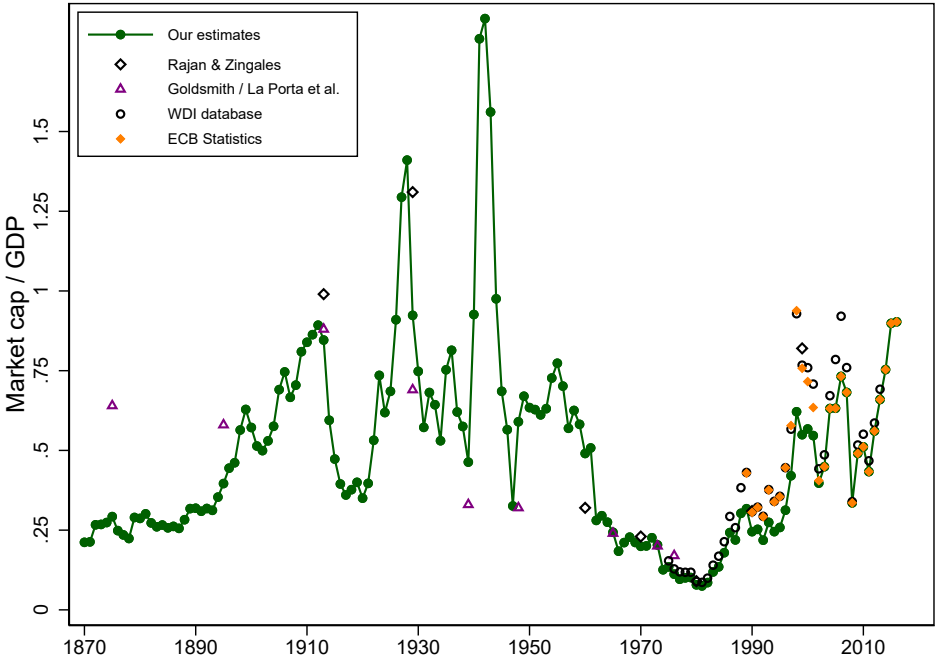


Table E.2 documents the sources of our data for Belgium, and Figure E.2 shows the resulting market capitalization series alongside alternative existing estimates. The historical data cover the Brussels Stock Exchange, which was the dominant stock exchange throughout the data coverage period in our paper, and are sourced from the security-level SCOB database (see [Annaert et al., 2012](#), for the description). These data cover all firms with main economic activities in Belgium, that are listed on the Brussels Stock Exchange. Unlike other existing estimates, the capitalization is aggregated

up from security-level data for each year, and does not rely on estimation or extrapolation. For the modern period, the SCOB estimates are similar to other commonly used sources such as the WDI database and the ECB Statistical Data Warehouse data. We use the ECB statistics for the modern period to ensure consistency with the net issuance and capital gains series in our database.

We are grateful to Frans Buelens for sharing the SCOB market capitalization data with us.

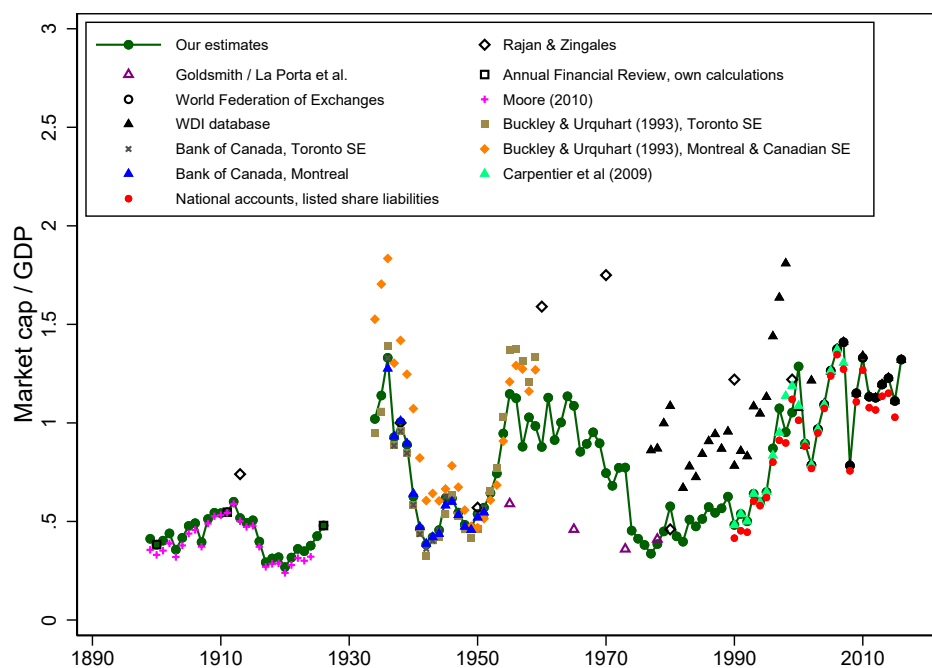
## Canada

**Table E.3:** *Data sources: Canada*

Year	Data source
<i>Stock market capitalization:</i>	
1899–1926	Capitalization of all Canadian firms listed on foreign exchanges. Baseline data from <a href="#">Moore (2010b)</a> , scaled up using own calculations from microdata in the <i>Annual Financial Review</i> in years 1900, 1911 and 1926. The scaling accounts for firms missing from the listings in <a href="#">Moore (2010b)</a> data, and exclusion of foreign firms. Market cap growth for 1924–1926 estimated using the change in the share price index and assumed net issuance of 1.2% of market cap (the average of observed issuance for 1937–2016, using data from the Bank of Canada <i>Statistical Summaries (Financial Supplement, years 1964–1969)</i> and Banking and Financial Statistics database.
1934–1953	Combined capitalization of the Toronto, Montreal and Canadian stock exchanges from <a href="#">Buckley and Urquhart (1993)</a> , scaled down to exclude cross-listings, foreign shares and preference shares, using the data on these scaling factors from our benchmark estimates based on data from the <i>Annual Financial Review</i> . The scaling factor is close to 2 (a halving of the gross series).
1954–1989	1990 capitalization extrapolated back using growth in share prices and net issuance of ordinary shares.
1990–1996	Total capitalization of all Canadian firms listed in Canada, adjusted for cross-listings, from <a href="#">Carpentier, L’Her, and Suret (2009)</a> .
1997–2001	2002 capitalization extrapolated back using using growth in share prices and net issuance of ordinary shares.
2002–2016	Total capitalization of all Canadian listed firms, shares listed on all Canadian exchanges, adjusted for cross-listings, from the World Federation of Exchanges (WFE) <i>Statistical Reports</i> , various years
<i>Net equity issuance:</i>	
1945–1969	Net issuance of ordinary shares from the Bank of Canada <i>Statistical Summaries</i> .
1970–1974	Net equity issuance (listed and unlisted) from the OECD <i>Financial Statistics</i> , sourced from <a href="#">Richter and Diebold (2021)</a> , scaled down using the ratio of listed to total equity issuance for the 1990s.
1975–2016	Net equity issuance of common stocks from the Bank of Canada statistics series V111900717 (for overlapping years, the data are very close to the issuance of listed shares from the OECD <i>Financial Statistics</i> ).

Table E.3 documents the sources of our data for Canada, and Figure E.3 shows the resulting market capitalization series alongside alternative existing estimates. Constructing historical market capitalization estimates is especially challenging in the case of Canada, for several reasons. First, throughout the whole of our sample period, Canada has operated at least two large and active stock exchanges, in Toronto and Montreal. The capitalizations of these two exchanges have tended to quite similar, with Montreal slightly larger in the early historical period, and Toronto in the latter. Many available statistics provide the gross total value of securities listed on each exchange. But most large companies were listed on both of these stock exchanges, which makes adjusting gross estimates for cross-listings especially important. Even in the modern data, including the estimates of [Rajan](#)

Figure E.3: Canada: Alternative stock market cap estimates



and Zingales (2003) and the World Federation of Exchanges, the total Canadian capitalization was not adjusted for cross listings until year 2002, such that the totals often double-counted the shares of large cross-listed firms (Carpentier, L'Her, and Suret, 2009). Second, the Canadian industry and financial markets were internationally integrated with the US and UK due to geographical proximity and colonial-era ties. This makes the exclusion of foreign listings from calculations important. Further, a few Canadian firms were only listed on US exchanges or in London, meaning that they should be excluded from our data. Third, many statistics group together all “stocks” issued by Canadian firms, which include both ordinary and preference shares, whereas we want to capture ordinary shares only.

These measurement issues have created considerable variation across existing estimates of Canadian market cap. Carpentier, L'Her, and Suret (2009) argue that total market capitalization can be overstated by a factor of three even in some modern data sources, on account of not fully netting the cross-listings. In historical data, the sources underlying the estimates of Rajan and Zingales (2003) (RZ) include Toronto only, Montreal only, and an unadjusted sum of the two at different dates. This results in market cap variation that is difficult to square with movements in capital gains or issuance: for example, between 1970 and 1980, the RZ estimate of the market cap to GDP ratio fell by a factor of four while the Goldsmith (1985) (GS) estimate increased between 1973 and 1978. At the same time, stock prices increased and issuance remained stable. Going further back in time, the direct market cap estimates for the 1930–1970 period, published by RZ, Buckley and Urquhart (1993) (BU), and the Bank of Canada *Statistical Summaries* Estimates are several times larger than those of GS. Conceptually, it is the GS estimate that should be larger because it includes unlisted as well as listed equity wealth. These differences largely come about because many of the official estimates do not net out cross-listed securities between Montreal and Toronto, and often include foreign firms and preference shares. For example, adding up the BU estimates of the Toronto and Montreal capitalization in the 1930s results in a market cap to GDP ratio of 400% right in the aftermath of the

Great Depression.

To help deal with these issues, we rely on benchmarking and use of capital gains and net issuance data to ensure consistency. The benchmarks are constructed using the microdata on individual companies in the *Annual Financial Review* publication for years 1901, 1912, and 1927.<sup>16</sup> Because the *Annual Financial Review* only has each company enter once, this effectively adjusts for any cross listings. In addition, these data contain information on company headquarters and operations, as well as which exchanges the firm is listed on, allowing us to control for factors such as foreign ownership. For the purpose of this calculation, we include firms incorporated and governed from Canada, but with operations overseas, such as the various Mexican tramway companies which appear in the 1911 listing, but this has little bearing on our results. Net issuance data come from the various publications of the Bank of Canada and the *OECD Financial Statistics* (a cross-country equivalent of the flow of funds), sourced from [Richter and Diebold \(2021\)](#).

For both the early 20th century, and the recent decades, we are able to calculate the total capitalization of Canadian listed firms, with all the necessary adjustments, with a high degree of accuracy. The baseline data for the early series come from [Moore \(2010b\)](#), who uses stock listings data to compute the total cross-listings-adjusted capitalization of the Toronto and Montreal stock exchanges. Nonetheless, these data include foreign firms, and might not include securities of smaller companies or those listed on unofficial or curb exchanges. To account for this, we benchmark the [Moore \(2010b\)](#) data to our own benchmark-year estimates from the *Annual Financial Review*.

Given that the [Moore \(2010b\)](#) estimates for the 1920s are so far below those of BU and Bank of Canada *Statistical Summaries* in the 1930s, and the fact that stock price appreciation between late 1920s and early 1930s in Canada was very small due to the Great Depression, we construct our own estimates for the early period, which enable us to benchmark the [Moore \(2010b\)](#) data. The benchmark estimates are close to the data from [Moore \(2010b\)](#) (see [Figure E.3](#)): around 15%–20% higher for 1900 and 1926, and similar in size for 1911, due to a high number of foreign companies on the market during that year, which we adjust out but [Moore \(2010b\)](#) does not. Based on this, we scale up the [Moore \(2010b\)](#) data slightly to match the adjusted total, and bridge the 1924–1926 gap by using share price appreciation for those years, and an assumed net issuance that equals the long-run average in Canadian data.

For the recent period, the World Federation of Exchanges provides statistics that measure the adjusted total capitalization of all Canadian firms listed in Canada for 2002–2016. Previous years' estimates from this source include some double-counting, so we do not use them. Instead, we extrapolate the 2002 WFE estimate back using data on capital gains and net issuance (published by the Bank of Canada, but the series are also close to the *OECD Financial Statistics* flow of funds estimates), and combine them with the series that adjusts from cross-listings from [Carpentier et al. \(2009\)](#).<sup>17</sup> The 1990 estimate from [Carpentier et al. \(2009\)](#) is roughly one-third of the unadjusted sum of the capitalization of all shares on all Canadian exchanges, which illustrates the importance of dealing with these double counting issues. Our estimates match up nicely with the national balance sheet estimates for the market value of listed equity liabilities of Canadian firms ([Figure E.3](#), red diamonds), available from the national accounts data in the *CANSIM* database of the Bank of Canada.

We have several sources available to us for the 1934–1989 period: the estimates from the World Bank's WDI Database for the 1975–2016 period, historical statistics data for 1934–1959 from BU, the estimates by the Bank of Canada in their *Statistical Summaries*, which are the underlying source of

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<sup>16</sup>Capitalization data refer to the end of each respective previous calendar year, i.e., end-1900, end-1911 and end-1926.

<sup>17</sup>When extrapolating back using net issuance, we inflate the net issuance data by half the capital gain during the year to proxy the within-year capital appreciation of newly issued stocks.

the BU data, as well as the computations of RZ and GS. We also have data on net equity issuance, which cover the 1937–2016 period, and national balance sheet estimates of the total equity value of listed and unlisted Canadian firms. Some of these sources are, however, likely to contain a lot of measurement error. The WDI Database estimates before 2002 are highly noisy and, according to [Carpentier et al. \(2009\)](#), their underlying source—the WFE database—double- or triple-counts cross-listed securities for this period. The estimates of RZ change their exchange coverage over time and are also often gross of cross-listings, while the underlying definitions of the GS data are uncertain. As seen from [Figure E.3](#), the data for all three of these sources are also rather noisy. Based on this, we decide not to use the WDI, RZ, and GS data, and restrict ourselves to the estimates of BU, Bank of Canada, share prices and net issuance.

