OECD Equity Market Review

ASIA 2018

OECD CAPITAL MARKET SERIES

OECD Equity Market Review

Asia 2018

Please cite this publication as:

OECD (2018), OECD Equity Market Review of Asia 2018
www.oecd.org/corporate/OECD-Asia-Equity-Market-Review-2018.pdf

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ABOUT THIS REPORT

This annual OECD report provides a comprehensive and comparable picture of the use and functioning of public equity markets in Asia. The objective of the report is to inform policy discussions on how capital markets can serve their role to channel financial resources from households to productive investments in the real economy.

The report covers the main aspects of the capital market ecosystem in Asia. The first part looks at primary equity markets to describe how and to what extent Asian companies use public equity markets to raise equity capital. This includes data on both initial public offerings and the often neglected use of public equity markets by already-listed companies that choose to raise additional equity capital through a secondary public offering. The second part pays special attention to the use of public equity markets by growth companies, including their size and sectoral distribution. The third part describes and provides analyses of the stock exchange landscape in Asia, including their relative size and developments over time. The fourth part examines the corporate ownership landscape. It provides information about who the shareholders are and how they own. Special attention is given to the institutional investors as owners of publicly listed companies. The last part of the report looks at developments with respect to the four main investment banking activities, namely equity underwritings, corporate bond transactions, mergers and acquisitions, and syndicated loans. This section describes the emergence of the regional investment banking industry and the shifts in market shares between Asian and non-Asian banks since 2000. This year's focus chapter discusses the potential for new financial technologies, in particular blockchain technology, in primary public equity markets.

The report is part of the *OECD Capital Market Series* which maps and provides analyses of market-based financing around the world with a view to understand how policies and regulations can improve corporate access to capital, competitiveness and the quality of investment. In this work, an empirical understanding of the structure and functioning of capital markets is essential in order to design capital markets and corporate governance policies that help economies to effectively bridge the gap between household savings and productive investment opportunities in the real economy.

A set of selected indicators and detailed description of data sources as well as the methodology for data collection are provided in the annexes. The content and the methodologies in this report will be further refined in discussions with the participants of the OECD Corporate Governance Committee, the OECD-Asian Roundtable on Corporate Governance and other experts.

The report was prepared by a team led by Mats Isaksson who is Head of the Corporate Governance and Corporate Finance Division of the OECD Directorate for Financial and Enterprise Affairs composed of Serdar Çelik, Adriana De La Cruz, Alejandra Medina, Yun Tang and Inga van den Bongard. The focus chapter was developed by Catriona Marshall, who is also in the Corporate Governance and Corporate Finance Division. The report benefits from the financial support of the Government of Japan.

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ACRONYMS AND ABBREVIATIONS

ASEAN	Association of Southeast Asian Nations
ATP	Alternative trading platform
CSRC	Chinese Securities Regulatory Commission
ETF	exchange-traded fund
ICO	Initial coin offering
IMF	International Monetary Fund
IPO	initial public offering
M&A	mergers and acquisitions
MSCI	Morgan Stanley Composite Index
MTF	Multilateral trading facility
NTS	Non-tradable share
OECD	Organisation for Economic Co-operation and Development
R&D	research and development
REIT	real estate investment trust
ROE	return on equity
SOE	State-owned enterprises
SPO	secondary public offering (follow-on offering)

EXECUTIVE SUMMARY

During the past 20 years, stock markets have undergone profound changes. Various forms of institutional ownership have increased in importance at the expense of direct ownership by individual households; new investment strategies and investment vehicles, such as index investment and exchange traded funds (ETFs) have become much more common; and, the business models of stock exchanges have been fundamentally transformed as many exchanges have become profit-maximising corporations that are themselves listed companies.

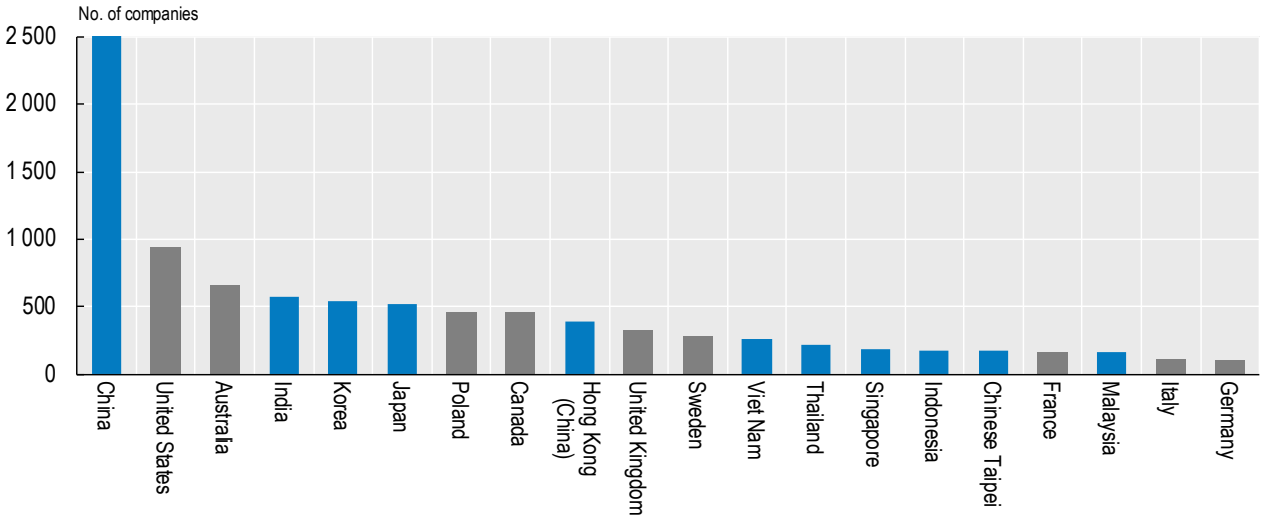
On an international scale, the most important development has been the rapid growth of Asian stock markets - both in absolute and in relative terms. Today, Asian companies are the world's largest users of public equity financing. And as a consequence, stock exchanges and investment banks in Asia have increasingly become important actors in globally connected capital markets. Thousands of Asian companies are now listed or traded on markets other than their local exchanges and investment banks from non-Asian markets, in particular from the United States and Europe, play a significant role in Asian markets together with other globally active intermediaries and service providers. Importantly, household savings in other parts of the world in the form of pension funds, insurance companies and other collective investment vehicles have increased their investments in Asian companies and markets. While the pace of international integration of Asian capital markets naturally is slower than their domestic expansion, it is already apparent that the evolution of Asian capital markets will have important global implications.

2017 saw the highest number of Asian company IPOs in two decades, reinforcing their status as the world's largest users of public stock markets

In 2017, a record number of 1 074 companies got listed in Asia. This is almost twice as many as the annual average between 2000 and 2016. More than 90% of the companies that listed in 2017 were non-financial. The largest number of issuers were from the People's Republic of China (China) with 470 companies, followed by companies from India (158); Japan (82); Hong Kong, China (73) and Korea (57). There were also 128 IPOs by non-financial companies from the emerging economies of ASEAN.

The strong IPO activity in 2017 reinforced Asian companies' status as the largest users of public equity markets globally. Figure 1 shows that 11 out of the top 20 jurisdictions in terms of IPOs during the last ten years are in Asia. Companies from China have been the largest users of IPOs not only in the region but also worldwide, exceeding companies from the United States by almost 170%. Companies from India, Korea and Japan are also globally important users of public equity markets. Notably, several Asian emerging markets, such as Viet Nam, Thailand, Indonesia and Malaysia, rank higher in the list than most advanced capital markets.

Figure 1. Top 20 jurisdictions by number of non-financial company IPOs during the past 10 years (2008 to 2017)



Source: OECD Capital Market Series dataset, see Annex for details.

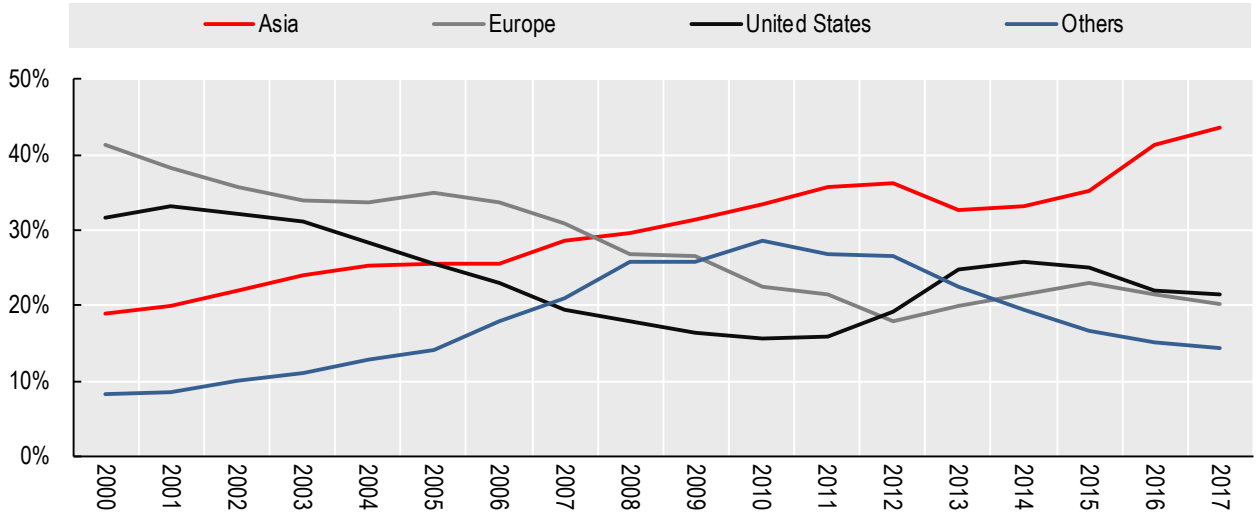
In 2017 Asian companies accounted for 43% of all public equity capital raised in the world

Despite a record number of listings in 2017, there was only a modest pickup in the total amount of capital that was raised compared to 2016. Out of the USD 81 billion raised by Asian companies in 2017, 75% (USD 61 billion) was raised by non-financial companies and 25% (USD 20 billion) by financial companies. Similar to the overall trend since 2000, Chinese companies accounted for the largest share followed by India; Korea; Japan; Thailand and Hong Kong, China. Indian IPOs in 2017 were dominated by a few large financial company transactions, while the amount of capital raised in Viet Nam was heavily influenced by a single large financial company IPO.

As more companies have entered the public equity market, Asian non-financial corporations have also increased their use of secondary public offerings (SPOs). In the 5-year period 2013-2017, non-financial Asian companies tripled their use of secondary offerings compared to the first five years of the 2000s. The surge in total proceeds was not only the result of an increased use of SPOs by Chinese companies but rather a regional wide boost. In the ASEAN region for example, the value of SPOs more than tripled from an annual average of USD 5 billion in the period 2000-2005 to an average of USD 17 billion in the period 2013-2017. Underlining the importance of secondary offerings as a source of finance for companies that are already listed it is worth noting that in 2017, the total value of non-financial company SPOs was more than three times the total IPO value in the region.

Following years of strong growth both in terms of the number of listed companies and the amount of equity capital that they raise through initial and secondary public offerings, Asian companies have successively strengthened their position as the largest users of public equity financing. As seen in Figure 2, already in 2006 Asian non-financial companies raised more public equity than firms from the United States. And in 2017 they accounted for 43% of the global volume of equity raised, which means that they also surpassed the combined share of Europe and the United States.

Figure 2. Share of Asian non-financial companies in global public equity financing, 2000-2017

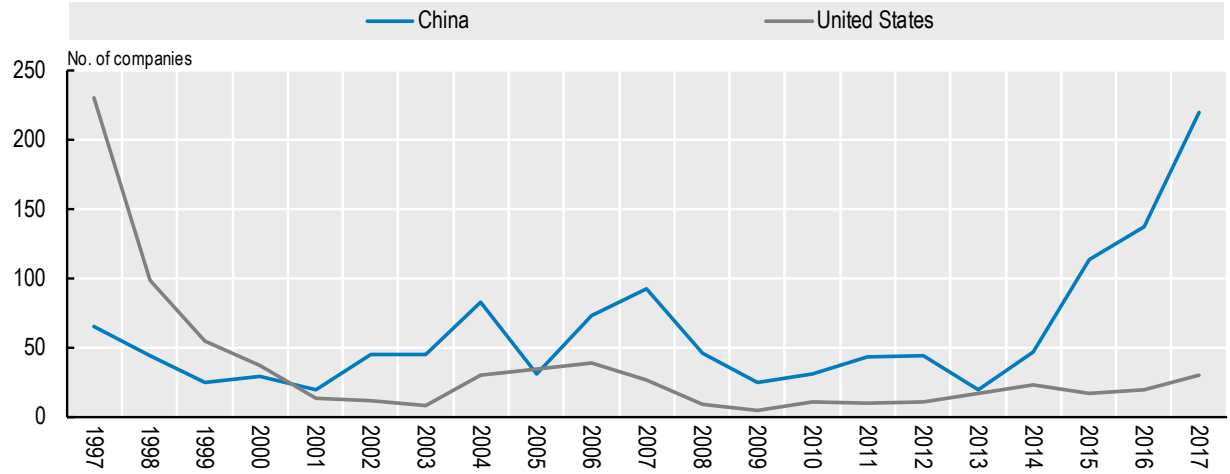


Note: The shares of regions are calculated as a three-year moving average.
Source: OECD Capital Market Series dataset, see Annex for details.

Asian markets are changing the global landscape of listed companies and stock markets

Contrary to most Asian markets, the number of companies that have accessed public equity markets through IPOs has declined in advanced economies. This is particularly significant for smaller non-financial companies and, since 2008, IPOs below USD 50M have almost disappeared in the European Union and the United States. However, equity markets for such growth companies have remained strong in several Asian jurisdictions, including China; Japan; Korea and Hong Kong, China. Notably, the number of IPOs by Chinese growth firms has radically increased in recent years to levels that were seen in the US market at the end of the 1990s.