For the 1954–1989 period, we extrapolate back the market capitalization value of 1990 using data on capital gains and net issuance. The trend is similar to that obtainable from the WDI data during the 1970s and 1980s, when the growth trend in the WDI data seems reasonably accurate, and definition of the series is consistent from year to year. This gives us confidence that our data track the underlying evolution of adjusted Canadian stock market cap during this time period. For the period before the 1970s, the growth in the series is generally similar to that of the Montreal- and Toronto-only series from the Bank of Canada *Statistical Summaries*. For the period before 1953, we use an adjusted version of the BU data. We use our *Annual National Review* benchmarks to scale down the series to account for cross-listings, and exclude foreign firms and preference shares. This adjusts the BU series down by a factor of roughly two. The value of the scaled-down series in 1954 is very similar to our main series based on net issuance and capital gains extrapolation, which is why we make the switch to the scaled BU series in year 1953.

Taken together, our estimates for Canada should go some way towards resolving the considerable uncertainty resulting from the wide range of existing estimates in [Figure E.3](#). That being said, the severity of the potential measurement issues for Canada mean that, especially for the mid 20th century period, the series are likely to contain some measurement error.

## Denmark

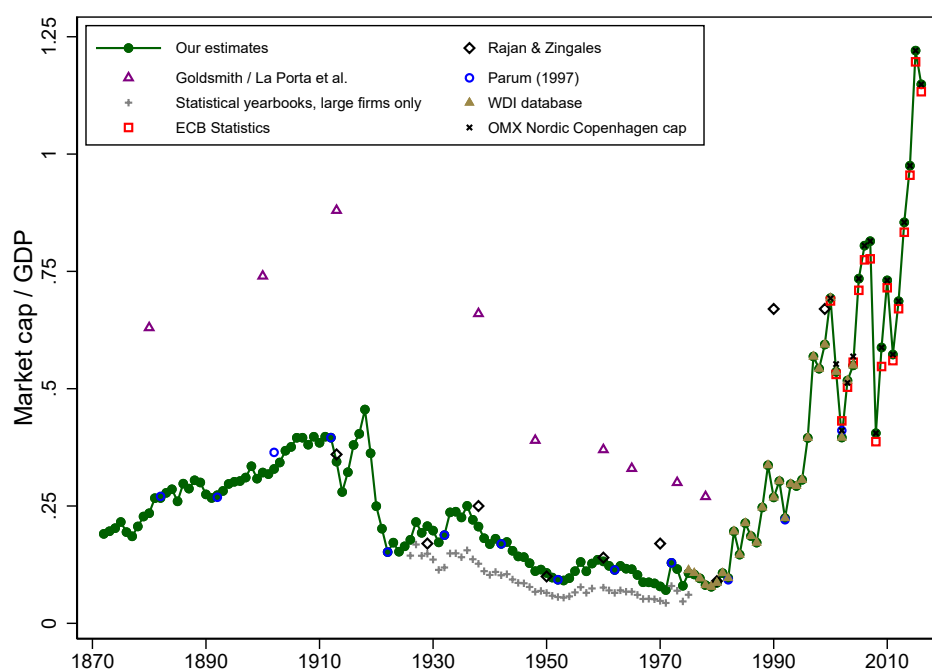
**Table E.4:** *Data sources: Denmark*

Year	Data source
<i>Stock market capitalization:</i>	
1872–1899	Total market cap of all Danish firms listed in Denmark, aggregated up from individual firms' capitalization in the Green's <i>Dankse Fonds og Aktier</i> yearbooks, various years. Ordinary shares only.
1900–1925	Total market cap of all Danish firms listed in Denmark, computed as previous years' market cap * the total book cap of listed firms * market-to-book ratio of listed firms, benchmarked to Parum (1997)'s decennial market cap estimates. Book cap of listed firms estimated as book cap of all firms from Hansen and Svendsen (1968) and <i>Statistical Yearbooks</i> (various years), times share of listed firms estimates from own data in 1899 and Erichsen (1902). Parum's decennial estimates sourced from Abildgren (2006).
1926–1975	Market capitalization of large listed Danish firms, scaled up to match capitalization of all firms at decennial benchmarks. Data for all firms from Parum (1997). Data for large firms are from the listings in the <i>Statistical Yearbooks</i> , various years, and contain 50–60 firms for each year.
1975–2004	Total capitalization of all Danish listed firms, shares listed on Danish exchanges, from World Bank's WDI database. Spliced with the scaled-up capitalization of largest firms over the years 1975–1977 (the two series are very similar).
2005–2016	Total capitalization of ordinary shares on the Copenhagen Stock Exchange, sourced from the OMX Nordic Yearly Nordic Statistics.
<i>Net equity issuance:</i>	
2003–2016	Net equity issuance by listed firms from the OECD <i>Financial Statistics</i> , sourced from Richter and Diebold (2021).

Table E.4 documents the sources of our data for Denmark, and Figure E.4 shows the resulting market capitalization series alongside alternative existing estimates. Long-run estimates of the total capitalization of Danish firms for 1882–2002 are available from Parum (1997) and Abildgren (2006). However, these data are computed at decennial frequency only. To fill the gaps, we construct our own estimates of the total stock market capitalization of ordinary shares of listed Danish firms for each year between 1872 and 1899 using statistics on individual firms' share prices and book capital in Green's *Dankse Fonds og Aktier*. Green's yearbooks contain data on all Danish listed firms at annual frequency.

For 1900–1925, we combine benchmark year estimates from our own microdata and Parum (1997) with statistics on share prices and book capital of listed firms. We estimate listed firms' book capital using data on total capital of all firms, available in Hansen and Svendsen (1968) up to 1914 and yearly editions of the *Statistical Yearbooks* thereafter, and estimates of the proportion of firms listed in Erichsen (1902), as well as those computed by comparing the total book capital estimates with data on share prices and market cap at benchmark years. We compute the annual change in market capitalization as the change in total book capital of all firms, times the change in the share of firms listed, times the capital appreciation in the share price index (for 1900–1914, we also compute

Figure E.4: Denmark: Alternative stock market cap estimates



the actual market-to-book of listed firms, and use that instead, but the estimation gives us similar numbers to using the share index). We then adjust the growth rates of capitalization in each year to match the data at benchmark dates. The main adjustment concerns the 1915–1922 period, during which the book capital of all firms nearly doubled while the book capital of listed firms remained flat, presumably following sharp delistings during the banking crisis of the early 1920s. The trend in the book capital of all firms gives us the boom-bust dynamics of high capital issuance during the book of the late 1910s, and delisting during the early 1920s, which we then rescale to match the implied larger delistings by listed firms. For 1923–1925, very little adjustment to growth rates is necessary.

From 1926 onwards, each yearly edition of the *Statistical Yearbook* publishes a summary stock listings, which includes data on capital and market-to-book of all major listed firms in Denmark. We use these data to estimate total market capitalization by scaling it up to match the total cap in Parum (1997) at decennial benchmark periods, and scaling the growth rates in-between if necessary. It turns out that the large firms in the *Statistical yearbook* listings, which number around 50–60 in total, consistently represent around half of the total Danish market cap, and track the aggregate data very well, so very little adjustment to growth rates is necessary to match the capitalization estimates for all firms at the benchmark years.

For the recent period, market capitalization estimates for all of Denmark, or the Copenhagen Stock Exchange are available from the World Bank’s World Development Indicators, ECB Statistical Data Warehouse and the OMX Nordic Yearly Nordic Statistics. We use a combination of the WDI and OMX Nordic data for our estimates, but the data are similar to the estimates of the ECB. Even though the OMX Nordic data in principle only cover Copenhagen, and cover foreign as well as domestic firms, in practice these numbers follow total Danish capitalization estimates almost one-for-one, and we use these data rather than the ECB statistics to avoid potential measurement error when converting the ECB data from euros to kronas.

Our estimates are substantially below those of Goldsmith (1985), with the most likely reason



for the upward bias in the [Goldsmith \(1985\)](#) estimates being the inclusion of unlisted equities and debt securities. Our estimates are close to those of [Rajan and Zingales \(2003\)](#) for the respective benchmark years.

We would like to thank Kim Abildgren for helping us locate and interpret the historical data sources for Denmark.

## Finland

**Table E.5:** *Data sources: Finland*

Year	Data source
<i>Stock market capitalization:</i>	
1912–1991	Total capitalization of all Finnish companies on the Helsinki Stock Exchange, from <a href="#">Nyberg and Vaihekoski (2014a)</a> , kindly shared by Mika Vaihekoski.
1992–2017	Total capitalization of all Finnish firms, shares listed in Finland. Source: ECB Statistical Data Warehouse, Security issues statistics.
<i>Net equity issuance:</i>	
1913–1989	Change in the book value of listed equity, from <a href="#">Nyberg and Vaihekoski (2014a)</a> , kindly shared by Mika Vaihekoski.
1990–2016	Net equity issuance by all Finnish companies listed in Finland, from the ECB Statistical Data Warehouse, Security issues statistics.

**Figure E.5:** *Finland: Alternative stock market cap estimates*

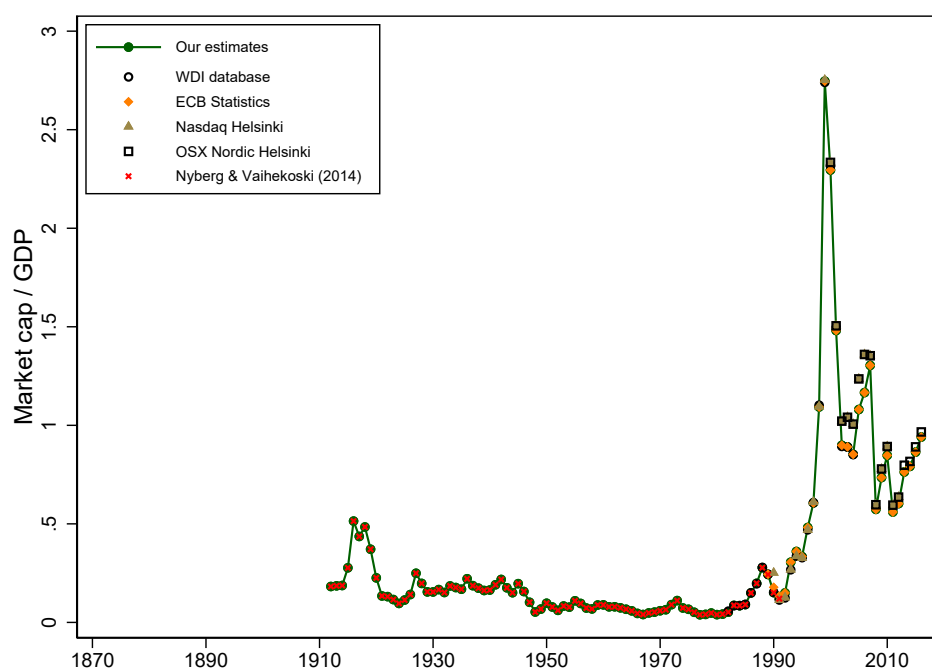


Table E.5 documents the sources of our data for Finland, and Figure E.5 shows the resulting market capitalization series alongside alternative existing estimates. The long-run data come from [Nyberg and Vaihekoski \(2014a\)](#), who compiled a database of returns and capitalization on all stocks listed on the Helsinki exchange between its foundation in 1912 and 1991, when modern capitalization indices are available (see [Nyberg and Vaihekoski, 2011, 2014b](#), for further details on the data). The

Nyberg and Vaihekoski (2014a) series are aggregated up from individual share-level data, obtained from a range of historical sources, and fit the modern day series well for the overlapping period, as shown in Figure E.5. The modern data from the ECB series are very close to Helsinki Stock Exchange capitalization estimates from Nasdaq and OMX Nordic (Figure E.5).

For net equity issuance, Nyberg and Vaihekoski (2014a) provide estimates of the total book value of listed stocks in each year. The change in this book value is our proxy for issuance, as it reflects the changes in stock market capitalization that are not driven by price appreciation. For more recent years, we use the net equity issuance statistics of the ECB.

We are grateful to Mika Vaihekoski for sharing data and providing help and support in locating the sources for Finland.

## France

**Table E.6:** *Data sources: France*

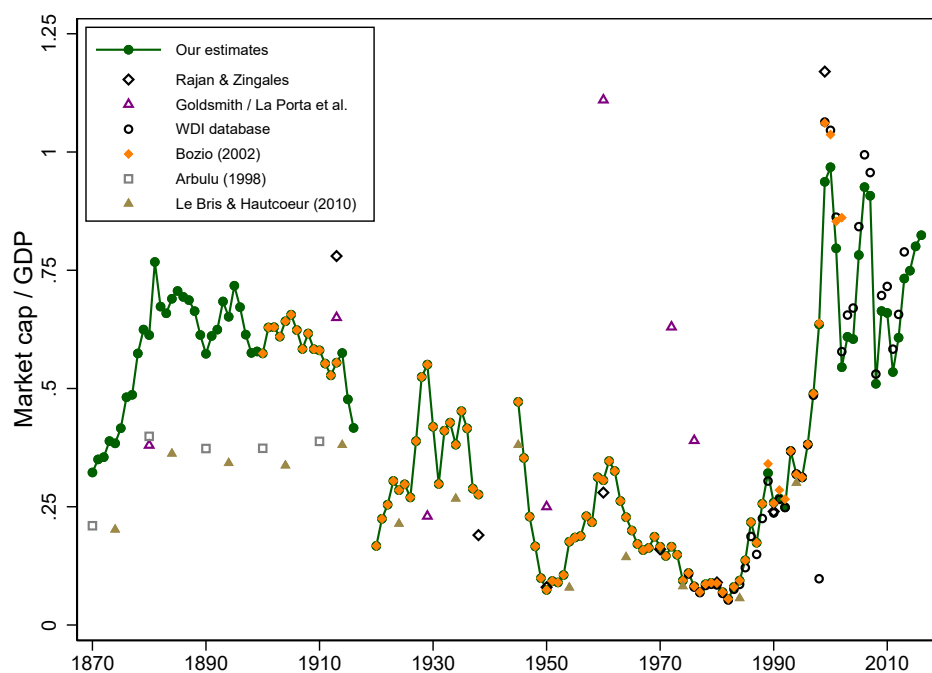
Year	Data source
<i>Stock market capitalization:</i>	
1870–1899	Stock market capitalization of the Paris Stock Exchange from <a href="#">Arbulu (1998)</a> and <a href="#">Le Bris and Hautcoeur (2010)</a> , at roughly five-year benchmarks, scaled up to proxy France total using data from <a href="#">Bozio (2002)</a> (using the 1904 ratio between the <a href="#">Le Bris and Hautcoeur (2010)</a> Paris series and <a href="#">Bozio (2002)</a> France series as the benchmark), and year-to-year movements between the benchmark years estimated using changes in the capitalization of all French securities from <a href="#">Saint-Marc (1983)</a> .
1900–1988	Market capitalization of all shares of French companies listed on French stock exchanges, from <a href="#">Bozio (2002)</a> .
1989–2017	Total capitalization of all French firms, shares listed in France, from the ECB Statistical Data Warehouse, Security issues statistics.
<i>Net equity issuance:</i>	
1964–1989	Change in the book value of listed equity, from <a href="#">Bozio (2002)</a> , originally sourced from various editions of the <i>Année Boursière</i> .
1990–2016	Net equity issuance by all French companies listed in France, from the ECB Statistical Data Warehouse, Security issues statistics.

Table E.6 documents the sources of our data for France, and Figure E.6 shows the resulting market capitalization series alongside alternative existing estimates. Most of the data are drawn from the comprehensive study of [Bozio \(2002\)](#), who estimated the total capitalization of French shares listed on all French exchanges between 1900 and 2002. Between 1900 and 1963, [Bozio \(2002\)](#) relied on yearly capitalization of the *Cote Officielle* for the Parisian bourse, scaled up to match the total for France using data for all French stock exchanges at benchmark periods. After 1964, the [Bozio \(2002\)](#) data are a direct estimate of the total capitalization of all French stock exchanges. For the recent period, these data match up well with the series from the World Bank’s WDI Database, and ECB Statistical Data Warehouse. We rely on the ECB data for the recent period. The [Bozio \(2002\)](#) and ECB data also offer direct estimates of net equity issuance, estimated as changes in the book value of listed equity capital for the former and actual net issues for the latter.

For the 19th century, we use benchmark year estimates for the total capitalization of the Parisian bourse, from the studies of [Arbulu \(1998\)](#) and [Le Bris and Hautcoeur \(2010\)](#). We scale up these data to proxy the capitalization of all French exchanges, using the ratio of Parisian to total French market cap in year 1904. This extrapolation, therefore, implicitly assumes that the market share of regional exchanges did not change too much during the late 19th century. It is possible that the regional exchanges were somewhat more important during this early period, in which case our data would somewhat understate the total French market cap.<sup>18</sup> In-between the benchmark years, we use the changes in the [Saint-Marc \(1983\)](#) estimates of the total capitalization of French securities, computed

<sup>18</sup>The [Bozio \(2002\)](#) estimates suggest that the relative importance of the Parisian stock exchange increased slightly between 1900 and 1913, remained roughly unchanged between 1913 and 1938, and spiked again after World War II.

**Figure E.6:** France: Alternative stock market cap estimates



by scaling up capital income data, to proxy the year-to-year movements in market cap during the late 19th century.

Figure E.6 also highlights the uncertainty around earlier market capitalization estimates, especially those of [Goldsmith \(1985\)](#), and also to some extent the [Rajan and Zingales \(2003\)](#) data: on average, they tend to overstate the French stock market capitalization, perhaps by including securities which are not common stocks, which can often be the case with national balance sheet estimates such as those of [Goldsmith \(1985\)](#), or foreign securities. In the early 1960s, the [Goldsmith \(1985\)](#) market capitalization estimate is almost five times the size of the [Rajan and Zingales \(2003\)](#) estimate, with our estimate, derived from [Bozio \(2002\)](#) data in-between these two, but closer to those of [Rajan and Zingales \(2003\)](#).

We are grateful to Antoine Bozio for providing help in understanding the various sources for the French market capitalization data.

## Germany

**Table E.7:** *Data sources: Germany*

Year	Data source
<i>Stock market capitalization:</i>	
1870–1871	1872 total German market cap extrapolated back using the growth in the capitalization of 30 largest German listed companies from <a href="#">Ronge (2002)</a> .
1872–1913	Market capitalization of all German firms listed on all major German exchanges (Berlin, Frankfurt, Hamburg, Cologne, Leipzig, and Munich), adjusted for cross-listings, computed by authors from microdata helpfully shared by Christian Hirsch at the Frankfurt Center for Financial Studies. The underlying data are sourced from the regional financial newspapers and stock listings, namely: the <i>Berliner Börsen-Zeitung</i> , <i>Berliner Börsencourier</i> , and <i>Neumann's Cours-Tabellen</i> ; Frankfurt, Munich and Leipzig <i>Börsen-Kursblatt</i> ; <i>Frankfurter Zeitung</i> , <i>Hamburgischer Correspondent</i> , <i>Kölnische Zeitung</i> , and <i>Kölner Tageblatt</i> .
1914–1918	Capitalization of 30 largest German listed companies from <a href="#">Ronge (2002)</a> scaled up to match all German listed companies (1913 used as benchmark year for scaling).
1919–1924	Total market capitalization of shares listed on the Berlin Stock Exchange from <a href="#">Moore (2010b)</a> , scaled up to match all of Germany and down to exclude foreign firms, using data for overlapping years between the <a href="#">Moore (2010b)</a> and our all-Germany series in the early 20th century.
1925	Capitalization of 30 largest German listed companies from <a href="#">Ronge (2002)</a> scaled up to match all German listed companies (1913 used as benchmark year for scaling).
1926–1943	Total capitalization of shares listed on the Berlin Stock Exchange from <a href="#">Deutsche Bundesbank (1976)</a> , scaled up to match all of Germany and down to exclude foreign firms, using data for overlapping years between the <a href="#">Moore (2010b)</a> Berlin series and our all-Germany series in the early 20th century.
1944–1950	Capitalization of 30 largest German listed companies from <a href="#">Ronge (2002)</a> scaled up to match all German listed companies (1943 and 1950 used as benchmark years).
1951–1974	Total market cap of all German listed firms, shares listed on German exchanges, from <a href="#">Deutsche Bundesbank (1976)</a> . Spliced with the scaled-up Berlin series over 1944–1950.
1975–1998	Total market cap of all German listed firms, shares listed on German exchanges, from World Bank's WDI Database.
1999–2017	Total market cap of all German listed firms, shares listed on German exchanges, from the Bundesbank database (series BBK01.WU0178).

[Continued overleaf]

**Table E.7: Data sources: Germany**

Year	Data source
<i>Net equity issuance:</i>	
1873–1914	Net equity issuance by all German firms listed on German exchanges, computed from microdata helpfully shared by Christian Hirsch at the Frankfurt Center for Financial Studies.
1926–1989	Change in the book value of listed equity, multiplied by the market-to-book of equity issuance. Listed equity book values are from <a href="#">Deutsche Bundesbank (1976)</a> for the period before 1972, and from the 1991 <i>Wirtschaft und Statistik</i> yearbook of the <i>Statistisches Bundesamt</i> after 1972. Market-to-book data are from the March 2013 <i>Handbook of the Deutsches Aktieninstitut</i> . Before 1970 the market-to-book data cover gross issuance by all firms, and after 1970 they cover gross issuance by listed firms. Market-to-book before 1948 is set to equal the 1948–1957 average.
1990–2016	Net equity issuance by all German companies listed in Germany, from the ECB Statistical Data Warehouse, Security issues statistics.

**Figure E.7: Germany: Alternative stock market cap estimates**

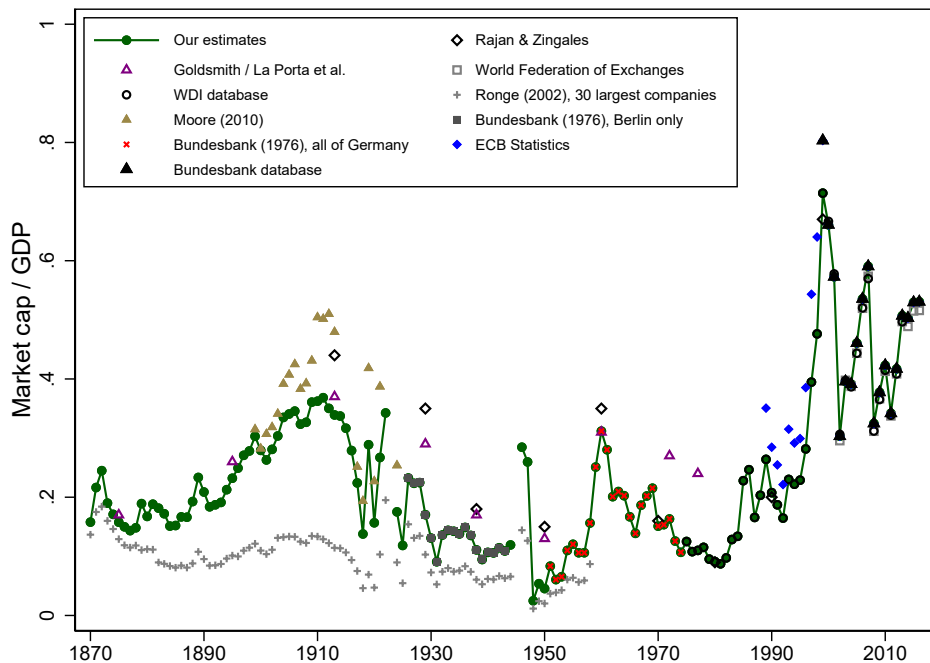


Table E.7 documents the sources of our data for Germany, and Figure E.7 shows the resulting market capitalization series alongside alternative existing estimates. For 1873–1914, we construct our own best-practice estimate of the German stock market capitalization, using data on individual securities listed on all major German exchanges (Berlin, Frankfurt, Hamburg, Cologne, Leipzig, and Munich), adjusted for cross-listings, and computed from microdata helpfully shared by Christian Hirsch at the Frankfurt Center for Financial Studies. Outside of these data, we rely on a number of

proxies to construct the capitalization of all German companies listed in Germany from a variety of other sources. These proxies consist of the [Ronge \(2002\)](#) estimates of the capitalization of the largest 30 listed German companies, helpfully shared with us by Ulrich Ronge, and covering 1870–1958; and the total capitalization of the Berlin Stock Exchange computed by [Moore \(2010b\)](#) for 1899–1924, and by [Deutsche Bundesbank \(1976\)](#) for 1926–1943. We scale down the Berlin capitalization data to mimic the exclusion of foreign companies, and scale it up to mimic the inclusion of regional exchanges, by comparing the Berlin capitalization estimates to those for the whole of Germany for various benchmark years. Finally, we use the [Ronge \(2002\)](#) series to fill in the remaining gaps.

The different early-period series match up with each other rather well: for example, in the 1870s most of the total market cap can be accounted for by the 30 largest companies (the [Ronge, 2002](#), estimates), and the top-30 share gradually decreases as new listed firms enter the market in the late 19th and early 20th centuries, before the market becoming more concentrated again during the interwar period and the 1930s. In the early 20th century, the total Berlin capitalization is actually somewhat larger than that of the German companies listed on all German exchanges, due to a large presence of foreign stocks, and the two measures (Berlin total vs all-Germany German companies) become very similar in the 1920s and 1930s as the share of foreign stocks drops after World War I.

The post-1950 data cover all German company ordinary shares listed on German exchanges, and are sourced from the various Bundesbank publications, namely [Deutsche Bundesbank \(1976\)](#) and the online statistical database of the Bundesbank. These match up rather well with alternative estimates from the ECB database, the World Bank’s WDI database, and data from the World Federation of Exchanges. Concerning the earlier estimates, both [Goldsmith \(1985\)](#) and [Rajan and Zingales \(2003\)](#) have tended to somewhat overestimate the size of the German stock market relative to GDP.

Our series of net equity issuance generally follows the market capitalization sources, with the pre-1914 series constructed from the microdata at the Frankfurt Center for Financial Studies and post-1990 data provided by the ECB. In-between these dates, we rely on changes in the book capital of listed firms provided by the

We are grateful to Christian Hirsch for sharing data, to Ulrich Ronge for sharing data and offering advice on the historical German series, and to Carsten Burhop for helping us locate the historical data sources.



## Italy

**Table E.8:** Data sources: Italy

Year	Data source
<i>Stock market capitalization:</i>	
1900, 1913	Total stock market capitalization of Italian firms, estimates from <a href="#">Musacchio (2010)</a> .
1928–1949	Total stock market capitalization of Italian firms, shares listed in Italy, aggregated from individual stock capitalizations published in <a href="#">Mediobanca (various years)</a> .
1950–1988	Total stock market capitalization of Italian firms, shares listed in Italy, using aggregate estimates published in <a href="#">Mediobanca (various years)</a> . No data for 1951.
1989–2016	Total capitalization of Italian firms, shares listed in Italy, from the ECB Statistical Data Warehouse, Security issues statistics.
<i>Net equity issuance:</i>	
1980–1988	Net equity issuance (listed and unlisted) from the OECD <i>Financial Statistics</i> , sourced from <a href="#">Richter and Diebold (2021)</a> , scaled down using the ratio of listed to total equity issuance for the 1990s.
1990–2016	Net equity issuance by all Italian companies listed in Italy, from the ECB Statistical Data Warehouse, Security issues statistics.