Figure 3. IPOs by Chinese and US non-financial growth companies



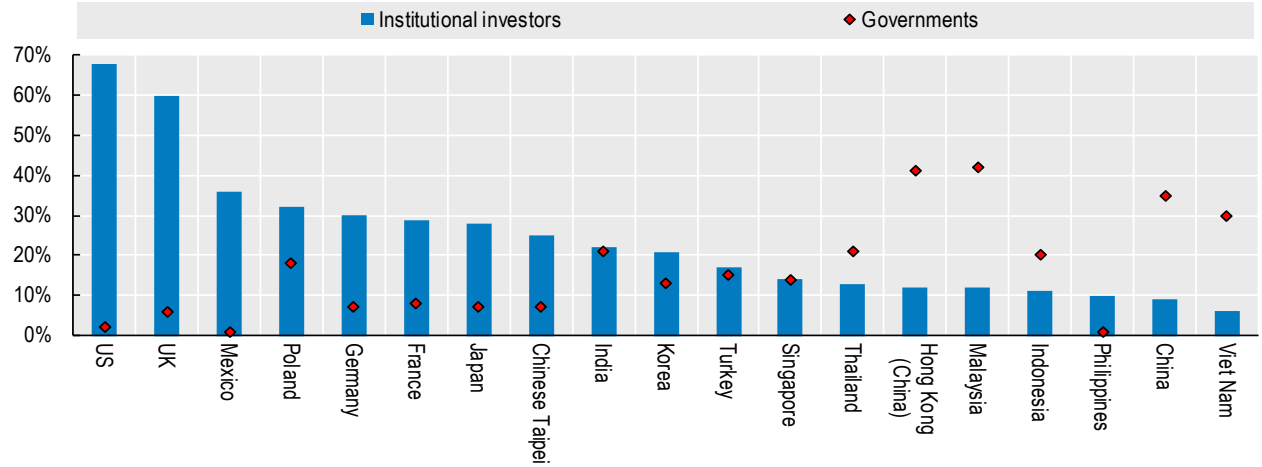
Source: OECD Capital Market Series dataset, see Annex for details.

Listed company ownership structure in Asia is still dominated by company groups and governments, with institutional investors gaining increased attention

With respect to the ownership of large Asian listed companies, Corporations and Holding Companies hold on average 24% of the capital, making them the largest category of owners. The second largest category of owners is Government, mainly as a result of partial privatisations through stock market listing. In China; Hong Kong, China; Malaysia and Viet Nam, the government is an important owner with average holdings ranging between 30% and 42%. Analysis throughout this report shows that higher government ownership is associated with lower company performance in all markets where Government is a relevant owner.

Despite a smaller role, the importance of institutional investors is notable also in Asian markets, particularly in Japan (28%), Chinese Taipei (25%), India (22%) and Korea (21%). In most other Asian markets, institutional ownership is less common with average holdings of around only 10%. Importantly, most of the institutional investment in Asia is held by foreign institutions, partly as a result of low allocation to equity by domestic institutions. For example, while equity accounted for the largest investment asset class of private pension funds in the United States, it has been a minor asset class for funds in Korea, Japan and Singapore.

Figure 4. Government and institutional ownership in the listed corporate sector, as of end 2017



Source: OECD Capital Market Series dataset, FactSet, see Annex for details.

Importantly, the increase in Asian capital market activity has also triggered several initiatives aiming to further increase participation by foreign investors in the region's markets. For example, Stock Connect Programmes between mainland Chinese markets and Hong Kong Exchange allow international investors access to the mainland China market, while allowing mainland investors to trade companies listed in Hong Kong, China. Supported by improved market accessibility to the A-shares market as a result of the Stock Connect Programmes, MSCI, a global index company has decided to partially include A-shares in its emerging markets index. After the initial inclusion of 5% of A shares in May and August 2018, China stocks, including H shares listed in Hong Kong, already accounted for around 31% of the index. With only 5% of Chinese A-shares included, Asian companies now account for more than 70% of the index. Since equity market indices are increasingly tracked by a large number of institutional investors, the inclusion may, in the future, significantly change the investor landscape in China's mainland market and increase the participation of institutional investors in Asian markets.

Asia presents a growing market both for domestic and international investment banking activities

Together with public equity markets, Asia's relative importance in the three other main areas of capital market activities, namely corporate bonds, syndicated loans and M&As, has also increased. Between 2000 and 2007, Asia's global share remained around 10 percent in all of the three activities. A decade later, in 2017, Asia's global share in M&As had doubled to 22% and their global share of corporate bond issuances had tripled to 32%. This increase in capital market activities has been coupled with an absolute increase in non-Asian bank activities in the region as well as an emergence of Asian investment banks. Across all the four areas of capital market activities, local banks in China, India and Korea have, in recent years, all witnessed an average increase of market share of more than 20 percentage points. At the regional level, this mainly has been at the expense of Japanese banks.

After a few years of consecutive decline, in 2017 both US and European banks experienced a strong gain in market share in the region's equity market. In particular, US banks have increased their market share by 14% in Hong Kong, China and 8% in China. Following changes in regulation in April 2018, which allow foreign investors to directly hold up to a 51% share in joint venture securities companies in China (previously set at 49%), foreign banks interest in the region and China may further increase.

Global integration of capital markets has increased the OECD's role in the international corporate governance dialogue

As of end 2017, there were approximately 50 000 listed companies worldwide. Almost half of these were listed on Asian stock exchanges representing 40% of global market capitalisation. Without taking into account some recent developments, such as index inclusion of Chinese A-shares, at least 12% of the capital in Asian listed companies is held by foreign institutional investors. This global integration allows companies to seek finance from a much larger pool of investors who in turn will be able to grasp investment opportunities beyond their own national borders. But it also implies an increased interdependence between investors and corporations from countries with different legal, regulatory, economic and cultural traditions. And this calls for a common language when it comes to expectations and practices in the area of corporate governance.

A good basis for developing such a shared understanding is the *G20/OECD Principles of Corporate Governance*. The G20/OECD Principles have been endorsed by countries hosting Asia's largest capital markets and explicitly address issues that relate to the functioning of capital markets and the role of stock exchanges. They will serve as useful reference for an ongoing international policy dialogue that can support a smooth integration of Asian capital markets in the global economy. Today, the OECD has made available several platforms for this dialogue, including the OECD Corporate Governance Committee and the OECD Asian Roundtable on Corporate Governance.

The rapid growth of Asian stock markets has also changed the global landscape of listed companies. Since the ownership structure of listed companies in Asian markets is typically characterised by concentrated ownership, listed companies with a controlling owner have become the rule rather than the exception in the global public equity market. This also includes listed state-owned enterprises, which play an important role in today's world economy. The presence of publicly traded state-owned enterprises presents its own set of corporate governance issues. Notably with respect to the government's role as an owner and the need to maintain a level playing field. The OECD has monitored these developments closely and is currently hosting an increasingly relevant dialogue on the governance of state-owned enterprises that is based on the globally recognised *OECD Guidelines on Corporate Governance of State-Owned Enterprises*.

PART I. PRIMARY PUBLIC EQUITY MARKETS IN ASIA

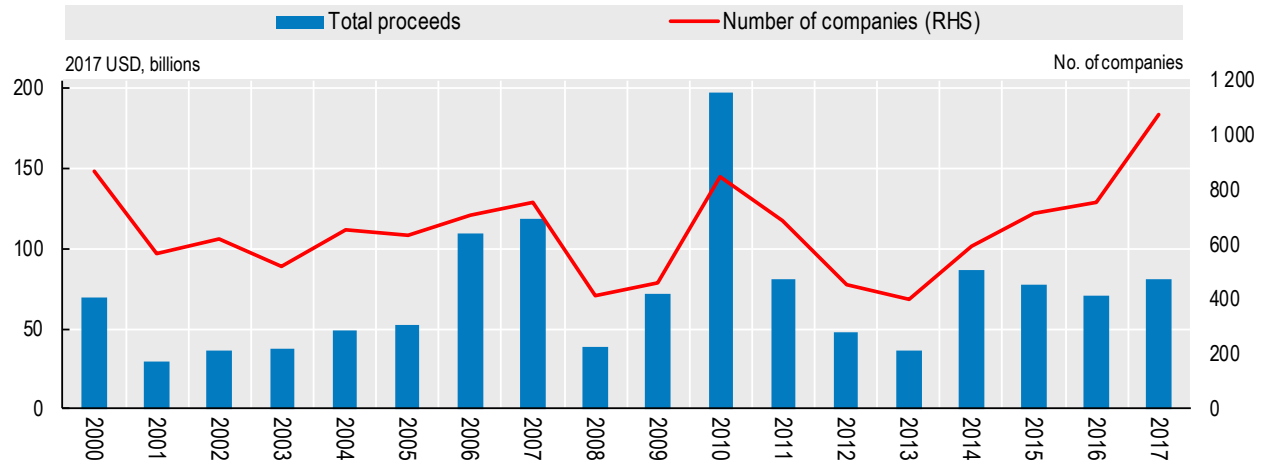
A key economic function of capital markets is to give a broad range of companies the opportunity to access different sources of market-based financing that they can use to develop and grow their businesses. Considering that equity capital is long-term and risk-willing, it is well-suited to support long-term investments that include research and development with uncertain outcomes. In addition, the possibility to buy and sell public equity in regulated markets allows for a separation between the investment horizon of an individual provider of the capital and the investment horizon of the corporation. This means that long-term business ventures can be financed with relatively shorter term savings.

There are two main ways in which a company can raise equity capital by using the primary public equity market. The first way is through an initial public offering (IPO), which refers to the process through which a company is first introduced and listed on a stock exchange. The other way is through a secondary public offering (SPO or follow-on offering) when an already publicly listed company turns again to the public equity market to raise additional equity. This part of the report provides an overview of how and to what extent Asian companies have used IPOs and SPOs as sources of equity finance since 2000. It includes cross-country and cross-industry comparisons.

1.1. Trends in initial public offerings

Figure 5 shows the total amount of equity raised through IPOs by Asian companies and the total number of newly listed companies each year between 2000 and 2017. Before 2007 the annual average number of IPOs by Asian companies was around 650, without any major fluctuations. The exception was 2000 when there were around 870 offerings. From 2008 to 2016, the annual number of IPOs was more volatile, varying between 400 and 850 with an annual average of 590 IPOs. 2017 was a record year with 1 074 new companies being listed.

Figure 5. Initial public offerings (IPOs) by Asian companies

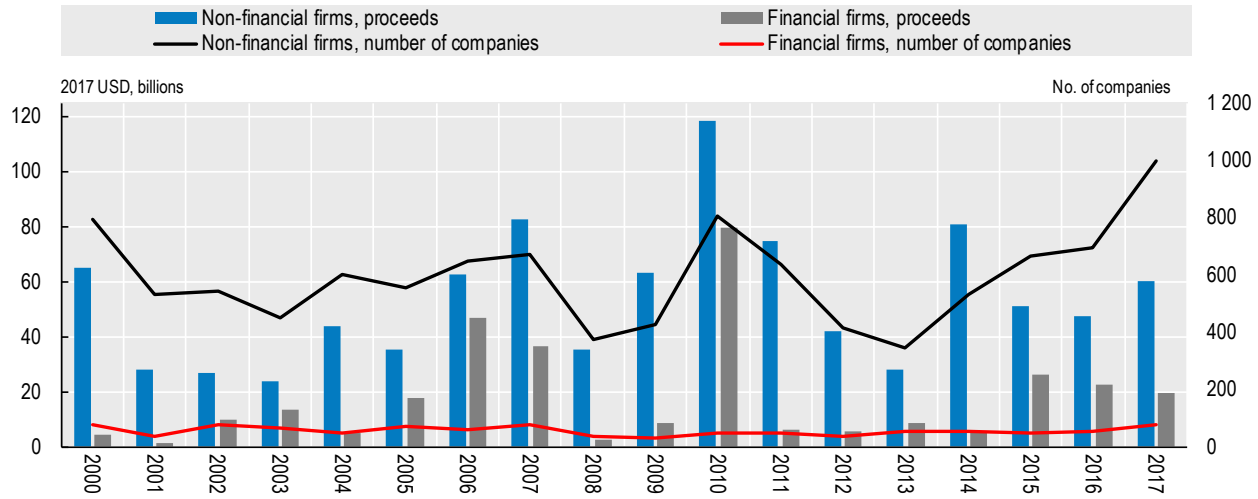


Source: OECD Capital Market Series dataset, see Annex for details.

The increase in the number of IPOs between the two periods is also reflected in the amount of equity that Asian companies have raised. Mainly driven by the record level of IPOs in 2010, the annual average amount of equity raised increased from USD 63 billion during the period 2000-2007 to USD 79 billion during the period 2008-2016. In the last four years, the total amount has been stable at around USD 80 billion, with a modest pickup in 2017.

Figure 6 identifies initial public offerings by both financial and non-financial companies, excluding real estate investment trusts (REITs), other trusts and funds. Between 2000 and 2017, an average of 56 Asian financial firms went public per year. Following the global financial crisis, the number fell to 34 only to rise to 48 in 2010 and remain between 50 and 60 until 2017. Similar to the overall trend, the number of financial company IPOs also increased in 2017 when 75 companies got listed. During the 18-year period as a whole, Asian financial firms raised a total of USD 322 billion. Half of that amount was raised in three years: 2006, 2007 and 2010. In the four-year period following 2010, the average annual amount was only USD 7 billion. In the last three years including 2017, however, the average amount has more than tripled. Relative to the increase in the number of newly listed financial firms, this was a significant change and was heavily driven by some large transactions.[1]

Figure 6. Initial public offerings (IPOs) by Asian financial and non-financial companies



Source: OECD Capital Market Series dataset, see Annex for details.

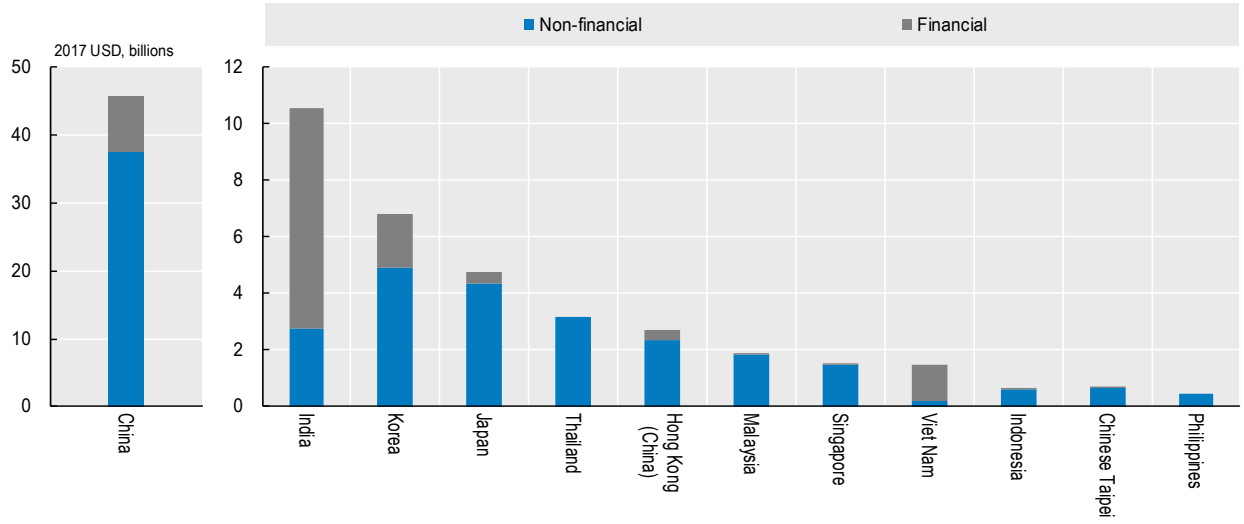
Similarly to financial companies, the total amount of equity capital raised by non-financial Asian companies also reached a record level in 2010 with a total amount of USD 118 billion. Despite a decline in the average number of issuing companies from 600 in the period 2000-2007 to 540 in the period 2008-2016, the average annual amount of money raised was almost 30% higher in the second period, reaching USD 60 billion per year. In 2017, 999 non-financial Asian companies went public, a record number since 2000.

Figure 7 focuses on IPOs by Asian non-financial and financial companies in 2017. The total amount of IPOs was USD 81 billion, of which 75% of the proceeds (USD 61 billion) was raised by non-financial companies and 25% (USD 20 billion) by financial companies. Similar to the overall trend

[1] For instance, in 2017, the median size of financial company IPOs was USD 26 million and the average issue size was USD 265 million.

since 2000, Chinese companies accounted for the largest share followed by India; Korea; Japan; Thailand and Hong Kong, China. Indian IPOs were dominated by a few large financial IPOs, while the number for Viet Nam was heavily influenced by a single large financial company IPO.

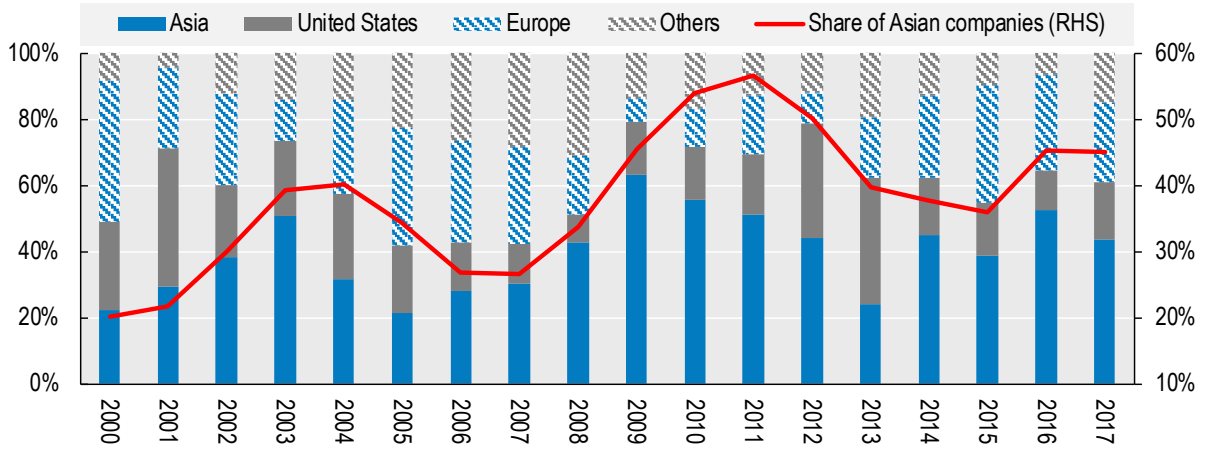
Figure 7. IPOs by Asian companies in 2017



Source: OECD Capital Market Series dataset, see Annex for details.

The increase in the total amount of equity capital raised by Asian non-financial companies after the 2008 financial crisis has also influenced the global distribution of IPOs. Reinforced by a downward trend in IPOs by US and European companies, Asian non-financial companies have come to dominate the global initial public offerings scene. Figure 8 shows the shares of global IPO proceeds to non-financial companies from Asia, the United States, Europe and other countries during the last 20 years. Between 2000 and 2001, Asian companies accounted for 21% of all capital raised in the world. This share increased to 33% between the 2002 and 2007 period and has since 2008 been 44%. During 2017, 45% of all equity raised in the world through IPOs went to Asian companies, marginally less than in 2016.

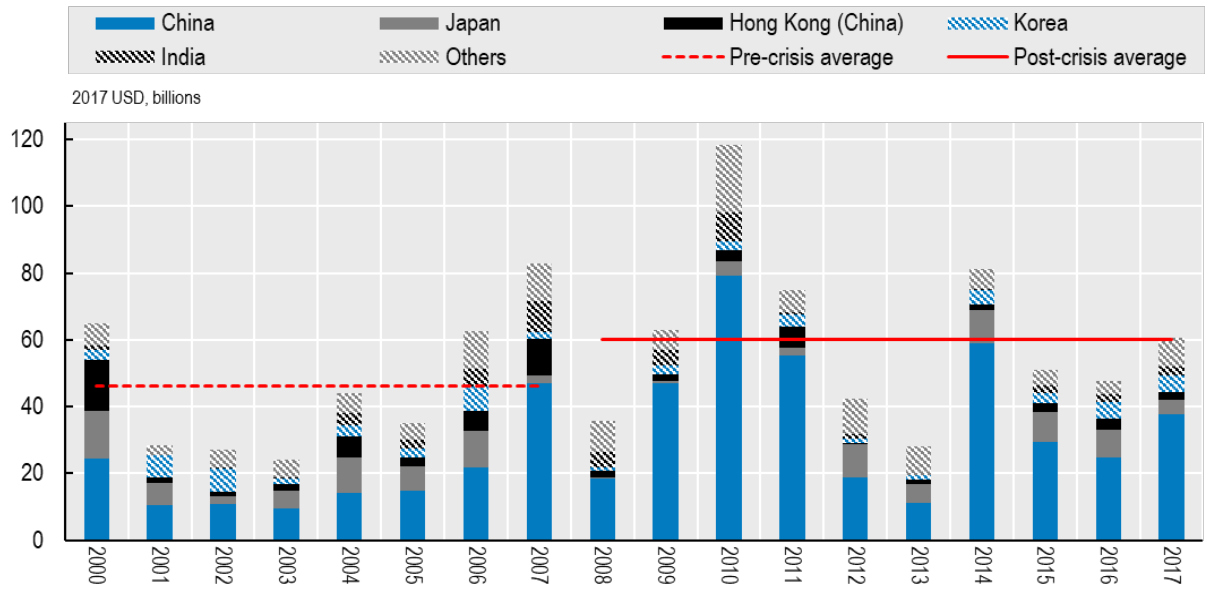
Figure 8. Distribution of global IPO proceeds by non-financial companies



Note: The share of Asian companies is calculated as a three-year moving average.
Source: OECD Capital Market Series dataset, see Annex for details.

When discussing the shift of IPOs towards Asian companies, it is also of interest to look at the relative importance of different Asian economies. This is shown in Figure 9 together with the increase in the average annual amount raised by non-financial Asian companies between two periods, 2000-2007 and 2008-2017. As illustrated by the red horizontal lines, the average annual amount raised was 30% higher during the second period with an annual average of USD 60 billion. Following a downward trend in the total volume since 2014, there was an increase of USD 13 billion in 2017 compared to the previous year. The figure also shows that IPOs by Chinese companies increased both in absolute and relative terms.

Figure 9. IPO proceeds based on home jurisdiction of non-financial companies



Source: OECD Capital Market Reviews dataset, see Annex for details.

Since the 2008 global financial crisis, Asian non-financial companies have raised a total amount of USD 602 billion through initial public offerings, accounting for almost half of the capital raised worldwide. This number has been mostly driven by Chinese company IPOs that represent more than 60% of the total proceeds in the region. In fact, during the last ten years, Chinese companies have raised more equity capital through IPOs than companies from any other country in the world.

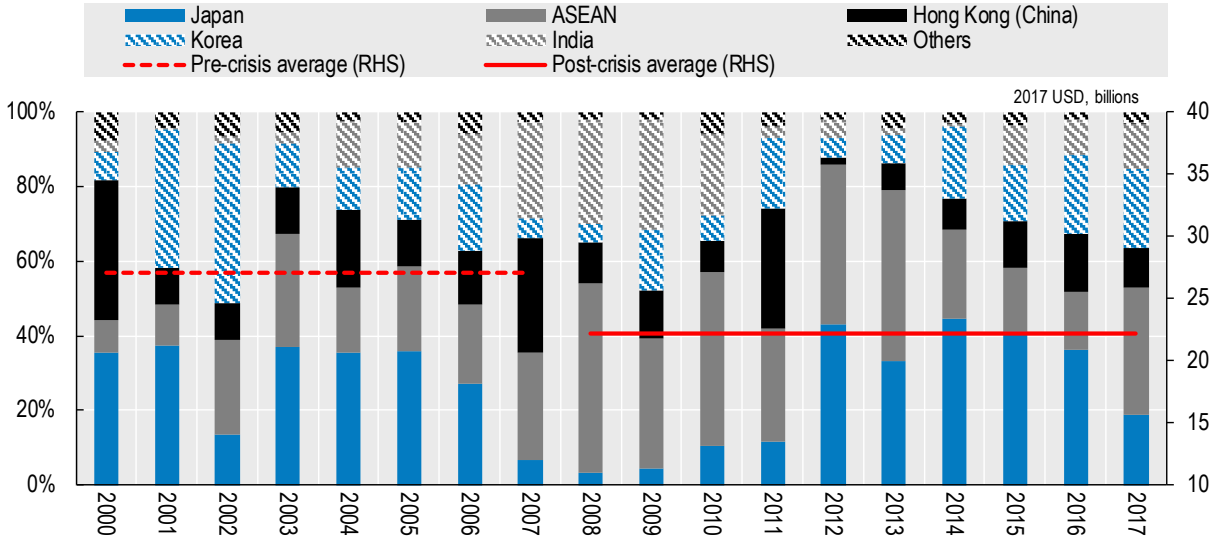
As part of their efforts to make capital markets better serve the real economy, the China Securities Regulatory Commission (CSRC) has launched a normalisation process for IPOs aimed at promoting mainland Chinese (A-share) IPOs (CSRC, 2016). Between 1994 and 2016, IPOs in China have been suspended nine times resulting in a large number of IPO applications waiting to be processed. To achieve IPO normalisation, the CSRC has significantly increased the pace of approval process, reducing the application cycle from 2-3 years to around one year in 2017. As a result, the number of IPOs that has been processed and approved in 2017 has reached 633 and 401 respectively, the highest numbers in history (CSRC, 2017a).[2]

[2] According to the CSRC 2017 Annual Report, there was 401 IPO approvals out of 633 applications in 2017. Meanwhile, there were 419 IPOs completed in 2017 as there were some transactions already approved in 2016 but completed in early 2017.

At the same time, the review process by CSRC has become stricter. In 2017, only 63% (401 out of 633) of IPO applications received an approval, which is the lowest approval rate since 2010. In order to improve the quality of newly listed companies, the CSRC's review process now takes into consideration additional criteria such as corporate governance, business sustainability and risk control, leading to a higher rate of rejection. In October 2017, CRSC established a new Public Offering Review Committee that is expected to follow stricter standards for IPO approval as committee members are subject to life-long accountability for the IPOs authorised.[3]

In order to give a clearer picture of developments in other Asian markets, Figure 10 excludes IPOs by Chinese companies. One important observation from the figure is that the annual average amount for the other Asian companies declined from USD 27 billion to USD 22 billion between the two periods. Overall, throughout the period, Japanese companies[4] have raised the highest amount of equity capital followed by Hong Kong, China; Korea and India. The share of Japanese companies was around 32% of Asian IPO proceeds excluding China between 2000 and 2006, and dropped to an annual average of 7% in the years 2007 to 2011. The share of Japanese IPOs proceeds in Asia, excluding China, increased substantially during the 2012-2017 period, when it reached an average of 36%. The share of Japanese IPO proceeds saw a decrease in 2017 while ASEAN IPO proceeds experienced an increase of 18 percentage points.

Figure 10. IPO proceeds based on home jurisdiction of non-financial companies, excluding China



Source: OECD Capital Market Series dataset, see Annex for details.