**Figure E.8:** Italy: Alternative stock market cap estimates

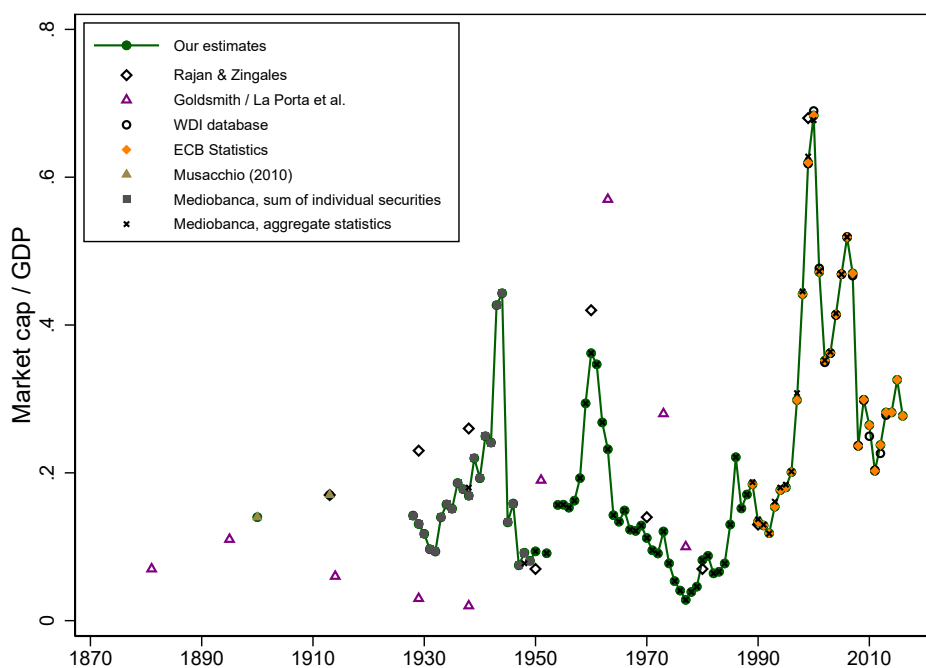


Table E.8 documents the sources of our data for Italy, and Figure E.8 shows the resulting market capitalization series alongside alternative existing estimates. Most of the data are sourced from the *Indici e Dati* publication, *Mediobanca (various years)*, which presents various aggregate and security-level statistics on Italian stocks and bonds, as well as further accounting data for the major Italian companies. For years 1928–1949, this publication publishes the market capitalization of individual Italian listed companies, and we compute our market cap measure as an aggregate of these security-level data. From 1950 onwards, *Indici e Dati* publishes aggregate market capitalization statistics relating to shares of all Italian firms listed on Italian exchanges, which becomes the main source of our data. Even though the individual security listings from the earlier years could miss out on some smaller firms, comparison of the two *Mediobanca* series (dark squares and x crosses in Figure E.8) suggests that these differences are, in practice, negligible. The later-years *Mediobanca* aggregate series match up well with alternative estimates from the World Bank’s WDI Database and the ECB Statistical Data Warehouse. We use the ECB series for our estimates from 1989 onwards.

For the early years, we use *Musacchio (2010)* estimates of the Italian market capitalization in 1900 and 1913, with the 1913 estimate being the same as those of *Rajan and Zingales (2003)*. We do not use the earlier *Goldsmith (1985)* estimates, because in 1910, 1930, and 1940 these seem to vastly underestimate the size of the Italian stock market. The *Rajan and Zingales (2003)* estimates are, on average, somewhat higher than those in our paper.

We are grateful to Stefano Battilossi for providing helpful advice in locating the historical data sources for Italy.

## Japan

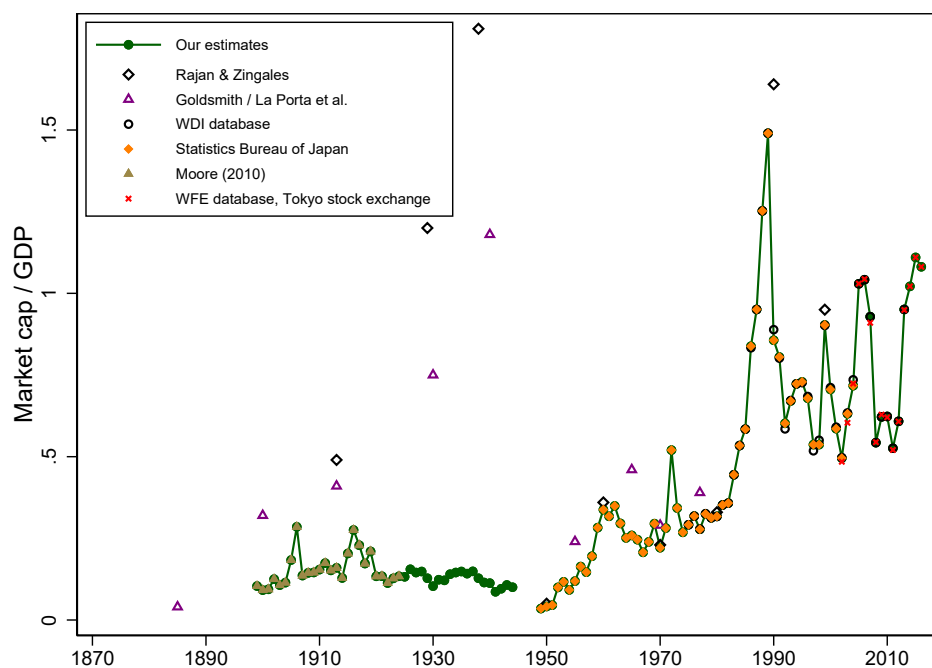
**Table E.9:** *Data sources: Japan*

Year	Data source
<i>Stock market capitalization:</i>	
1899–1924	Total capitalization of the Tokyo Stock Exchange from <a href="#">Moore (2010b)</a> .
1925–1945	The 1924 market capitalization extrapolated forward using changes in the book capital of business corporations from <a href="#">Bank of Japan (1966)</a> , and stock price growth from <a href="#">Jordà et al. (2019)</a> .
1948–2004	Total capitalization of the Tokyo Stock Exchange first and second sections, from the <i>Statistics Bureau of Japan</i> historical statistics, Tables 14-25a and 14-25b.
2005–2013	Total capitalization of Japanese firms' shares listed on Japanese exchanges, from World Bank's WDI Database.
2014–2016	Total capitalization of Japanese firms listed on the Tokyo Stock Exchange, from the World Federation of Exchanges <i>Statistical Reports</i> .
<i>Net equity issuance:</i>	
1945–1969	Net issuance of ordinary shares from the Bank of Canada <i>Statistical Summaries</i> .
1980–2016	Net equity issuance of listed firms from the OECD <i>Financial Statistics</i> , sourced from <a href="#">Richter and Diebold (2021)</a> . Data after 1995 are actual listed firm issuance, data before 1995 are issuance by all firms scaled down using the ratio of listed to total equity issuance for 1995–2005.

Table E.9 documents the sources of our data for Japan, and Figure E.9 shows the resulting market capitalization series alongside alternative existing estimates. For the early historical period, our main source are the [Moore \(2010b\)](#) estimates of the total capitalization of the Tokyo Stock Exchange. While these may somewhat understate the total capitalization of Japanese firms because they exclude regional exchanges, they may also overstate it via including foreign shares, with these two biases, to some extent, balancing against each other. The [Moore \(2010b\)](#) data cover 1899–1924. For the subsequent historical periods, we rely on book capital data that cover both listed and unlisted businesses, from [Bank of Japan \(1966\)](#), and stock price data from [Jordà et al. \(2019\)](#). For each year in the 1925–1945 period, we estimate the change in market cap as the stock price change multiplied by the change in the book capital of listed firms. This implicitly assumes that the share of the book capital of listed firms relative to that of all firms remains relatively stable. Comparing the data on book capital with our market capitalization series, there is a rapid growth in book capital during the late 19th and early 20th century but the market capitalization and book capital growth seem to stabilise around 1910 and remain consistent throughout the period for which we have both independently sourced market cap and book capital series. Our final year estimate for 1945 is higher than the market capitalization in 1948, which makes sense given the large potential for delistings during the stock market closure of 1946–1947.

Alternative estimates for the early period do exist, but they appear somewhat more noisy and less reliable than even our extrapolated data. The estimates of [Goldsmith \(1985\)](#) and [Rajan and Zingales \(2003\)](#) are not too far away from ours in the early 1900s, but report much higher capitalization during the 1930s and around World War II. These very high capitalization ratios are,

Figure E.9: Japan: Alternative stock market cap estimates



however, difficult to reconcile with other available data. The implied stock market expansion in the 1930s goes far beyond both the book capital growth and the increase in the share price index, implying new listings that far exceed the data reported for other periods and countries in our sample. The post World War II data, where our estimates, based on the Statistics Bureau of Japan historical statistics, are more consistent with those of Goldsmith (1985) and Rajan and Zingales (2003), again suggest a drop in market size that far exceeds that in the stock price index. Even though the Tokyo Stock Exchange was closed during 1946–1947, the market capitalization ratios reported by Goldsmith (1985) and Rajan and Zingales (2003) in the 1940s are in the region of 1.2–1.8 of GDP, whereas those reported in the late 1940s and 1950s by both Statistics Bureau of Japan and Rajan and Zingales (2003) are closer to 0.035–0.05 of GDP. In light of these differences, we do not benchmark our series to the Goldsmith (1985) and Rajan and Zingales (2003) estimates, but without a doubt, there remains considerable uncertainty around all available estimates for the early period and in particular the 1930s and 1940s.

For the recent period, we use the Statistics Bureau of Japan estimates of the Tokyo Stock Exchange capitalization (both the 1st and 2nd sections) during the 1949–2004 period, which match up rather well with the total capitalization of all Japanese listed firms reported in the World Bank’s WDI Database. For the latest period, we use the World Federation of Exchanges capitalization of Japanese firms listed on the Tokyo exchange, which is similar to the WDI Database estimates. Even though WFE also provide estimates for the Osaka exchange capitalization, a comparison with WDI data suggests a high degree of cross-listings among the two exchanges, therefore we use the Tokyo only series for the most recent years. We complement these with net issuance data sourced from the OECD flow of funds in the OECD *Financial Statistics* (Richter and Diebold, 2021), kindly shared with us by Björn Richter.

Netherlands

Table E.10: Data sources: Netherlands

Year	Data source
<i>Stock market capitalization:</i>	
1899–1924	Total capitalization of the Amsterdam Stock Exchange from Moore (2010b), scaled down to proxy domestic firms only (using the proportion of domestic to foreign shares listed on the exchange in Moore, 2010b).
1938	Netherlands stock market cap estimate from Rajan and Zingales (2003).
1951–1974	Total capitalization of Dutch firms listed on the Amsterdam Stock Exchange from the Central Bureau of Statistics (2010).
1975–1988	Total capitalization of Dutch firms’ shares listed on Dutch exchanges, from World Bank’s WDI Database.
1989–2017	Total capitalization of Dutch firms, shares listed in the Netherlands, from the ECB Statistical Data Warehouse, Security issues statistics. Spliced with WDI data for year 1989.
<i>Net equity issuance:</i>	
1990–2016	Net equity issuance by all Dutch companies listed in the Netherlands, from the ECB Statistical Data Warehouse, Security issues statistics.

Figure E.10: Netherlands: Alternative stock market cap estimates

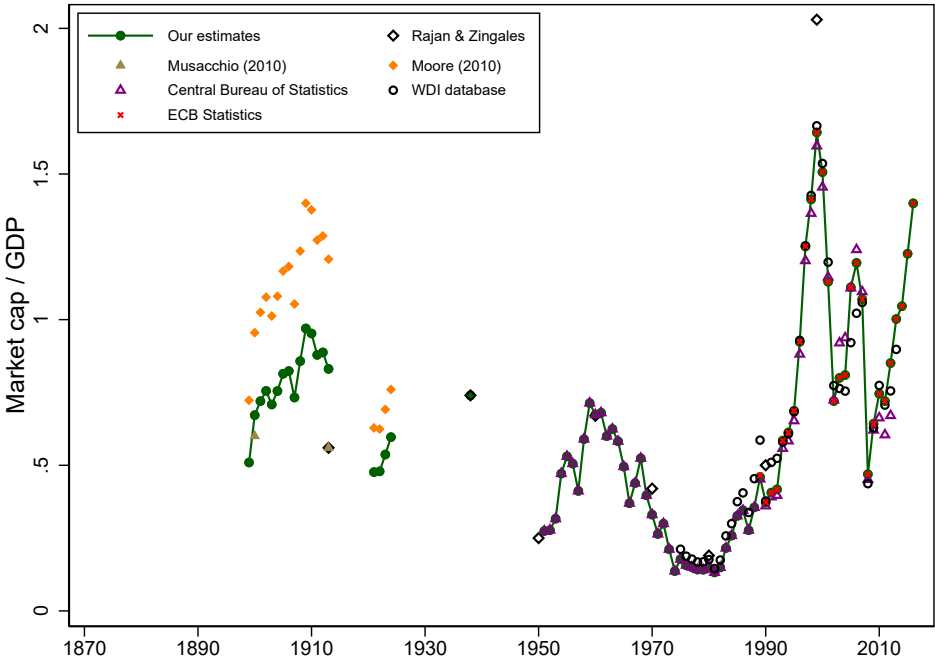


Table E.10 documents the sources of our data for the Netherlands, and Figure E.10 shows the resulting market capitalization series alongside alternative existing estimates. In the early period, our main source are the Moore (2010b) estimates of the total capitalization of the Amsterdam Stock Exchange. One issue, however, is that the Amsterdam exchange played an important role in the international financial system during this time period, and was used to trade many foreign as well as domestic stocks, as is clear from examining the stock exchange listings and the summary statistics on foreign and domestic listings in Moore (2010b). The total Amsterdam capitalization estimates in Moore (2010b) are, therefore, likely to substantially overstate the capitalization of Dutch firms. This also helps explain why the Moore (2010b) market cap estimates are higher than those of Rajan and Zingales (2003) and Musacchio (2010) for the early period, whereas our estimates for the later periods are broadly in line with those of Rajan and Zingales (2003). To adjust for this bias, we scale down the total capitalization of the Amsterdam exchange using the statistics on domestic and foreign shares listed in years 1899, 1909, and 1924 in Moore (2010b), calculating capitalization for this early period as total Amsterdam cap \* number of Dutch shares listed / total number of shares listed. Depending on the relative size of the average capitalization of domestic and foreign shares, and the accuracy of estimates in-between the benchmark periods, these estimates could either somewhat over- or understate the total capitalization of Dutch firms.

For the post-1950 data, we rely on estimates of capitalization of Dutch firms listed on Dutch exchanges from three sources: the 111 year statistics by the Central Bureau of Statistics (2010), and the data from World Bank's WDI database and ECB's Statistical Data Warehouse. These estimates tend to be similar to each other, and to those of Rajan and Zingales (2003). In light of this data consistency among the different sources, we also make use of the Rajan and Zingales (2003) estimate of the 1938 Dutch stock market cap.

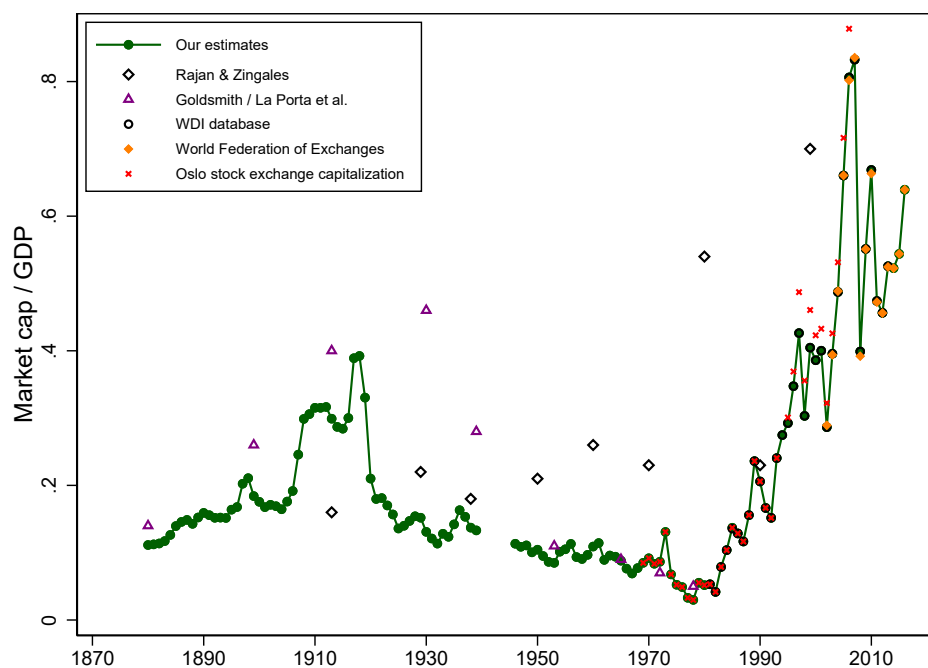
## Norway

**Table E.11:** *Data sources: Norway*

Year	Data source
<i>Stock market capitalization:</i>	
1880–1899	Total market capitalization of all Norwegian listed firms' ordinary shares, own estimates using individual stock data in the <i>Kierulf Handbook</i> and Oslo Stock Exchange listings.
1900–1918	Market-to-book of listed firms times an estimate of listed book capital. Changes in listed book capital proxied using changes in total book capital for years 1900–1911 and 1911–1917. The data for 1912 and 1918 are direct measures of the total market capitalization of Norwegian firms, computed in the same way as for the 1880–1899 period. Microdata sourced from <i>Kierulf Handbook</i> and Oslo <i>Kurslisten</i> ; aggregate book capital data sourced from the statistical yearbooks, various years.
1919–1968	Estimate of the total capitalization of Norwegian firms, computed as share capital of all Norwegian firms * proxy for share of listed firms * market-to-book of listed firms. The share of listed firms calculated as listed book capital relative to book capital of all firms in 1918, and as market capitalization of Oslo Stock Exchange relative to market value of all firm equity in 1969, and interpolated in-between (the 1918 and 1969 listed firm shares are very similar). Sources: <i>Kierulf Handbook</i> , Oslo <i>Kurslisten</i> , statistical yearbooks, various years.
1969–1993	Total capitalization of the Oslo Stock Exchange, data kindly shared by Daniel Waldenström.
1994–2013	Total capitalization of Norwegian firms' shares listed in Norway, from World Bank's WDI Database.
2014–2016	Total capitalization of Norwegian firms' shares listed in Norway, from World Federation of Exchanges (WFE) reports, various years.
<i>Net equity issuance:</i>	
1981–2016	Net equity issuance by listed firms from the OECD <i>Financial Statistics</i> , sourced from <a href="#">Richter and Diebold (2021)</a> . Data before 1996 are issuance by all firms (listed and unlisted) scaled down using the ratio of listed to total equity issuance for 1996–2006.

Table E.11 documents the sources of our data for Norway, and Figure E.11 shows the resulting market capitalization series alongside alternative existing estimates. For the early historical period, we construct our own estimates of stock market capitalization using data on individual stock prices and quantities, sourced from various issues of the *Kierulf Handbook*, and the Oslo Stock Exchange listings. For the late 19th century, we compute market capitalization in this manner for each individual year, and for the early 20th century we compute capitalization at benchmark years and use changes in book capital of all companies and the market-to-book value of listed companies to calculate the year-on-year movements in market capitalization. Since the share of listed company capital relative to book capital of all companies varies little across the different benchmark years, this calculation ought to be fairly accurate. The data show a substantial stock market boom in the late 1910s, and the subsequent stock market crash of the early 1920s during which market capitalization

Figure E.11: Norway: Alternative stock market cap estimates



more than halved.

For the modern period (1969 onwards), we start off by using the total capitalization of the Oslo Stock Exchange. Given the negligible presence of non-Norwegian companies on the exchange during this time period (which can be seen, for example, by comparing the WDI estimates for Norwegian firms with the Oslo exchange cap for overlapping years in Figure E.11), this acts as a good proxy for the total capitalization of Norwegian listed firms. For the 1990s and 2000s, we switch to using the WDI and WFE data, which focus on Norwegian firms only.

To link the 1969 and 1918 measures of stock market cap, we estimate market cap movements using changes in the book capital of all firms, the market-to-book value of listed firms, and a proxy for the proportion of the firms that are listed. The time between the 1920s bust and the 1980s marks a relatively stable period for the Norwegian stock market with, for example, the listed firm share growing by only 4 percentage points, from 30% in 1918 to 34% in 1969, which suggests that our estimates should have a relatively high degree of accuracy.

Taken together, our market capitalization estimates are substantially below those of [Rajan and Zingales \(2003\)](#), and show a pronounced boom-bust cycle that happened around the early 1920s banking crisis, that is not apparent in the [Rajan and Zingales \(2003\)](#) data. The estimates of [Goldsmith \(1985\)](#) are above ours for the early to mid 20th century period, but similar to ours after 1950.

The net equity issuance data come from the financial accounts digitized from historical publications of the OECD *Financial Statistics*, kindly shared with us by Björn Richter. We would like to thank Jan Tore Klovland for helping us locate and interpret the historical sources for the Norwegian stock price data, and the staff at the Oslo Nasjonalbiblioteket in Oslo for their help in locating the sources.



## Portugal

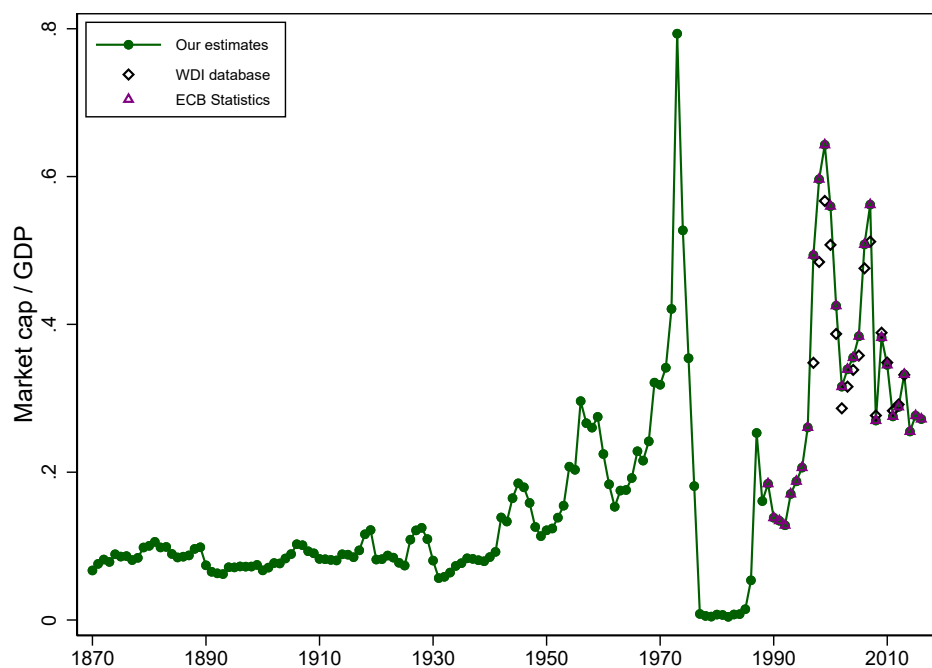
**Table E.12:** *Data sources: Portugal*

Year	Data source
<i>Stock market capitalization:</i>	
1870–1987	Total market capitalization of all Portuguese firms listed in Lisbon, own estimates using individual stock data and company published accounts. Sourced from <i>Diario do Governo</i> , <i>Boletim da Bolsa</i> , and individual company accounts, various years. For 1900–1925, we use changes in book capital for a subset of listed firms to estimate the changes in book capital of all listed firms. Market capitalization during the Carnation Revolution related stock market closure in 1975–1976 is interpolated linearly using the data for 1974 and 1977.
1988	Splice own estimates constructed from microdata in the <i>Boletim da Bolsa</i> and the ECB series, using the average of 1987 cap * price growth, and 1989 cap / price growth.
1989–2017	Total capitalization of Portuguese firms, shares listed in Portugal, from the ECB Statistical Data Warehouse, Security issues statistics.
<i>Net equity issuance:</i>	
1871–1987	Net equity issuance (new listings plus secondary issues minus delistings and redemptions) computed from share-level microdata using the same sources as the stock market cap.
1990–2016	Net equity issuance by all Portuguese companies listed in Portugal, from the ECB Statistical Data Warehouse, Security issues statistics.
<i>New listings:</i>	
1871–1987	End-year market capitalization of newly listed firms, computed from share-level microdata, using the same sources as for stock market cap.
1988–2016	Net equity issuance scaled down by the ratio of net issuance to new listings for the pre-1988 period (around 0.8; also note that there are no negative net issuance observations during this period). Figures for 1988–1989 are set to equal the 1990s averages.

Table E.12 documents the sources of our data for Portugal, and Figure E.12 shows the resulting market capitalization series alongside alternative existing estimates. Very few estimates of the Portuguese market capitalization exist, particularly for the period before 1990. Therefore we construct our own data using the prices and quantities of each stock listed on the Lisbon Stock Exchange during this period, and aggregating the individual shares' market capitalization. Throughout, we exclude preference shares, foreign and colonial companies to arrive at a measure of domestic market capitalization. Even though a smaller stock exchange operated in Porto, data from the stock listings suggest that its size was very small relative to the Lisbon exchange; therefore our estimates provide a good measure of the total market capitalization of Portuguese listed firms.

Most of the early period data are sourced from the official stock exchange listing *Boletim da Bolsa*, available for years 1874 to 1987. This listing contains information on both stock prices and quantities. These data are complemented by stock listings and company balance sheets published in

Figure E.12: Portugal: Alternative stock market cap estimates



the government newspaper *Diario do Governo*, and balance sheet data in the published accounts of limited companies. These additional sources are particularly important for the 1900–1925 period, during which the official *Boletim* stopped publishing share quantity data. For these years, we use a subset of listed companies, for which we have published accounts data, to estimate the changes in share quantities for the entire market. Another approximation is undertaken during 1975–1976, when the stock exchange was closed in the aftermath of the Carnation Revolution. Stock market capitalization dropped almost twenty-fold between 1974 and 1977, and we interpolate this drop across the years during which the stock exchange was closed, so that it this negative shock is not absent from our data. After the shock of the Carnation Revolution, the market stagnated during the 1970s before recovering rapidly in the late 1980s. As shown in Figure 9, Portugal is the only country in our sample that saw unusually high net issuances during this period—but these trends are rather specific to the recovery of the market from the turmoil associated with the 1970s revolution.

The modern data are sourced from the ECB Statistical Data Warehouse, and match up with our own estimated series, as well as the other modern-day series from the WDI, rather well.

We supplement the market capitalization series with estimates of net issuance and new listings based on the same microdata up to 1987, and based on a rescaling of the ECB net issuance series afterwards. For our historical data, net issuance and new listings are strongly positively correlated and similar in magnitude, which gives us some confidence that this estimation method should produce reasonably accurate results for the post-1987 time period. Both the net issuance and new listings series are dominated by the high issuance in the aftermath of the Carnation Revolution, which saw high levels of entry and churn by newly listed firms.

We are grateful to Jose Rodrigues da Costa and Maria Eugenia Mata for help and advice in finding and interpreting the data sources for the historical Portuguese data. We are also grateful to staff at the Banco do Portugal archive for helpful advice and sharing data.