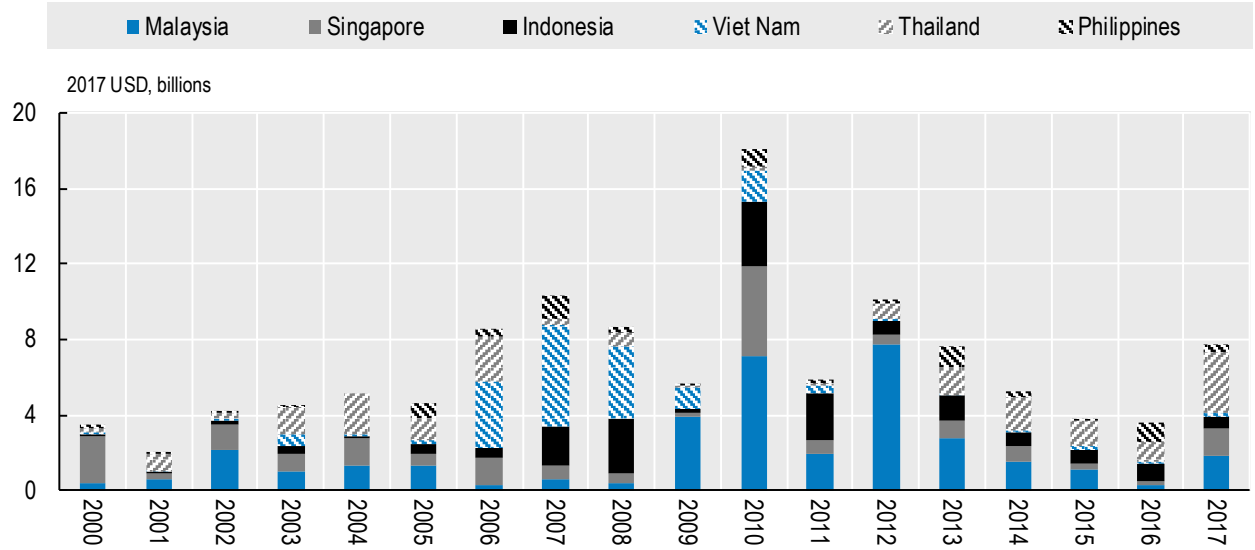
In 2017, IPOs by non-financial companies from ASEAN countries accounted for more than 40% of all Asian IPOs excluding China. Similarly, in 2008, 2010 and 2013 their share was almost 50% representing a total amount of USD 34 billion in equity raised. As seen from Figure 11, companies from Malaysia, Singapore and Indonesia raised record amounts of equity in 2010. However, since 2012, a clear downward trend was encountered and 2016 saw the second lowest issuance volume

[3] According to the CSRC, "No forbidden zones, full coverage, zero tolerance and life-long accountability" will be the guiding principle of the Public Offering Review Committee (CSRC, 2017b).

[4] The analysis in this report does not cover over-the-counter (OTC) market listings. JASDAQ in Japan was an OTC market until December 2004, when it had become a regulated stock exchange. IPOs made by JASDAQ listed companies since December 2004 are included in the analysis.

in 17 years. In 2017, however, the volume of ASEAN IPOs was close to 2013 levels. This increase was mainly driven by Thai IPOs, whose volume in 2017 was 3 times the amount in 2016. More than 50% of the total amount was raised by 4 energy companies. This included the largest IPO in more than a decade, which was issued by a large energy company (Gulf Energy Development) raising more than USD 700 million. Malaysian and Singaporean IPOs also experienced a significant increase in 2017.

Figure 11. IPO proceeds by ASEAN non-financial companies



Source: OECD Capital Market Series dataset, see Annex for details.

1.2. Trends in secondary public offerings

Fund raising through public equity markets is not limited to initial offerings. Companies that are already listed frequently tap public markets for additional capital through a secondary public offering (SPO). Secondary offerings can be made several years after the initial offering in order to, for example, re-capitalise the firm or finance a new investment.

In an SPO the company might issue new shares and sell them on the public market, or existing shareholders can decide to sell their privately held shares to the public. A company can also make a mixed offer which combines the issuance of new shares and the sales of existing privately held shares. When the company decides to issue new shares, the collected proceeds will be received by the company and can be used for corporate purposes including financing expansion plans. The newly issued shares will increase the equity capital of the company and the number of shares outstanding. When issuing new shares, existing shareholders who do not participate in the offer may risk a dilution of their voting power and the new share issuance could either increase or decrease the free-float of the company's shares.

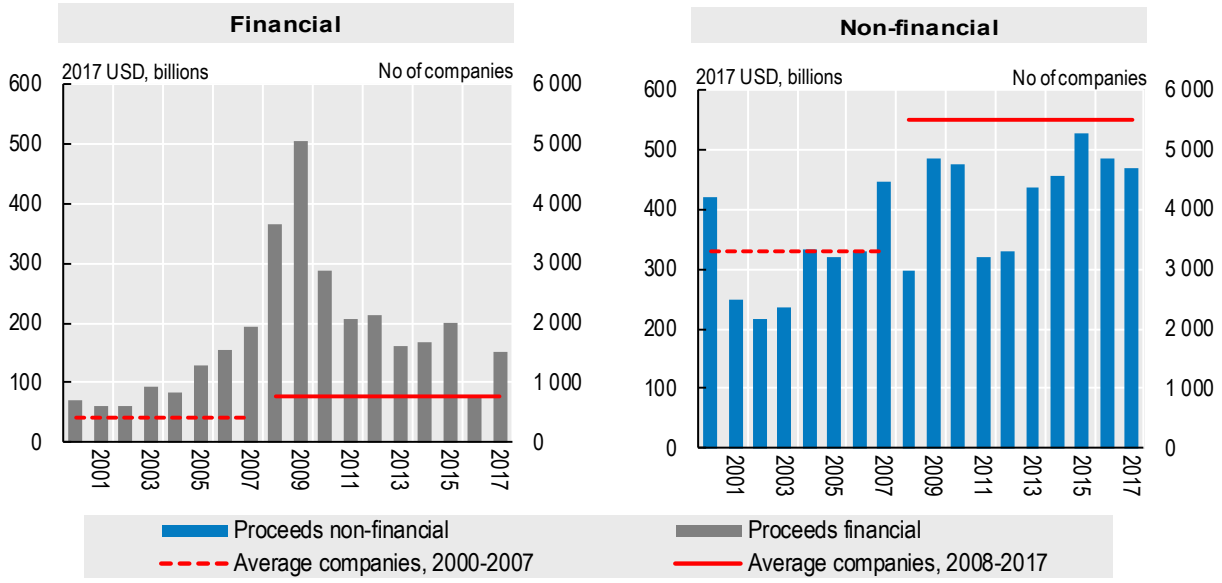
On the other hand, when shares have already been issued and are privately held, the shareholders selling them will be the ones receiving the proceeds of the offer. Investors offering their privately held shares in a secondary public offering are usually controlling shareholders, management, board members, venture capital or private equity firms. However, the selling shareholder can also be a company, a common situation in most Asian markets. In that case, the proceeds from the offering will be received by the owner company and not by the listed company. In general, when

an offer consists of already issued and privately held shares, the equity capital of the company and the number of shares outstanding will not change. Additionally, the remaining existing shareholders will not suffer from any dilution effect, as their ownership share will not change after the offering. Still, the free float of the company may increase, if more shares become held by the public.

This report covers all three types of secondary public offerings using either new shares, already issued and privately held shares or a combination of the two. A preliminary analysis of the type of shares offered shows that globally around 25% of the total amount raised through SPOs between 2000 and 2017 was related to a current owner selling part of his holdings. This also includes parent companies' sale of shares in subsidiaries. Such transactions were more common before 2007 compared to the rest of the period. In 2008 and 2009, 90% of the total amount raised through SPOs was through new share issuances. In addition, there are differences between countries in terms of the share that the owner sells to the public. In advanced markets around 30% of all SPO proceeds generally come from owner sales of shares, whereas it is around 20% in emerging markets.

Secondary public offerings globally outweigh the capital raised in initial public offerings for both financial and non-financial corporations. While companies worldwide have raised a total of USD 3.6 trillion through IPOs since 2000, they have raised no less than USD 10 trillion through SPOs. Notably, in the two years following the 2008 global financial crisis, financial companies relied to a significant extent on secondary offerings to raise more equity capital. In 2009 alone, the global amount of equity raised through SPOs reached almost USD 1 trillion, suggesting that they represent an important potential means of equity supply also in times of an economic downturn. Contrary to the global IPO trend, since the financial crisis, SPO proceeds and the number of companies raising capital through SPOs have remained strong (Figure 12). On average, the annual capital raised through SPOs between 2000 and 2007 was USD 424 billion compared to USD 661 billion between 2008 and 2017. The number of companies making a secondary public offering also increased. Since 2008 the average number of companies undertaking an SPO has increased by 69% from 3 720 between 2000 and 2007 to 6 270 companies between 2008 and 2017.

Figure 12: Global trends in secondary public offerings (SPOs)

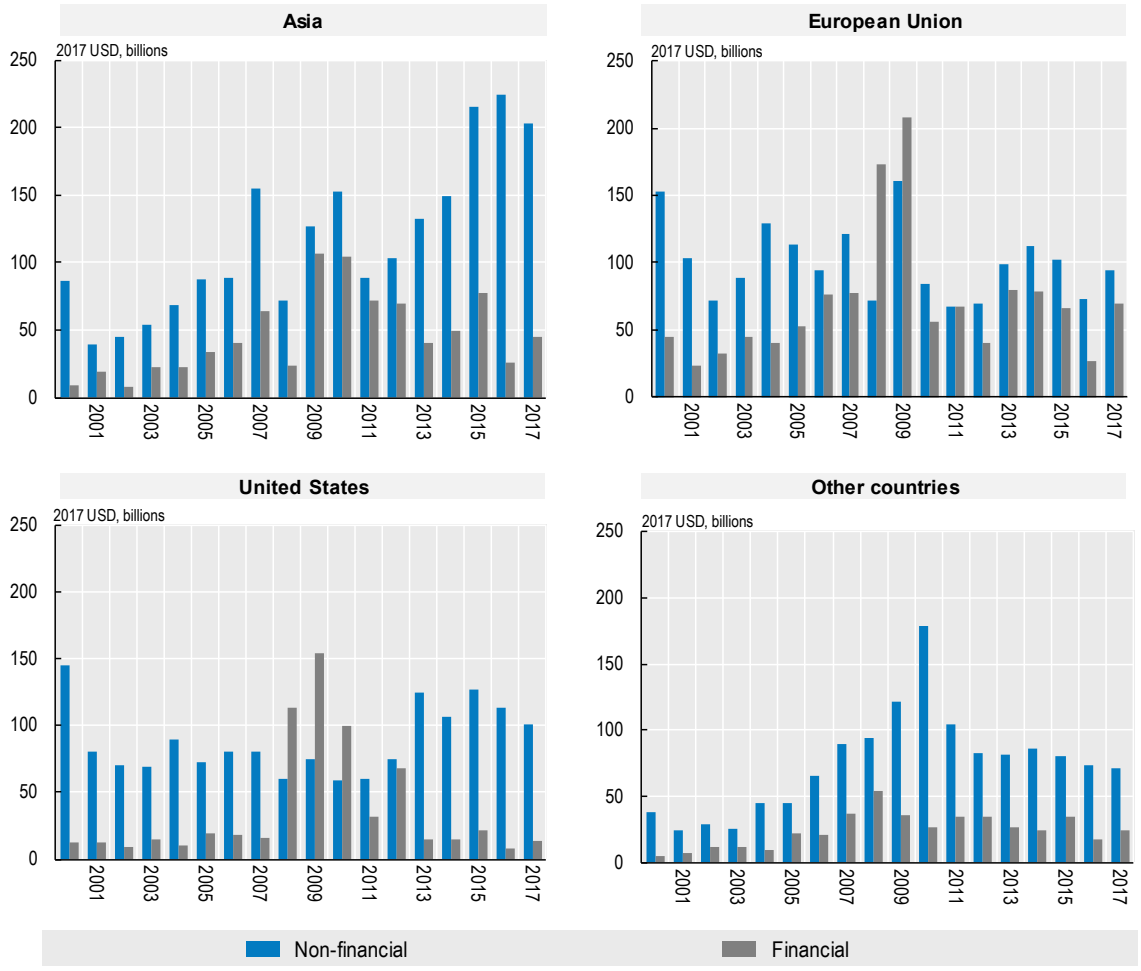


Source: OECD Capital Market Series dataset, Thomson Reuters, see Annex for details.

In addition, equity capital raised through SPOs has experienced a significant regional shift since the beginning of the millennium. Asian corporations' global share of capital raised through SPOs has increased from 19% in 2000 to 40% in 2017, mostly at the expense of European and US corporations. As seen in Figure 13, the total capital raised through SPOs by financial corporations in the aftermath of the financial crisis surpassed the amounts raised by non-financial companies in Europe and the United States. In fact, in 2009 the share of financial corporations in global SPO proceeds reached the highest level since 2000 at 51% of the total amount. Capital markets performed an important role in supporting the financial sector with large injections of equity capital during the crisis period. In the following years, an overwhelming portion of proceeds has gone to non-financial companies and represented almost 80% of all equity raised through SPOs in 2017.

Despite a surge in non-financial company SPOs in 2009 and 2010, the total amount raised in Asian financial company SPOs has not surpassed the amount raised through non-financial company SPOs since 2000. The exception is Japan which followed a similar trend to that of other advanced economies during the last ten years. Japanese financial companies raised a total amount of almost USD 50 billion in 2009, while the total proceeds from IPOs was below USD 1 billion. While SPOs by Japanese financial companies were negligible in 2015 and 2016, they reached USD 2.4 billion in 2017.