## Spain

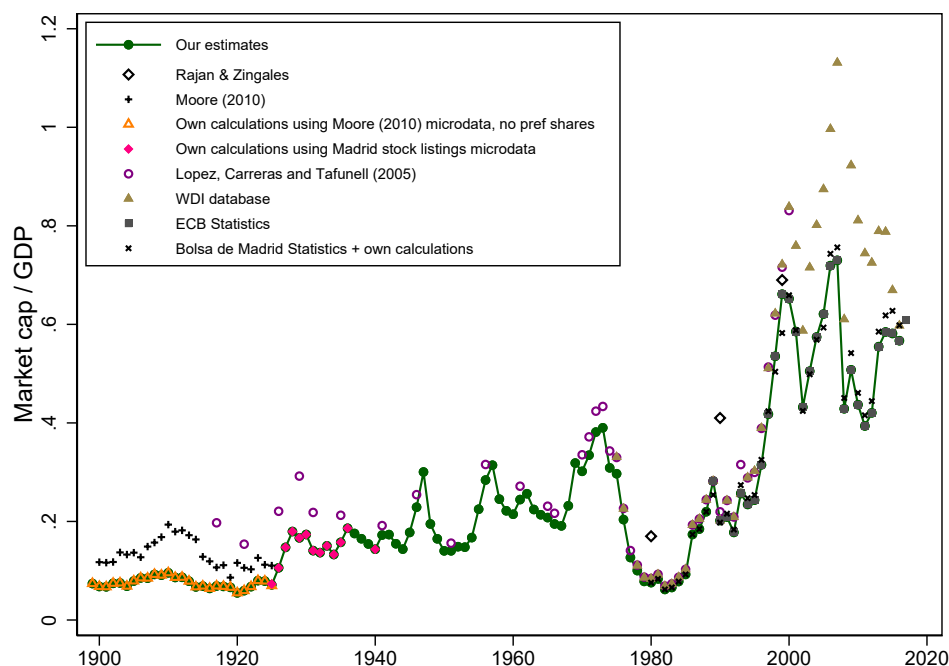
**Table E.13:** *Data sources: Spain*

Year	Data source
<i>Stock market capitalization:</i>	
1900–1924	Total market capitalization of all Spanish firms listed in Madrid, own estimates using microdata helpfully shared by Lyndon Moore. See <a href="#">Moore (2010a,b)</a> for the original source. We exclude preference shares from both our and <a href="#">Moore (2010b)</a> microdata, with the resulting two series matching up very well.
1925–1936; 1940	Total market capitalization of all Spanish firms listed in Madrid, own estimates using microdata from the Madrid Stock Exchange listings, <i>Boletín de Cotización Oficial</i> , various years.
1941–1988	Total capitalization of the major Spanish stock exchanges from <a href="#">López, Carreras, and Tafunell (2005)</a> . Between 1941 and 1971, data are provided at five-year benchmarks, with the in-between changes in market cap estimated using the changes in the stock price index from <a href="#">Jordà et al. (2019)</a> , and changes in the total book capital of Spanish firms from <a href="#">López et al. (2005)</a> . Data are scaled down slightly (factor of 0.9, based on the data from <i>Bolsa de Madrid</i> ) to proxy for the exclusion of foreign companies.
1989–2017	Total capitalization of Spanish firms, shares listed in Spain, from the ECB Statistical Data Warehouse, Security issues statistics.
<i>Net equity issuance:</i>	
1900–1940	Net equity issuance (new listings plus secondary issues minus delistings and redemptions) computed from share-level microdata using the same sources as the stock market cap.
1970–1989	Change in the nominal value of listed stocks from <a href="#">López et al. (2005)</a> , scaled down to exclude foreign firms using the same factor as for market cap.
1990–2016	Net equity issuance by all Spanish companies listed in Spain, from the ECB Statistical Data Warehouse, Security issues statistics.

Table E.13 documents the sources of our data for Spain, and Figure E.13 shows the resulting market capitalization series alongside alternative existing estimates. For the early historical period, we construct estimates of total capitalization of ordinary shares of Spanish firms listed on the Madrid Stock Exchange by aggregating up the capitalizations of individual shares in the official Madrid stock list. The data on share prices and quantities for 1925–1941 were sourced directly from the official stock list, *Boletín de Cotización Oficial*. Microdata for the 1899–1924 period were helpfully shared with us by Lyndon Moore, and are a slightly updated version of the series in [Moore \(2010b\)](#), sourced from [Moore \(2010a\)](#).

The series in [Moore \(2010b\)](#) included some preference shares, which accounted for as much as half of the market during the early historical period. Excluding these from the data results in market capitalization estimates that are lower than those in [Moore \(2010b\)](#). The early [López et al. \(2005\)](#) estimates are higher than both our estimates and those of [Moore \(2010b\)](#), making it likely that they include both some preference shares and foreign shares. The importance of preference shares

Figure E.13: Spain: Alternative stock market cap estimates



gradually declined during the 1920s, with these comprising about 20% of the market at the end of the Spanish Civil War. A notable market expansion took place during the 1920s, much of it driven by large stock price increases and some—by increased issuance. Our data, as well as the alternative series of López et al. (2005) and Moore (2010b), do not include the Barcelona Stock Exchange. The Barcelona Stock Exchange listings in the *La Vanguardia* newspaper do not contain information on quantities, but most stocks traded are also traded in Madrid, and the majority of trades were in government and corporate bonds rather than shares. This suggests that the bias from not including the Barcelona exchange is likely to be small.

During the Spanish Civil War, the stock exchange was closed, hence the data for 1937–1939 are missing, but we collect data on listings in 1936 and 1940, which show that market capitalization declined slightly, but the fall was not comparable to that following other large shocks in the sample, as for example the market decline during the Portuguese Carnation Revolution (Figure E.12). To make sure that omitting the Civil War does not upwardly bias our estimates of averages and growth during this period, we linearly interpolate the market cap to GDP ratio during the Civil War years.

From 1941 onwards, we use estimates of the total capitalization of the major Spanish exchanges—starting with Madrid, and later also including Barcelona, Bilbao and Valencia—provided by López et al. (2005). Before 1970, these are only available at five-year benchmark periods. Because the López et al. (2005) data include foreign shares, we scale these estimates down slightly using modern-period data from the Bolsa de Madrid statistical publications, which suggest that the foreign listing share in Spain before late 1990s was small, leading to a scaling factor of 0.9. It is unclear whether the López et al. (2005) data include preference shares, but whereas this seems to be the case for the early historical period, by the 1930s and 1940 the differences between our ordinary-share-only and the López et al. (2005) series scaled down to exclude foreign shares are very small. Based on this, we do not make any further adjustment to exclude preference shares, which constituted around 20% of the market in 1940 but are likely to be excluded from the post-1940 López et al. (2005) data.

To estimate market cap evolution between benchmark years, we estimate the year-to-year changes in capitalization as the stock price growth times the change in the capital of all Spanish firms, using data from [Jordà et al. \(2019\)](#) and [López et al. \(2005\)](#) respectively, with the growth rates scaled up or down to match the capitalization at benchmark years. Accurate interpolation relies on the proportion of listed firms not fluctuating too much from year to year within the five-year benchmark periods. Given that book capital of listed firms does not vary dramatically from year to year in other time periods in the Spanish data, or in the data for other countries, the measurement error from this interpolation is unlikely to be large. For 1970 onwards, [López et al. \(2005\)](#) provide annual estimates of Spanish listed firms' market capitalization. The WDI Database, Bolsa de Madrid and the ECB Statistical Data Warehouse provide alternative estimates for the modern period. The WDI estimates for Spain, unfortunately, seem to suffer from considerable measurement error (after liaison with the WDI database staff some of these were fixed, but some seem to remain in place given the difference between the WDI series and all other estimates in [Figure E.13](#)). The *Bolsa de Madrid Statistics* estimates are accurate, but the share of foreign firms had to be proxied by us before year 2001. In light of this, we use the ECB series for the modern period, which are close to estimates provided by [López et al. \(2005\)](#) and Bolsa de Madrid.

The data on net issuance are computed from sources consistent with market cap: listings microdata for the pre-Civil-War period, [López et al. \(2005\)](#) for the mid 20th century, and the ECB Statistical Data Warehouse for the post-1990 period.

We thank Lyndon Moore for sharing the microdata from the Madrid Stock Exchange for the early historical period as well as offering helpful advice, and Stefano Battilossi in helping locate the historical data sources.

Sweden

Table E.14: Data sources: Sweden

Year	Data source
<i>Stock market capitalization:</i>	
1870–1979	Total market capitalization of Swedish firms from Waldenström (2014). For 1927–1929, we interpolate the market cap growth using the growth in the Rydqvist and Guo (2020) series.
1980–2017	Total capitalization of Swedish firms listed on the Stockholm Stock Exchange from Rydqvist and Guo (2020), using data kindly shared by Kristian Rydqvist.
<i>Net equity issuance:</i>	
1912–2017	Net equity issuance (new listings plus secondary issues minus delistings) from the database in Rydqvist and Guo (2020), using data kindly shared by Kristian Rydqvist.
<i>New listings:</i>	
1912–2017	End-year market capitalization of newly listed firms from the database in Rydqvist and Guo (2020), using data kindly shared by Kristian Rydqvist.

Figure E.14: Sweden: Alternative stock market cap estimates

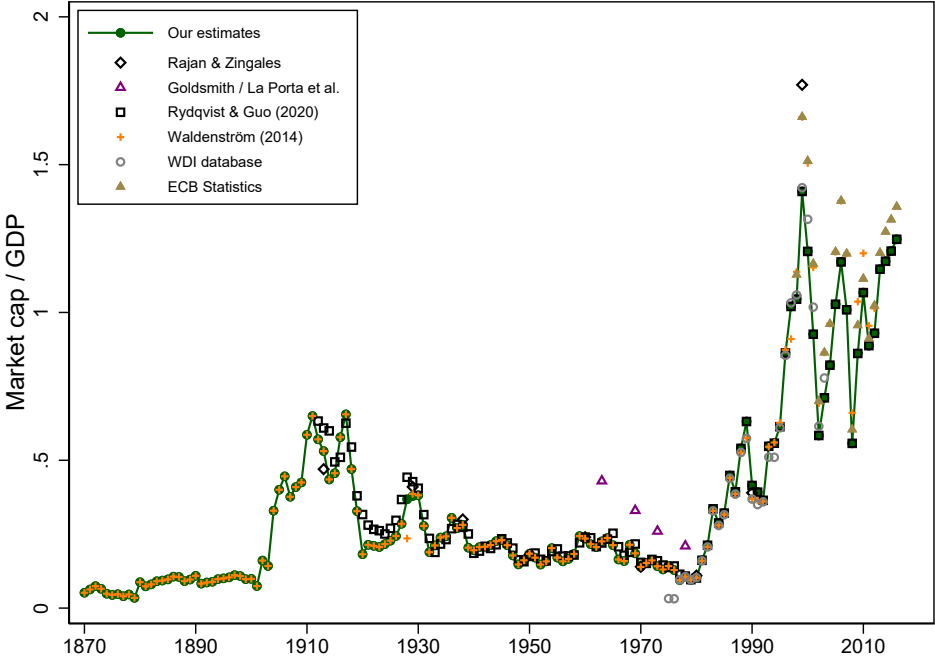


Table E.14 documents the sources of our data for Sweden, and Figure E.14 shows the resulting market capitalization series alongside alternative existing estimates. Two high-quality series of

long-run Swedish market capitalization are available from [Waldenström \(2014\)](#) and [Rydqvist and Guo \(2020\)](#). The [Waldenström \(2014\)](#) series go further back in time, whereas the [Rydqvist and Guo \(2020\)](#) series deal more carefully with those stocks which are traded very infrequently. [Rydqvist and Guo \(2020\)](#) also show that during the early period, most stocks on the exchange were in fact traded very infrequently. However, because most of the larger stocks were frequently traded, this has relatively little impact on the estimates of value-weighted return indices and on the aggregate stock market cap, which are the focus of our paper. Figure [E.14](#) shows that the [Waldenström \(2014\)](#) and [Rydqvist and Guo \(2020\)](#) market capitalization series are very close to each other. For the modern period, we additionally have the estimates from the World bank's WDI Database and the ECB's Statistical Data Warehouse.

For the early period, we use the series of [Waldenström \(2014\)](#) since this is the only series available before 1912, and it matches up well with other data sources for overlapping years. We continue using these series for the mid 20th century since they align better with movements in the stock price index, therefore resulting in a more accurate price-quantity decomposition of movements in market cap. The growth in the [Waldenström \(2014\)](#) series for years 1927–1929, however, does not align with capital gains and issuance for these years, and we apply the growth rates of the [Rydqvist and Guo \(2020\)](#) series for these years instead. For 1980 onwards, we switch to the [Rydqvist and Guo \(2020\)](#) series, which better align with the stock price movements for the modern period. None of these choices affect the long-run trends documented in the paper, but using a combination of sources rather than one of them makes our decomposition of market cap growth into capital gains and issuances more accurate.

In addition to this, we construct a series on equity issuance and new listings from [Rydqvist and Guo \(2020\)](#) using data kindly shared with us by Kristian Rydqvist. The redemptions in the Swedish stock market are almost non-existent and almost entirely apply to preference rather than ordinary shares, so our net issuance measure consists of new listings plus secondary issues minus delistings. Our new listings measure is a mixture of direct listings and IPOs, but before 1979 these comprise entirely of direct listings due to legal limitations for IPO issuance on the Stockholm Stock Exchange.

We are grateful to Kristian Rydqvist and Daniel Waldenström for sharing their data, providing helpful comments and helping us understand the drivers of market cap movements and the institutional details throughout the history of the Swedish stock market.