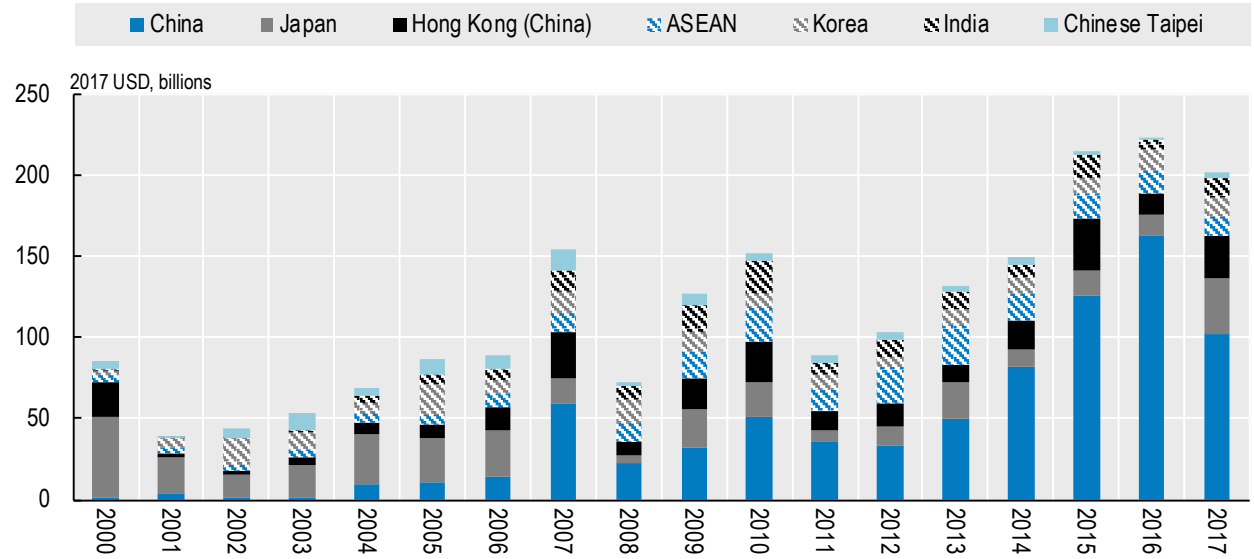
Figure 13. Regional trends in secondary public offerings (SPOs)



Source: OECD Capital Market Series dataset, Thomson Reuters, see Annex for details.

Asian non-financial corporations have been increasingly using secondary offerings to raise capital. In the 5-year period of 2013-2017, non-financial Asian companies tripled their use of secondary offerings compared to the first five years of the 2000s (Figure 14). The surge in total proceeds was not only the result of an increased use of SPOs by Chinese companies but rather a regional boost. For example, while ASEAN countries' average annual issuance volume was only USD 5 billion in the first five year period, it reached USD 17 billion per year in 2013-2017. Another important observation from the figure is that non-financial Korean companies almost regularly tap the SPO market with an annual average of USD 10 billion.

Figure 14. SPOs by Asian non-financial companies



Source: OECD Capital Market Series dataset, Thomson Reuters, see Annex for details.

National frameworks for secondary public offerings

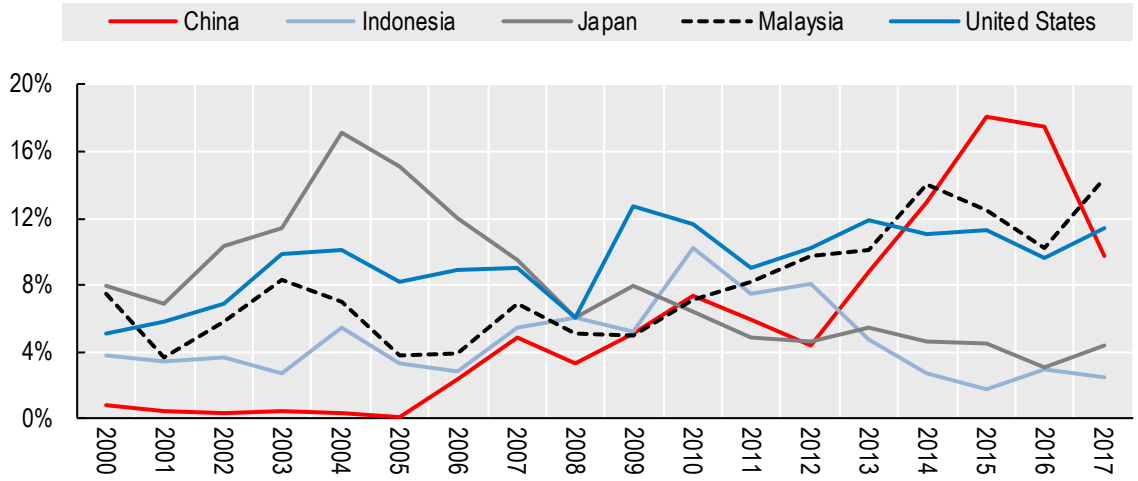
National frameworks for secondary public offerings differ from jurisdiction to jurisdiction depending on the regulatory approach and ownership structure in each jurisdiction. Some stock markets in Asia have grown as a result of partial privatisation of state-owned companies since the 1990s. In many cases, after privatisation, the state still controls or owns a significant stake of publicly listed companies. As shown in Part IV, governments and corporations/holding companies are important shareholders in Asian markets. This characteristic of Asian markets influences how the market for secondary equity offerings functions and how the collected proceeds are used. For example, when the selling shareholder is a company, it can use the proceeds from the offering for its own corporate purposes including investments and the reduction of debt. When the offering includes the sale of state-owned shares (privatisation), however, the transaction does not represent a capital-raising transaction for the company itself.

As described above, in an SPO, the company might issue new shares and sell them on the public market, or existing shareholders can decide to sell their privately held shares to the public. In China, however, until 2005, it was not possible for existing shareholders to sell their privately held shares to the public via an SPO. The transactions could only include rights, new shares and/or convertible bonds. The first companies joining the stock market in China were mostly SOEs, whose control was kept in the hands of the government after the IPO. At this first phase of capital market development, the Government designed a dual class share system with tradable and non-tradable

shares, where tradable shares were owned by the public and non-tradable shares (NTSs) by the government. NTSs that belonged to the other state-owned companies were ultimately owned by the central or local governments. By the end of 2004, around one third of the Chinese stock market was composed of tradable shares; the remaining shares were all non-tradable. In 2005, the Chinese government announced a reform aimed at eliminating non-tradable shares. The reform required holders of non-tradable shares to bargain beforehand with holders of tradeable shares and compensate them to gain liquidity for their shares. The compensation was established as a mechanism to avoid the 2001 experience, when the government invited companies to sell their shares to tradable shareholders without bargaining with them beforehand and it resulted in a significant decline in stock prices (Yeh, Shu, Lee and Su, 2009). By mid-2006 half of the companies in China had completed the split share reform (Sun and Tong, 2003; Huang, 2012).

Not surprisingly, the number of companies raising capital through a secondary public offering in China was modest before the split share reform. In fact, most of the capital raised after an IPO was done by the issuance of rights. Figure 15 shows the share of domestically listed companies making a secondary offering in their home market and excludes issuance of rights. Before 2005, very few companies listed in China raised capital through an SPO compared to other markets in the region and abroad.

Figure 15. Home market SPOs, as share of domestically listed companies



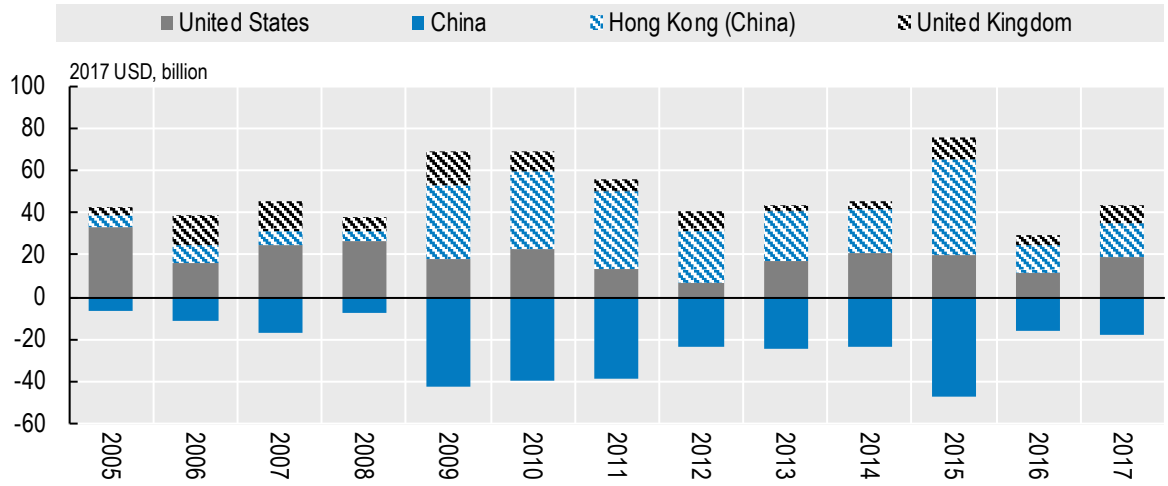
Source: OECD Capital Market Series dataset, Thomson Reuters, World Bank Data, see Annex for details.

In search for capital to finance growth expansion plans, Chinese companies have also made use of overseas markets. Figure 16 shows the amount of capital provided to foreign companies in selected markets. Jurisdictions like the United States, the United Kingdom and Hong Kong, China are net capital providers, meaning that the total capital raised through SPOs in their local stock exchanges surpasses the SPO capital raised by domestic companies. Chinese companies raised more capital through SPOs than the amount raised in the local market (reflected by negative values in Figure 16). This can be explained by a relatively strict regulatory framework for secondary offerings in China and by the fact that some large Chinese companies have decided to list and raise capital abroad targeting a more diversified pool of investors.

In China, the regulatory framework governing SPOs varies depending on the type of security issued. Based on “The Administration Measures of the Issuance of Securities by Listed Companies” released in 2006, SPOs can be carried out mainly through public offering or private placement. When SPOs are conducted through public offering, including right issues, open offers

and convertibles, corporations are subject to specific requirements in order to be authorised to issue the security. Corporations have to show positive accounting profit during the previous three consecutive fiscal years to be eligible for a public offering, while for open offers and convertibles, the requirements are stricter: the weighted average return on equity (ROE) during the previous three years should not be lower than 6%.

Figure 16. Capital provided through SPOs to foreign companies



Source: OECD Capital Market Series dataset, Thomson Reuters, see Annex for details.

Chinese corporations also face pricing requirements when issuing a secondary offering of shares. The subscription price for open offers should be at least the average market price of the previous 20 trading days or the average market price of the previous day; for rights issues, the newly offered shares should be limited to 30% of the existing shares, among others. In contrast to public offerings, shares offered through private placements have lower requirements, i.e. no profitability requirement. Private placements are still under CSRC supervision and require CRSC's approval. Moreover, a maximum of 10 investors can participate in the private placement, the newly offered shares cannot be sold within 12 months, and when the new shares are sold to controlling shareholders the lock-up period extends to 36 months (CSRC, 2007).

In Japan, secondary offerings were mostly structured as public offers of new or existing shares or a combination of both. Rights offerings were common in Japan because of the cumbersome regulatory procedure to use them. As a consequence, the amendment to the Financial Instruments and Exchange Act of Japan in 2011 aimed at facilitating the use of rights offerings. One of the main changes was exempting issuers – under certain conditions – from the obligation to provide a prospectus when using rights. In Korea, secondary public offerings usually take the form of new share issuances, which can be categorised as rights offerings or third-party allotments, while the latter must be supported by the company's articles of incorporation. Ordinary public offerings, when the right to subscribe shares is granted to the general public, are not common due to pre-emptive rights of existing shareholders.

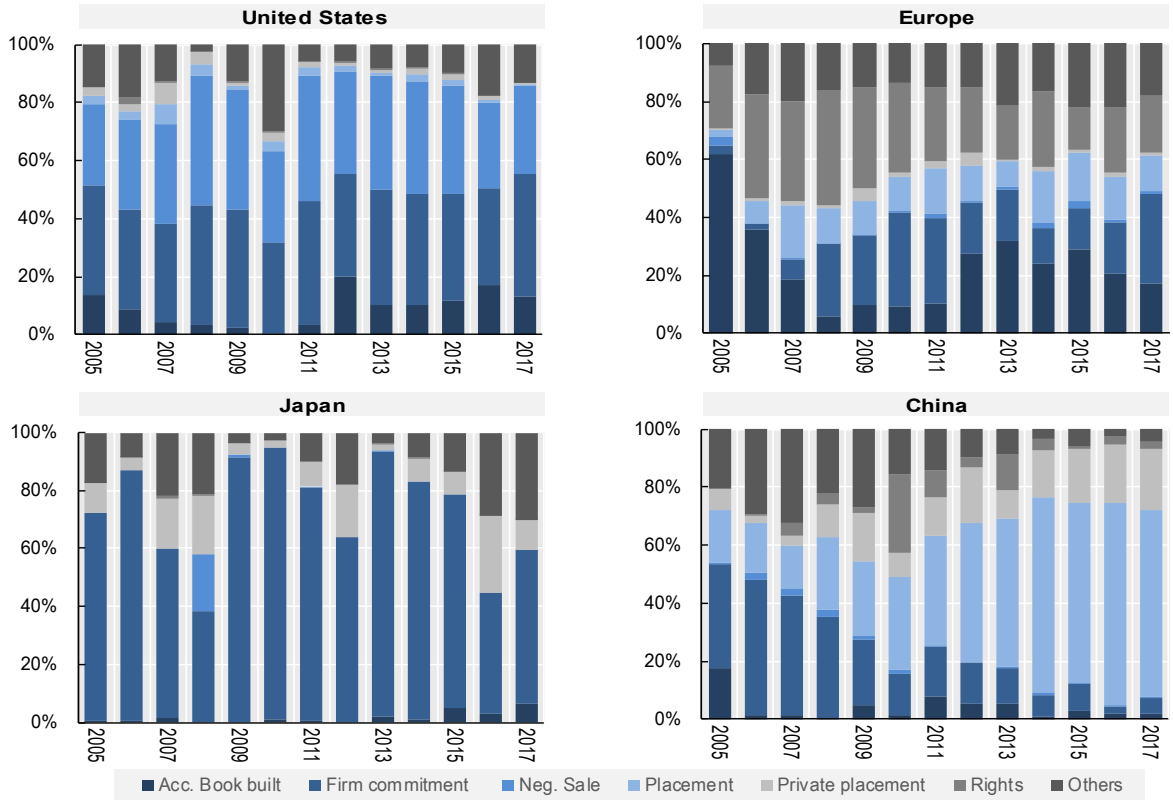
The offering techniques in SPOs differ between markets depending on the regulatory framework and the ownership structure. The most common SPO techniques for issuing new shares or to sell existing shares can be grouped into the following categories: 1) *accelerated book building* when the company makes a short-term controlled offering of shares; 2) *firm commitment* when the offer is bought by the underwriters and they absorb any securities that are not sold; 3) *negotiated sale*

when the terms of the issue are negotiated between the issuer and one underwriter only; 4) *placement* is a direct sale of securities to institutional investors; and 5) *private placement*, which in the US means the direct sale of securities to institutional investors without SEC-registration and in international markets typically means the sale of securities that are not widely listed; and 6) *rights issues* which represents an option that allows existing shareholders to buy shares of a common stocks issue at a discounted price before it is offered to the public. The remaining techniques are pooled into the category "Others".

Figure 17 shows the most popular offering techniques used across different markets. In Japan, firm commitment is the most popular technique used to raise capital in secondary offerings representing on average 70% of the capital raised through SPOs. In Europe, most of the capital raised between 2005 and 2017 used accelerated book building and rights. Both techniques account for on average half of the capital raised through SPOs. In the United States, firm commitment and negotiated sales represent on average 73% of the capital raised in SPOs. Differently from other markets, in China corporations use mainly placements, which may imply a less cumbersome issuance procedure than other techniques. Since 2012 the share of capital raised using placements in China has represented more than 60% of the total capital raised, and has continued to grow reaching 90% in 2016.

The fact that in Asia corporations and governments play an important role in the ownership of listed corporations has an impact on the channels used to raise capital in secondary offerings. Part IV of this report provides an overview of the ownership structure in Asian markets.

Figure 17. Offering techniques in secondary public offerings

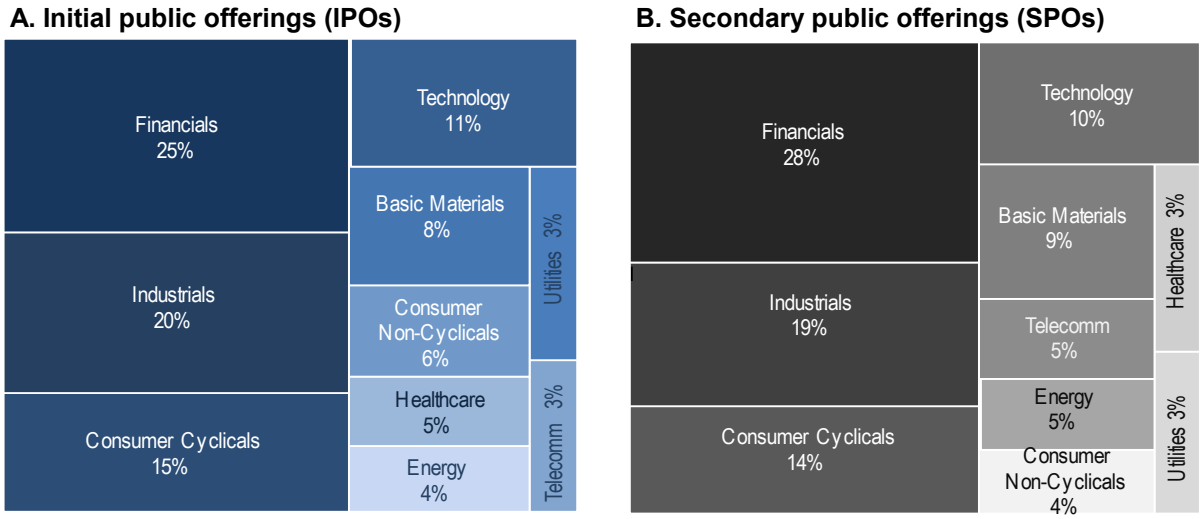


Source: OECD Capital Market Series dataset, see Annex for details.

1.3. Sectoral distribution of public equity financing

The sectoral distribution of public equity financing has followed a clear trend in Asia towards financial corporations. Figure 18 presents a breakdown of the total proceeds from IPOs and SPOs by Asian companies across sectors during the period between 2000 and 2017. It shows that companies from the financial sector have been the single largest users of both initial and secondary public equity offerings. Focusing on just IPOs, it shows that Financials (25%) represent the largest share, followed by Industrials representing 20% of all IPOs and 28% and 19% of all SPOs respectively. Similarly, the share of Technology public offerings is 10% over the period in Asia.

Figure 18. Sectoral distribution of the proceeds from public equity offerings by Asian companies, 2000-2017



Source: OECD Capital Market Series dataset, see Annex for details.

Table 1 shows the shifts in sectoral distribution of IPOs in five Asian jurisdictions before and after the 2008 financial crisis. The largest IPO market in the region, China, has with some exceptions experienced modest changes in sectoral distribution ranging between 2 to 5 percentage points. The two most important exceptions are the financial industry, which dropped 13 percentage points and the technology industry, which gained 8 percentage points. Japan, has experienced a significant shift to Industrials at the expense of Consumer Cyclicals and Technology. In Hong Kong, China, six out of the nine non-financial industries experienced a decrease in their share of total IPO proceeds, while Financials increased its share by 40 percentage points. Like in Japan, Technology experienced a significant drop in India and Hong Kong, China. In Korea, the share of Technology and Healthcare went up by 6 and 8 percentage points respectively.

Table 1. Changes in sectoral shares in IPOs, pre-crisis vs. post-crisis in percentage points

	China	Japan	Hong Kong (China)	Korea	India
Basic Materials	-2.2	-0.1	-4.4	1.6	0.0
Consumer Cyclicals	4.8	-9.0	-9.2	-20.0	-12.4
Consumer Non-Cyclicals	2.9	1.0	4.3	4.0	2.4
Energy	-5.1	-4.7	1.3	0.3	4.6
Financials	-13.4	4.8	40.5	6.7	30.1
Healthcare	4.3	3.1	4.7	8.5	2.9
Industrials	0.4	27.1	-11.0	-6.1	-3.9
Technology	8.4	-14.7	-4.5	6.3	-10.5
Telecommunications	-1.8	-1.9	-20.2	-1.2	-2.9
Utilities	1.6	-5.6	-1.7	0.0	-10.3

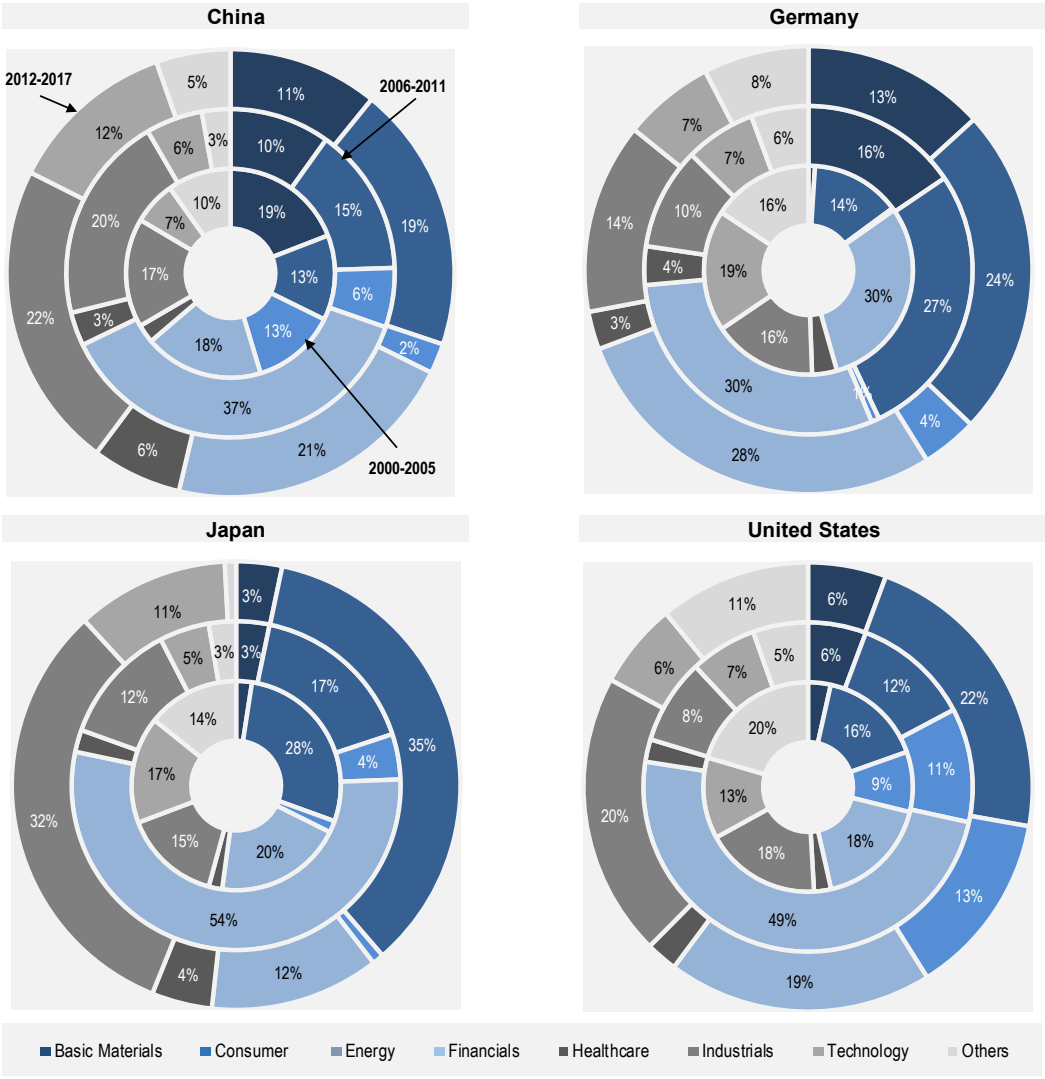
Note: The table shows the difference between the average sectoral share during the post-crisis period (2010-2017) and the pre-crisis period (2000-2007).

Source: OECD Capital Market Series dataset, see Annex for details.

Figure 19 focuses on the four largest economies in the world in terms of GDP as of end 2017 and exhibits the sectoral distribution of the total combined proceeds from IPOs and SPOs during the periods of 2000-2005, 2006-2011 and 2012-2017. Together, companies from the four countries raised a total of USD 2.2 trillion over the period 2012-2017, accounting for half of the total amount raised globally. Financials is the dominant industry in Germany since 2000, absorbing on average 30% of the total public equity financing. For the remaining economies, Financials was the largest industry during the 2006-2011 period, reaching 54% of the public equity proceeds in Japan and 49% in the United States. In Japan, Industrials and Basic materials have represented the largest share of public equity financing since 2012 with more than 30% each. In China, Energy has almost disappeared from the public equity market sphere accounting on average for 2% over the last period (2012-2017), compared to 13% between 2000 to 2005.

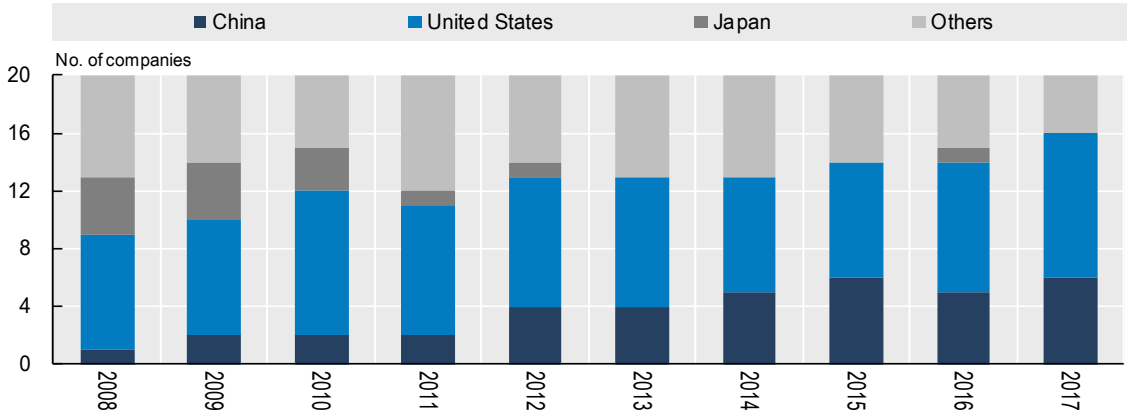
In the United States, Japan and Germany, the share of Technology almost halved between the first period (2000-2005) and last period (2012-2017). On the other hand, Chinese technology companies have increased their share in the public equity market from 7% in the first period to 12% in the last period. The same trend is observed when analysing the top 20 companies of the technology sector ranked by market capitalisation (Figure 20).

Figure 19. Sectoral distribution of public equity financing in selected countries, 2000-2017



Source: OECD Capital Market Series dataset, see Annex for details.