## Switzerland

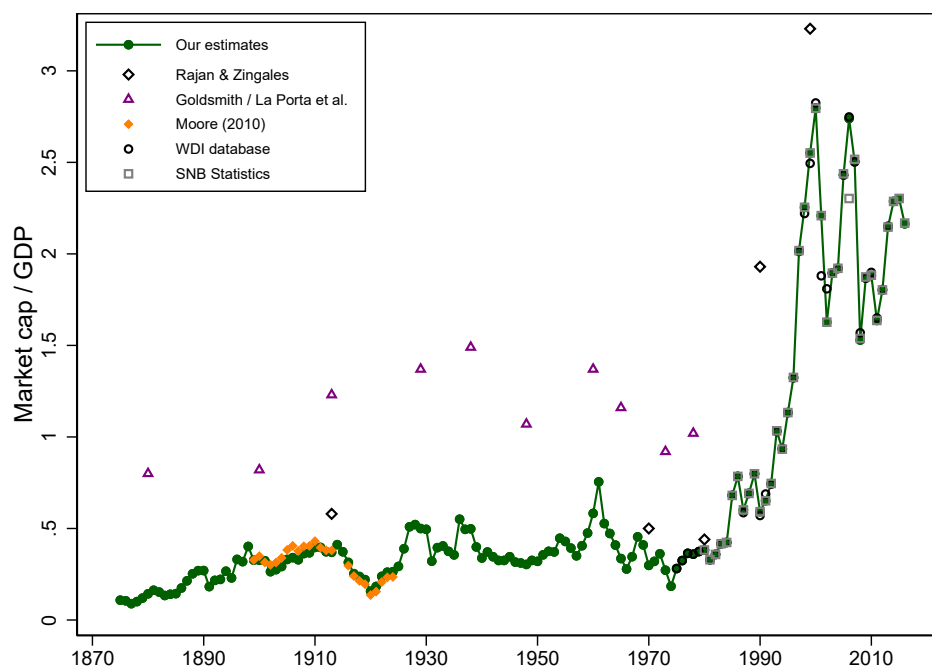
**Table E.15:** *Data sources: Switzerland*

Year	Data source
<i>Stock market capitalization:</i>	
1875–1970	Total market capitalization of all Swiss firms listed in Zurich, own estimates. For 1875–1898 and 1925–1970, we digitise the stock listings of the Zurich exchange (Kursblatt der Züricher Effektenbörse), complemented by data on individual company accounts, and compute the sum of capitalizations of all Swiss companies. For 1899–1925, we use microdata helpfully shared by Lyndon Moore (Moore, 2010a,b). We scale up the pre-1899 series to match the Lyndon Moore estimates. To match the WDI market cap value in 1975, we further scale up the annual cap growth rate by around 1 ppt.
1971–1974	1970 stock market cap extrapolated forward using net issuance data from the Swiss National Bank <i>Capital Market Statistics</i> , with growth rates adjusted up by 1 ppt to match the 1975 WDI cap value.
1975–1979	Total capitalization of all Swiss listed firms, shares listed on Swiss exchanges, from the WDI database.
1980–2017	Total capitalization of the Swiss and Liechtenstein firms listed on the SIX (Swiss Stock Exchange), from the SNB <i>Capital Market Statistics</i> .
<i>Net equity issuance:</i>	
1876–1970	Net equity issuance (new listings plus secondary issues minus delistings and redemptions) computed from share-level microdata using the same sources as the stock market cap.
1971–2017	Net issuance by all Swiss listed firms from the SNB <i>Capital Market Statistics</i> . Data before 1996 are gross issues minus redemptions. Data after 1996 are new issues plus secondary issues minus delistings and redemptions.
<i>New listings:</i>	
1876–1970	End-year market capitalization of newly listed firms, computed from share-level microdata, using the same sources as for stock market cap.
1971–1982	Gross issuance from the SNB <i>Capital Market Statistics</i> scaled down by the share of gross issues to new listings for the 1970s and 1980s.
1983–2017	End-year market capitalization of Swiss IPOs calculated from microdata kindly shared by Roger Kunz (see Kunz and Aggarwal, 1994, for the original source), scaled up to proxy for direct listings. The scaling factor is calculated by comparing the aggregate IPO market cap series with the new listings series from the WFE, published in the March 2013 <i>Handbook of the Deutsches Aktieninstitut</i> (factor of about 1.1).

Table E.15 documents the sources of our data for Switzerland, and Figure E.15 shows the resulting market capitalization series alongside alternative existing estimates. For the first 100 years of the series, we are able to construct estimates of Swiss stock market capitalization, issuance and new listings based on microdata on stocks listed on the Zurich Stock Exchange. Before 1899, the stock listings (Kursblatt) do not always have information on the number of shares, and we complement



**Figure E.15:** *Switzerland: Alternative stock market cap estimates*



these with data on share capital from published accounts of individual Swiss companies. For those companies for which we do not have either number of shares or published accounts data, we assume their listed book capital growth follows that of other firms. Because the companies with missing book capital data mainly consist of smaller firms, the resulting estimates should give us a reasonably accurate representation of the evolution of listed book capital in Switzerland over time, and combined with the stock price data in the listings—of overall market cap.

For the 1899–1925 period, we construct these estimates from microdata kindly shared with us by Lyndon Moore (Moore, 2010a,b). The estimates are close to the Zurich total in Moore (2010b), but slightly below it due to the exclusion of foreign firms. These data have slightly better coverage than the early *Kursblatt* listings, and we scale up the pre-1900 capitalization series to match the Moore (2010b) data for overlapping years to account for this, by a factor of about 1.18. From 1926 onwards, we switch back to our own estimates based on the *Kursblatt* stock listings. These match up well with Lyndon Moore data, but are likely to slightly understate the annual growth of market cap, based on comparison with the WDI and SNB series for the 1970s and 1980s. To make sure our series are well aligned with the modern-day estimates, we scale up annual market cap growth by about 1 ppt during the 1925–1974 period. For the 1971–1974 period, we have data on stock prices and issuance but not for capitalization, so we construct the capitalization series using previous year’s market cap, net issuance and capital gains, with the above-mentioned cap growth correction. The resulting estimates match up well with alternative sources for the 1970s.

The modern data are based on the statistics in the World Bank’s WDI Database, and the *Capital Market Statistics* of the Swiss National Bank, both of which aim to capture all Swiss firms listed in Switzerland. The two series are close to each other, and we use the WDI series for the early years, switching to the SNB data when these become available.

We complement these data with estimates of net issues and new listings derived from the same data sources. For the first 95 years of our sample (1876–1970), these are constructed from the listings

microdata digitised by us and the data helpfully shared by Lyndon Moore. For the post-1970 period, the SNB provide statistics on net issuance in their historical capital market statistics and the modern capital market database. The modern series has more detail and is more likely to correctly account for direct listings and delistings as well as capital issuance, so we switch to it in 1996 when these series become available, and use the historical statistics series for the years before. However, we cannot use these modern data to construct our measure of new listings, because they record very large gross movements in new listings and delistings, likely driven by minor reclassifications of already listed shares and mergers or acquisitions, rather than truly newly listed firms.

For the post-1983 period, we construct our own new listings series based on historical IPO data helpfully shared with us by Roger Kunz. These data include statistics on each Swiss IPO on the Swiss stock exchanges between 1983 and 2017, as well as the free float proportion and end of first trading day share price. We construct an estimate of the end-year IPO market cap by dividing the number of issued shares by the free float percentage, multiplying it by the end-of-first-trading-day share price, and by a proxy for the stock price growth for the rest of the year derived from the aggregate stock index data. The resulting series may still underestimate new listings however, because they may not count direct listings and some specific types of shares of the listed company. To account for this, we benchmark these series to the aggregate new listings data provided by the WFE, which we are able to obtain from the March 2013 edition of the *Handbook of the Deutsches Aktieninstitut*. The year-on-year movements in the WFE series are likely to be less accurate than in the microdata-based series, but the average quantity of new listings is likely to be more accurate. By comparing the average quantity of these two series, we scale up the IPO market cap series by a factor of 1.1 to proxy for total new listings.

Compared to other sources, our estimates of Swiss stock market cap are substantially smaller than the early proxies from [Goldsmith \(1985\)](#), and are similar but slightly below the estimates of [Rajan and Zingales \(2003\)](#) at the corresponding benchmark years.

We thank Lyndon Moore for sharing the microdata from the Zurich Stock Exchange and offering helpful advice, to Roger Kunz for sharing data and helping us understand the workings of the Swiss IPO market, and to Carmen Hofmann and Rebekka Schefer for helping locate the other historical sources.

## United Kingdom

**Table E.16:** *Data sources: United Kingdom*

Year	Data source
<i>Stock market capitalization:</i>	
1870–1929	Total market capitalization of British firms listed on UK exchanges as reported in the <i>Investor Monthly Manual</i> , from <a href="#">Campbell, Grossman, and Turner (2021)</a> , scaled up to account for stocks not included in the IMM. The scaling is done by comparing with <a href="#">Moore (2010b)</a> data for the London Stock Exchange, scaled up to proxy for provincial exchanges using data in <a href="#">Campbell, Rogers, and Turner (2016)</a> , at five-year benchmarks between 1899 and 1924 (factor of 1.3–1.4), helpfully shared with us by Richard Grossman.
1930–1956	Extrapolate market cap growth using the growth in market value of equity of all UK firms (listed and unlisted) from <a href="#">Solomou and Weale (1997)</a> , with the aggregate growth rate adjusted to match the total value of quoted ordinary equity liabilities of UK firms in 1957, sourced from <a href="#">Roe (1971)</a> .
1957–1964	Total value of quoted ordinary equity liabilities of UK firms from <a href="#">Roe (1971)</a> .
1965–1994	Marked value of all UK and Irish companies listed on the London Stock Exchange, from <i>LSE Historical Statistics</i> . Spliced with the <a href="#">Roe (1971)</a> data over the 1965–1967 period.
1995–2004	Marked value of all UK companies listed on the London Stock Exchange, from <i>LSE Historical Statistics</i> .
2005–2006	Total capitalization of the UK firms listed at the London Stock Exchange, from the World Federation of Exchanges (WFE) reports, various years.
2007–2017	Marked capitalization of all UK listed firms, from the London Stock Exchange <i>Main Market Factsheets</i> , various years.
<i>Net equity issuance:</i>	
1870–1929	Change in the book value of British firms listed in the <i>Investor Monthly Manual</i> , using data from <a href="#">Campbell et al. (2021)</a> kindly shared by Richard Grossman, scaled up by the same factor as the stock market cap.
2003–2017	Net issuance of ordinary listed shares by all UK firms, from the Bank of England Monetary & Financial Statistics.
<i>New listings:</i>	
1918–1999	IPO gross proceeds from <a href="#">Chambers and Dimson (2009)</a> scaled up to proxy the total end-year market cap of IPOs, and direct introductions to the stock exchange. The scaling for market cap is based on proportion sold figures in <a href="#">Chambers and Dimson (2009)</a> , assumed to be 40% up to 1955 and 30% afterwards. The scaling up for introduction is done by comparing with data on market cap of all newly listed firms in the <i>LSE Main Market Factsheets</i> before 2004 (factor of about 1.1).
2000–2017	Market capitalization of all newly listed British firms from the <i>LSE Main Market Factsheets</i> .

Figure E.16: United Kingdom: Alternative stock market cap estimates

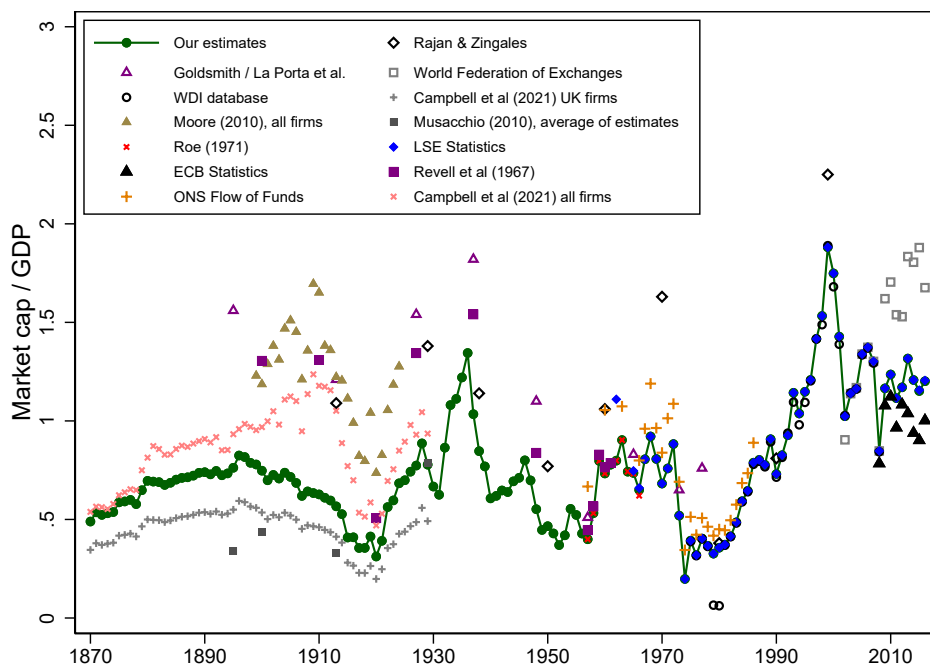


Table E.16 documents the sources of our data for the UK, and Figure E.16 shows the resulting market capitalization series alongside alternative existing estimates. The main difficulty in estimating the UK’s stock market capitalization comes about from two sources. First, since London has been an active financial center throughout the historical period considered, with an especially active role in the 19th and early 20th centuries, many stocks listed in London are those of foreign companies and need to be excluded from the total. Second, especially in the 19th century, the UK had a number of active regional exchanges (Campbell, Rogers, and Turner, 2016), whose capitalization needs to be added to the total.

For the early years in our sample, Campbell, Grossman, and Turner (2021) provide an estimate of UK market capitalization that is very close to our desired definition: it includes all UK firms in the *Investor Monthly Manual* (IMM), which should in principle include both the London and provincial exchanges. However, the coverage of the IMM is incomplete, as shown in Hannah (2018) and Campbell et al. (2021) by comparing the total par value of stocks and bonds in the IMM with the par value of all UK-traded securities in various issues of the *LSE Official Intelligence*. The degree of coverage also varies over time. This means that we have to scale up the IMM-based series to proxy for all UK ordinary shares listed in the UK.