Figure 20. Global distribution of the top 20 tech-companies, ranked by market capitalisation



Source: Thomson Reuters.

PART II. GROWTH COMPANIES' USE OF PUBLIC EQUITY FINANCING

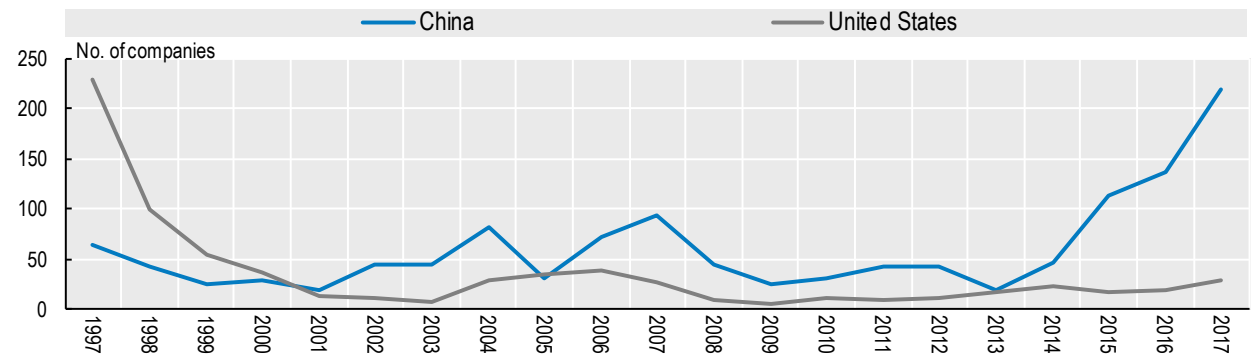
There are many reasons why companies use public equity financing and become listed on a stock exchange. For established companies, financing mergers and acquisitions and having better external monitoring can be important factors for such a decision. At the same time, companies that are relatively smaller and younger are often in need of new capital to finance growth opportunities. These growth companies play a critical role in the economy as they contribute to productivity and job creation by investing in research, innovation, human resources and fixed capital. Long-term and patient capital in the form of equity is well suited for growth companies that need to finance such forward looking investments that have an uncertain outcome.

This part provides an overview of the use of primary public equity markets by Asian growth companies during the 20-year period between 1997 and 2017. It also compares developments in Asia with some other major markets. In this report, growth company IPOs are defined as IPOs of less than USD 100M. Within this category, the report also identifies IPOs of less than USD 50M. Under the assumption that the average free float ratio for an initial offering is 25%, this means that the average market value of the two groups of growth companies would be below USD 200 and 400M respectively.

Globally, the average annual number of growth companies IPOs of less than USD 50M (USD 100M) was 997 (1 238) in the period 1997-2003. That number remained almost constant with 1 030 (1 205) companies during the period 2004-2010 and fell to 763 (957) for the period 2011-2017. However, the share of growth company proceeds globally compared to all non-financial company IPO proceeds remained the same in the 1997-2003 and 2011-2017 periods with a share of 7% (28%) for the IPOs of less than USD 50M (USD 100M).

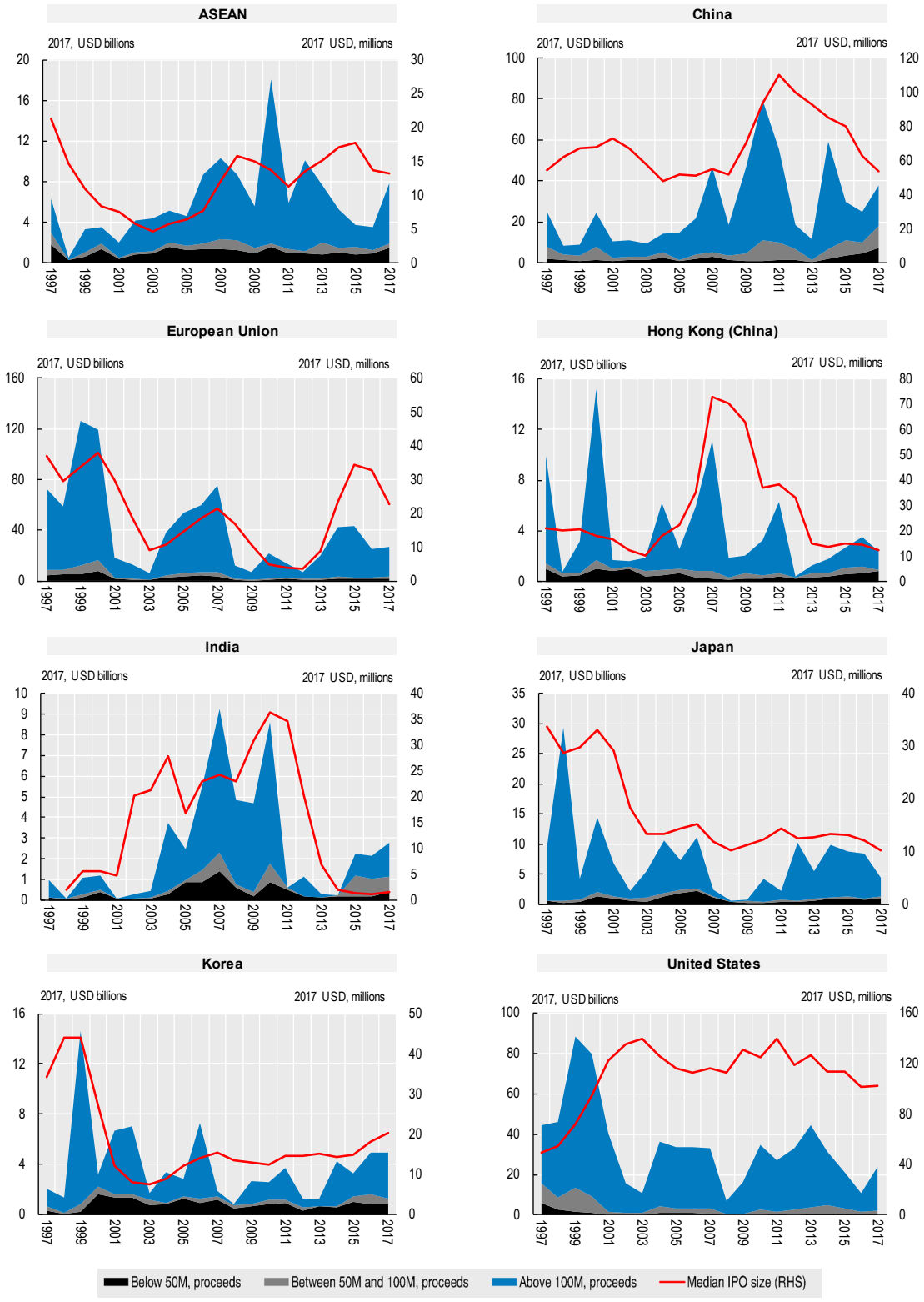
Behind these global figures, some significant regional trends can be identified. Figure 21 exhibits IPOs of less than USD 50M by Chinese and US non-financial companies over the period 1997-2017. In the US, the number of growth company listings was highest between 1997 and 1999 with a total number of 384 IPOs of less than USD 50M. Since 2000, however, this has declined to an annual average of only 20 companies. With respect to China, the development is quite the opposite. Since 2013, the number of IPOs by Chinese growth firms has been increasing, reaching 220 transactions in 2017. This is almost 5 times larger than the annual average over the period 1997-2012.

Figure 21. IPOs by Chinese and US non-financial growth companies



Source: OECD Capital Market Series dataset, see Annex for details.

Figure 22. IPOs by non-financial growth companies

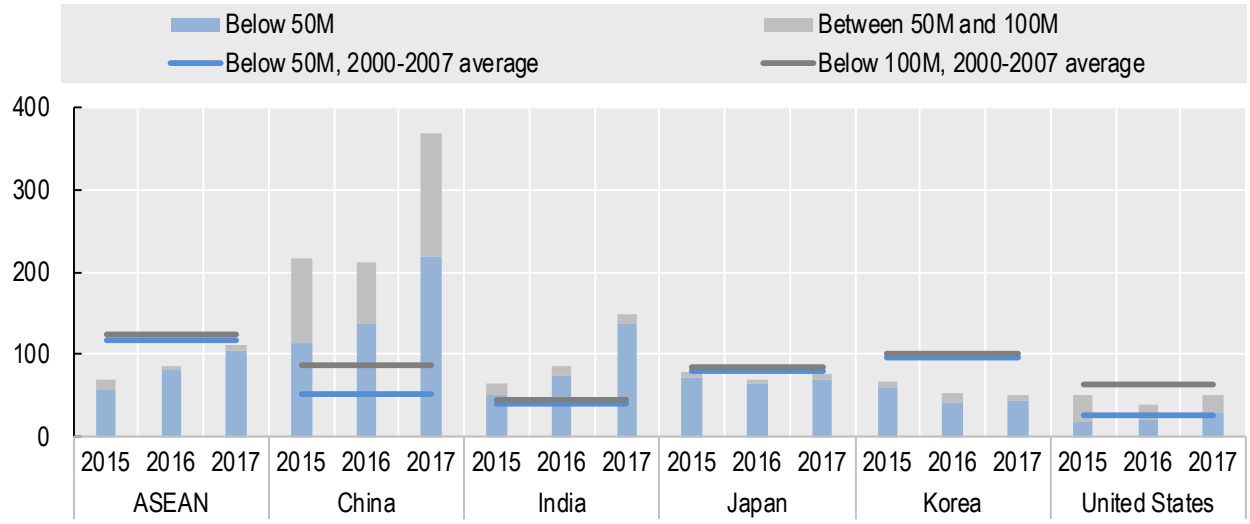


Source: OECD Capital Market Series dataset, see Annex for details.

Figure 22 provides a comparison between the European Union, the United States, the five largest Asian equity markets and the ASEAN countries as a group. As seen from the figure, IPOs below USD 50M have almost disappeared in the European Union and the United States since 2008. Japan also experienced a significant decrease between 2008 and 2013. But since then, Japanese growth company IPOs have rebounded somewhat and raised an annual average of almost USD 1 billion during the period 2014-2017. The total amount raised by Korean growth companies has been fairly constant over time, with the exception of 2012. One notable difference between Korea, Japan and China is that in the first two countries the majority of growth company IPOs were below the USD 50M threshold, whereas in China, the majority of growth company IPOs since 2008 were between USD 50M and 100M. In ASEAN, total proceeds from growth company IPOs were more evenly distributed with respect to the size of the IPO.

As discussed above, the number of growth company IPOs has declined globally over a 20-year period. Figure 23 shows Asian and US growth company IPOs in the last three years compared with the period 2000-2007. Only in China and India did the average number of growth company IPOs in 2015-2017 reach above the 2000-2007 averages. While Japanese growth company IPOs for the last three years have been close to the pre-crisis levels, the number of Korean and US growth company IPOs were all significantly below their 2000-2007 averages.

Figure 23. Number of non-financial growth company IPOs



Source: OECD Capital Market Series dataset, see Annex for details.

Public equity offerings are often seen as an important source of funding for growth companies in future oriented industries with relatively high risk. Looking at a sectoral breakdown of growth company IPOs, Table 2 shows that, during the period 2013-2017, industries like technology and healthcare, for example, accounted for 68% of all growth company IPOs below USD 100M in the United States and 41% in the European Union and 37% in Japan. The share of proceeds for the technology and healthcare sectors in growth company IPOs was high also in China and Korea with an average of 22% and 38% respectively. In India; China and Hong Kong, China industrials represented around 30% of all IPOs under USD 100M. This is considerably higher than in other countries, particularly the US.

Table 2. Sectoral breakdown of growth company IPOs as a percentage of total proceeds, 2013-2017

	China	European Union	Hong Kong (China)	India	Japan	Korea	United States
Basic Materials	15%	3%	2%	5%	4%	8%	1%
Consumer Cyclicals	20%	16%	32%	28%	25%	24%	7%
Consumer Non-Cyclicals	6%	4%	12%	11%	4%	11%	1%
Energy	2%	2%	1%	2%	0%	0%	1%
Financials	2%	14%	9%	8%	8%	3%	15%
Healthcare	8%	25%	9%	14%	9%	14%	54%
Industrials	32%	18%	28%	27%	20%	16%	5%
Technology	14%	16%	6%	6%	28%	24%	14%
Telecommunications	1%	1%	0%	0%	0%	0%	1%
Utilities	1%	1%	0%	0%	1%	0%	0%

Source: OECD Capital Market Series dataset, see Annex for details.

PART III. ASIAN STOCK EXCHANGES AND SECONDARY PUBLIC EQUITY MARKETS

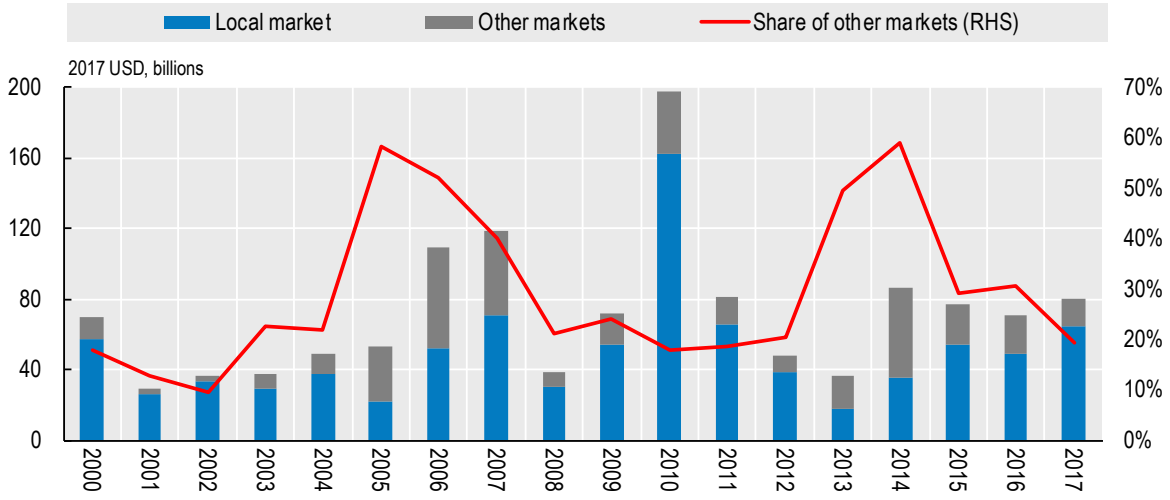
A key element of public equity markets are the marketplaces, most importantly stock exchanges, that play a critical role in matching companies that need access to external equity capital with investors that are in search of investment opportunities. In the process of designing policies directed to improve the functioning of capital markets it is therefore important to understand how stock markets are structured, how trading venues function and the important changes that they have undergone during the last decade or so. Stock exchanges serve some key functions that are also in the interest of the public. These include ensuring an efficient price discovery process, certain regulatory functions, supervision and sometimes enforcement responsibilities.