For the scaling, we use the series constructed by Moore (2010b) using stock listings in *The Economist*, *Money Market Review*, *The Times*, IMM, *The Mining manual* and the *Official Intelligence*. These series cover all shares listed on the London Stock Exchange, not just those of UK companies. But their total is larger than the UK and foreign total in the IMM calculated by Campbell et al. (2021) (the brown triangles vs. grey crosses in Figure E.16). Therefore, we scale up the Campbell et al. (2021) UK-only figures using benchmark-year ratios between the all-share (UK and foreign) Moore (2010b) and Campbell et al. (2021) market capitalization estimates. However, the Moore (2010b) series are for London only and do not include provincial exchanges. This means that we have to scale the resulting total up to proxy for the time-varying importance of provincial exchanges, which

we do by scaling it up by the ratio of all-UK to London-only equity and debt market capitalization in [Campbell et al. \(2016\)](#). Note that because the [Campbell et al. \(2016\)](#) data include preference shares and debt, we cannot use their estimates directly, and instead only use them for scaling purposes. The resulting early-period market capitalization series show a similar trend to the [Campbell et al. \(2021\)](#) data, but are larger in levels due to the above-mentioned inclusion of shares not listed in the IMM. They are below the estimates of substantially below those of [Goldsmith \(1985\)](#) and [Rajan and Zingales \(2003\)](#), whose proxies are much closer to the London total, unadjusted to exclude foreign shares. Our estimates are also above the benchmark-year estimates in [Musacchio \(2010\)](#).<sup>19</sup>

For the mid-20th century, we rely on estimates of the national wealth of the UK, published in a variety of sources, and in particular the part of wealth that is attributed to quoted UK shares. The early data are sourced from [Solomou and Weale \(1997\)](#), who publish a combined figure that includes the market value of both listed and unlisted UK firms. We use these series to capture market cap growth between years 1930 and 1957, for both of which we have estimates of the total listed equity wealth of UK firms. This gives us a value in 1957 which is slightly below the market value of quoted share liabilities of UK firms published in [Roe \(1971\)](#). Because the [Roe \(1971\)](#) estimates from the 1970s onwards align well with alternative data sources (e.g., the capitalization of UK firms estimated by the London Stock Exchange in the *LSE Historical Statistics*), we do not scale these series but rather slightly scale up the market cap growth between 1930 and 1957 so that the 1957 cap is equal to the [Roe \(1971\)](#) estimates. What stands out in these data is the UK stock market boom in the 1930s, which saw market capitalization rise to as high as 1.5 times GDP, a value not observed again until the big bang in the 1990s. The growth in market capitalization in the 1930s was almost entirely driven by rising stock prices—consistent with evidence reported in Section 4 of this paper—and dissipated close to the onset of World War II. Even though this boom was not apparent in the benchmark-year estimates of [Goldsmith \(1985\)](#) and [Rajan and Zingales \(2003\)](#), other annual estimates of UK equity prices and total wealth all show a similar boom-bust pattern in the 1930s.

For the second half of the 20th century and 21st century, we rely on official estimates of the capitalization of UK, or UK and Irish firms, provided by the London Stock Exchange. We use the UK and Irish capitalization provided in the *LSE Historical Statistics* between the 1960s and 1994. For the early 1960s, we stick to the [Roe \(1971\)](#) data, given that the LSE statistics estimate for 1962 seems to be an outlier not consistent with other series (Figure E.16). For 1995 onwards, we use data for UK firms only, with data before 2005 taken from the *LSE Historical Statistics*, and data after 2007—from the *LSE Main Market Factsheets*, with the 2005–2006 gap plugged using the UK firms' London capitalization estimates provided by the World Federation of Exchanges (WFE) in their monthly *Statistical Reports*. A number of alternative estimates for this later period are shown in Figure E.16. These include national wealth estimates from the *Office for National Statistics*, World Bank's WDI Database, WFE reports and ECB's Statistical Data Warehouse data. These are generally close to our data and the estimates from the LSE, but overall seem somewhat less accurate, with outliers such as the WDI data for 1975–1976 making us prefer the LSE data overall. Our estimates of the capitalization for the 1980s are similar to those of [Rajan and Zingales \(2003\)](#), while those at the height of the dot-com boom in 1999 are somewhat below theirs.

We complement our estimates of total market capitalization with data on net issuances and new listings. The net issuance data are only available for the early historical period and the post-2000 period. For the pre-1930 period, we calculate net issuance as the change in book capital of listed firms in [Campbell et al. \(2021\)](#) scaled up by the same factor as market cap, which allows us to proxy for firms not included in the IMM sample. For the post-2000 period, we use the Monetary & Financial Statistics of the Bank of England. The new listings data are based on long-run series

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<sup>19</sup>[Musacchio \(2010\)](#) offers a range of estimates due to the difficulty of estimating early-period UK market capitalization data, with the dark squares in Figure E.16 showing the average of these.

of IPO volumes and prices constructed by [Chambers and Dimson \(2009\)](#). We take the IPO gross proceeds and divide them by the proportion sold to proxy for the total capitalization of IPOs. The total proceeds data are provided by [Chambers and Dimson \(2009\)](#) on annual basis, but proportion sold is not published annually. However, [Chambers and Dimson \(2009\)](#) also show that proportion sold is higher in the earlier than later historical period. To account for this, we proxy proportion sold as 40% before 1955 and 30% afterwards ( $\pm 5$  ppts of the historical average of 35% reported in [Chambers and Dimson, 2009](#)). Some new listings on the London Stock Exchange were also direct introductions rather than IPOs, and are not included in the [Chambers and Dimson \(2009\)](#) data. To account for these, we compare our proxy for the IPO market cap based on [Chambers and Dimson \(2009\)](#) with the total market value of new listings published in the LSE *Main Market Factsheets*, for years where the data overlap and are broadly consistent with one another. As a result, we scale up the IPO cap series slightly by a factor of about 1.1.

The diversity of the UK market, its large size, and the need to account for foreign shares and regional exchanges, make estimating the UK's market capitalization a tricky task, illustrated by the large variety of alternative estimates in [Figure E.16](#). The ability to draw on all this previous work, however, means that we are able to select those estimates that best fit a consistent definition of UK firms' listed market cap, and provide a historical series that maps the evolution of the size of the UK equity market with a reasonable degree of accuracy.

We are grateful to Richard Grossman for providing helpful advice and sharing data, and to Leslie Hannah, David Chambers, and John Turner for offering helpful feedback on the data and historical sources.

## United States

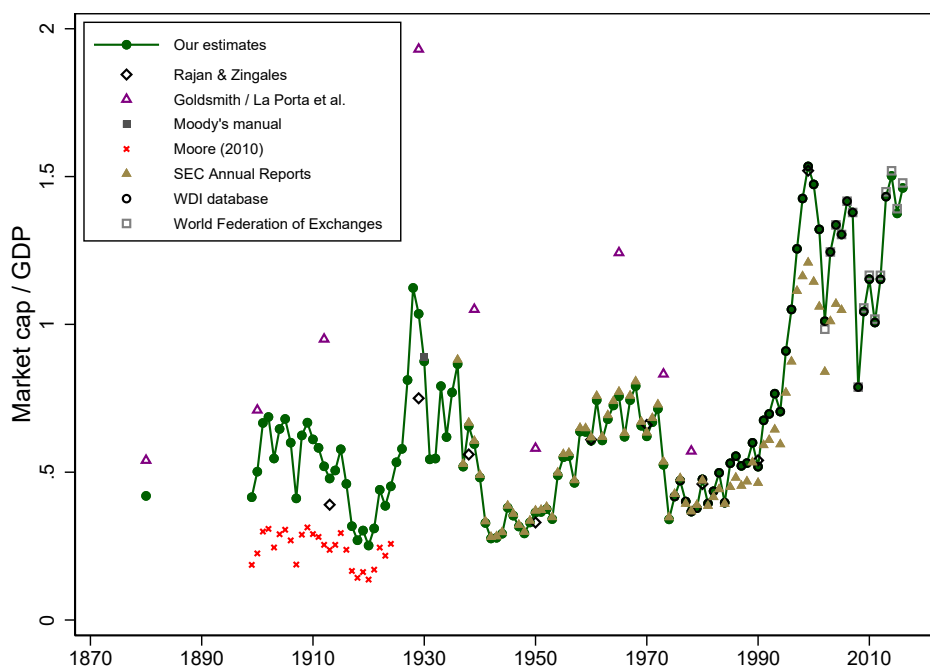
**Table E.17:** *Data sources: United States*

Year	Data source
<i>Stock market capitalization:</i>	
1880	<a href="#">Goldsmith (1985)</a> estimate of total equity wealth, scaled down to proxy the market capitalization of US listed firms, using the ratio of overlapping data for 1900 as the scaling factor.
1899–1924	Total NYSE market capitalization scaled up to reflect all exchanges, and scaled down to exclude foreign stocks. NYSE data from <a href="#">Moore (2010b)</a> . Scaling done using the data on relative importance of the NYSE and other exchanges helpfully shared by Leslie Hannah, and the ratio of NYSE to total cap in the Moody’s manual. Share of foreign firms calculated using NYX historical data.
1925–1935	Total equity wealth of US firms scaled down to capture listed shares only. Equity wealth data from <a href="#">Piketty, Saez, and Zucman (2018)</a> . Scaling done by benchmarking to our pre-1925 estimates, to Moody’s total US capitalization in 1930, and to SEC’s data on capitalization of all US exchanges in 1936.
1936–1975	Total market capitalization of all US exchanges, from the SEC’s <i>Annual Reports</i> , scaled down slightly to exclude foreign firms. Share of foreign firms calculated using <i>NYSE Historical Statistics</i> , and by comparing the SEC and WDI data for the 1970s.
1976–2013	Total capitalization of all US listed firms, shares listed on US stock exchanges, from the World Bank’s WDI database.
2014–2016	Total capitalization of all US listed firms, shares listed on US stock exchanges, from World Federation of Exchanges (WFE) reports, various years.
<i>Net equity issuance:</i>	
1926–2015	Net equity issuance by listed firms from <a href="#">Goyal and Welch (2008)</a> , data from Amit Goyal’s webpage extended to 2015. Net issuance is calculated as the differences between value weighted cap growth and capital gain on the CRSP all share index.
2016–2017	Net equity issuance by listed firms from the OECD <i>Financial Statistics</i> , sourced from <a href="#">Richter and Diebold (2021)</a> .

Table E.17 documents the sources of our stock market capitalization data for the US, and Figure E.17 shows the resulting series alongside alternative existing estimates. Most of the widely available estimates of US stock market capitalization refer to the New York Stock Exchange only, so the main challenge here reflects obtaining capitalization estimates that cover not only NYSE, but also other stock exchanges, and also adjusting estimates to exclude any foreign listings. Inclusion of non-NYSE stock exchanges is especially important for the early US data, with much of the trading taking place on the Curb Exchange and regional markets ([Sylla, 2006](#); [O’Sullivan, 2007](#)).

Our early data use the [Moore \(2010b\)](#) estimates of the NYSE cap, scale these up to also account for other stock exchanges, and scale them down to exclude foreign listings. We rely on a number of benchmark year estimates to approximate the relative importance of the NYSE. The 1906 NYSE share was helpfully shared with us by Leslie Hannah, and amounts to around 44% in terms of book cap. By 1930, comparison of the total capitalization of US firms in Moody’s manual to the NYSE

Figure E.17: United States: Alternative stock market cap estimates



capitalization estimates indicates that the NYSE share reached more than 60%, and by late 1930s that share was larger than 80%, as suggested by data in the *SEC Annual Reports*. These broad trends are also consistent with turnover statistics of the different stock exchanges reported in O'Sullivan (2007). Before 1936 (the first year of the SEC data), we interpolate the NYSE share in-between benchmark years to obtain an annual proxy. As for the foreign share, based on the data from NYX *Historical Statistics*, this amounted to little over 2% in the mid 1920s. A similarly small foreign share is obtained by comparing the *SEC Annual Reports* and WDI Database estimates for the 1970s. Based on this, we adjust the Moore (2010b) NYSE-only estimates up substantially to approximate the inclusion of other exchanges, and account for the gradually increasing importance of the NYSE, and adjust them down slightly to proxy the exclusion of foreign ordinary shares. As a result, our market capitalization estimates in Figure E.17 are substantially above the NYSE capitalization in Moore (2010b), and are also higher than the Rajan and Zingales (2003) estimates, which include regional exchanges but do not include the curb exchange, which was the largest non-NYSE market during this early period. We also provide a market capitalization proxy for 1880, obtained by scaling down the Goldsmith (1985) data, which contain both listed and unlisted shares.

From 1936 onwards, estimates of total US market capitalization are available from the *SEC Annual Reports*. These include the NYSE, AMEX and regional exchanges. We adjust the estimates down very slightly to proxy the exclusion of foreign firms, and link the SEC series to the WDI data in the mid 1970s. For the modern period, we rely on a mixture of the WDI and WFE (World Federation of Exchanges) data, whose definition more precisely fits what we are after, namely, including all US company shares listed on US stock exchanges. To fill a small gap in the 1920s and 1930s, we use annual growth in the capitalization of all US firms (listed and unlisted), provided by Piketty, Saez, and Zucman (2018), to estimate market capitalization growth in-between benchmark years.

Taken together, our US market capitalization estimates are much smaller than the early data from Goldsmith (1985), which includes a mixture of listed and unlisted shares. They are above



the estimates of [Rajan and Zingales \(2003\)](#) for the early period, thanks to our inclusion of the curb exchange, and similar to the [Rajan and Zingales \(2003\)](#) estimates for the more recent period.

We complement these with estimates on net equity issuance from CRSP data sourced from [Goyal and Welch \(2008\)](#), and for the most recent years from financial accounts data in the OECD *Financial Statistics*. [Goyal and Welch \(2008\)](#) estimate net issuance as the difference between the CRSP market cap growth and the value weighted price index. Because these two CRSP series are calculated on exactly the same underlying sample, they offer the best proxy of our desired issuance measure in equation (3). We effectively scale up their issuance to match our aggregate market cap series, therefore assuming that the listed firms not covered in the CRSP series (especially early on in the sample) issue equity at the same rate as those included in CRSP.

We would like to thank Leslie Hannah for sharing data and helping us locate and interpret the various historical sources for the US.

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