Part I and II of this report provided an overview of Asian companies' use of public equity financing from the perspective of the nationality of company. This part focuses on the domicile of the markets and classifies transactions based on the national domicile of the stock exchange where the offering was made. It also provides a brief overall view of the stock exchange landscape in Asia.

3.1. Stock markets in Asia

Figure 24 shows the amount of public equity raised through IPOs by Asian companies in local markets and other markets respectively. From 2000 to 2004, at least 80% of all equity capital raised by Asian companies was through offerings in the company's local market. In five of the years between 2005 and 2017, however, offerings in other markets exceeded 40% and reached almost 60% in 2005 and 2014.

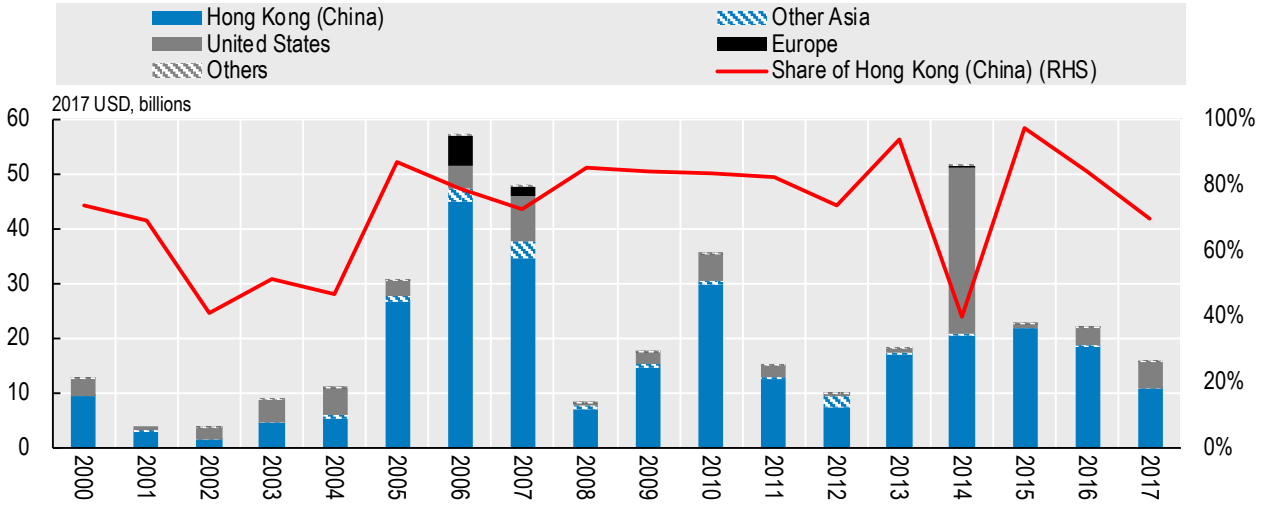
Figure 24. IPOs by Asian companies in local market and other markets



Source: OECD Capital Market Series dataset, see Annex for details.

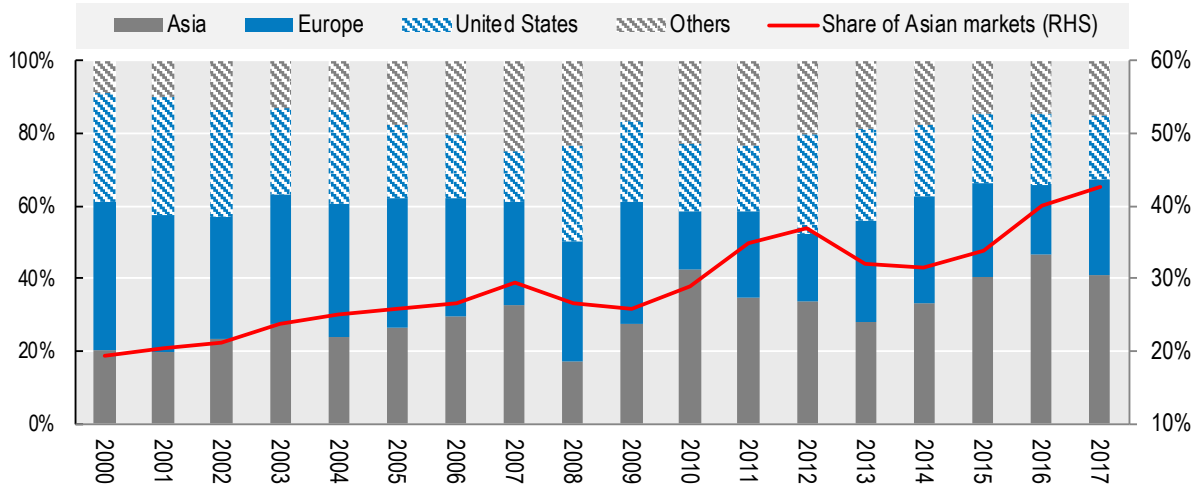
A more detailed analysis of the geographical distribution of IPOs by Asian companies outside their local market is presented in Figure 25. It reveals that every year since 2005, when the use of other markets started to increase, Hong Kong, China has been the single largest recipient of Asian company listings outside the local market. The only exception is 2014 when a very large Chinese technology company (Alibaba) listed in the US. The US has always been the main market for Asian company offerings outside the region. In some years before 2008, there was also a considerable amount of listings in European markets but this has largely come to a halt. It should be noted that nearly all proceeds raised by Asian companies in Hong Kong, China were raised by Chinese companies.

Figure 25. IPOs by Asian companies outside their local market



Note: Share of Hong Kong, China is displayed as a three-year moving average.
Source: OECD Capital Market Series dataset, see Annex for details.

Figure 26. Share of Asian markets in the global public equity market, as percentage of total proceeds from IPOs and SPOs

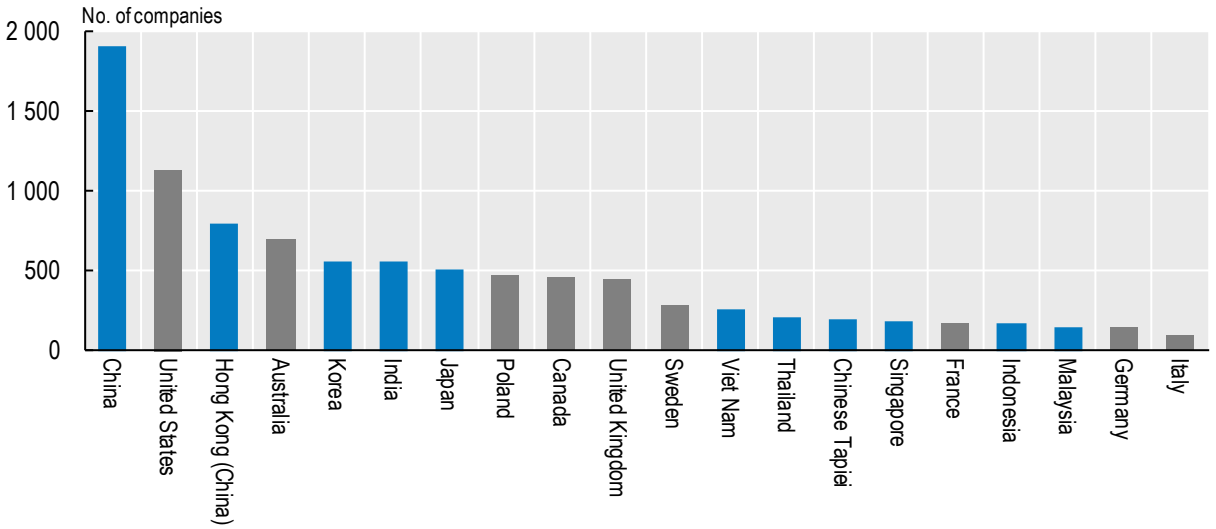


Note: Share of Asian markets is displayed as a three-year moving average.
Source: OECD Capital Market Series dataset, see Annex for details.

One important consequence of the increased use of public equity financing by Asian companies and their reliance on both local markets and other Asian stock markets has been an increasing share of the Asian stock markets of global public equity offerings. The share of Asian markets has grown steadily during the last 20 years and reached 43% of the global volume of public equity in 2017 (Figure 26).

The high share of Asian markets in the global public equity market is even more pronounced when looking at the number of IPOs. As seen in Figure 27, 11 of the top 20 markets in terms of non-financial IPOs globally during the last ten years are in Asia. The Chinese mainland market is by far the top market with the highest number of listings followed by the United States. Supported by the mainland Chinese company listing, the Hong Kong, China market is the third largest market globally.

Figure 27. Top 20 markets by number of non-financial company IPOs, 2008-2017



Source: OECD Capital Market Series dataset, see Annex for details.

3.2. Stock exchanges in Asia

The stock exchange industries in the United States and Europe have experienced important changes since the mid-1990s. Most traditional stock exchanges have either been acquired by another exchange or become part of a stock exchange group. In most cases the parent companies of exchanges have also become public companies with their shares listed and traded on one or more of their own stock exchanges. At the same time, new venues for trading have emerged, such as alternative trading systems (ATP) in the US and multilateral trading facilities (MTF) in Europe.

Stock exchanges in developed Asian economies have also been part of this transformation. For example, Japan Exchange Group (JPX) was established in 2013 as a result of the business combination between Tokyo Stock Exchange Group and Osaka Securities Exchange. Today, the parent company of the Tokyo Stock Exchange, the JPX, is listed on the exchange. The stock exchanges in Singapore and Hong Kong, China are also listed companies. Contrary to the situation in Europe and the United States, developed Asian markets do not face fierce competition from non-stock exchange trading venues. In 2015, for example, 33% of all trading in the United States and around 50% of all trading in major European markets took place on off-exchange trading

venues (OECD, 2016). In Japan, however, Tokyo Stock Exchange still accounts for almost all stock trading in domestic listed companies (JSRI, 2016).

Table 3. Stock exchanges in the Asia region, as of end 2017

	Stock exchange	Legal status	Self-listing	Market capitalisation (USD billion)	Number of listed companies	Trading volume (USD billion)
Bangladesh	Dhaka SE	Private company	No	44	302	27
	Chittagong SE	Private company	No	42	270	2
China	Shanghai SE	State-owned	No	5 084	1 396	7 558
	Shenzhen SE	State-owned	No	3 618	2 089	9 167
Hong Kong (China)	Stock Exchange of Hong Kong	Joint Stock Company	Yes	4 351	2 118	1 959
India	National SE	Joint Stock Company	No	2 351	1 897	1 013
	Bombay SE	Joint Stock Company	No	2 332	5 616	149
Indonesia	Indonesia SE	Private company	No	521	566	94
Japan	Tokyo SE	Joint Stock Company	Yes	6 223	3 604	5 805
Korea	Korea Exchange	Joint Stock Company	No	1 772	2 134	1 901
Malaysia	Bursa Malaysia	Joint Stock Company	Yes	453	901	128
Mongolia	Mongolian SE	Self-regulatory organisation	No	1	218	0
Pakistan	Pakistan SE	Private company	Yes	78	559	12
Philippines	Philippine SE	Joint Stock Company	Yes	290	267	34
Singapore	Singapore Exchange	Joint Stock Company	Yes	787	750	213
Chinese Taipei	Taiwan SE	State-owned	No	1 073	924	773
	Taipei Exchange	State-owned	No	112	744	252
Thailand	Stock Exchange of Thailand	State-owned	No	549	688	326
Viet Nam	Ho Chi Minh SE	State-owned	No	115	344	38
	Hanoi SE	State-owned	No	10	385	7

Source: World Federation of Exchanges and stock exchanges' websites.

In emerging markets the consolidation of the stock exchange industry has been mostly through M&As at the national level. For example, two stock exchanges in Indonesia merged in 2007 to form the Indonesia Stock Exchange. Also the three Pakistani stock exchanges recently underwent a merger and now operate as Pakistan Stock Exchange. While it is a common phenomenon that stock exchanges operating in advanced economies have transformed to become listed on their own exchange, the picture is less homogenous in emerging markets. Stock exchanges in Chinese Taipei, Thailand and Viet Nam are still run as state-owned enterprises. Also, the two largest stock exchanges in Asian emerging markets, which are both in China, operate as semi-public institutions and are membership institutions governed by the China Securities Regulatory Commission (CSRC). The stock exchanges in Malaysia, Pakistan and the Philippines, on the other hand, have transformed and are now listed companies on their own markets. Similarly to developed Asian

economies, non-exchange alternative trading platforms are not a significant feature in the Asian stock exchange landscape.

In addition to an overview of the legal status and listing information, Table 3 also presents some key indicators for Asian stock markets. Tokyo Stock Exchange had the highest market capitalisation as of end 2017, followed by the two Chinese exchanges and the Stock Exchange of Hong Kong. In terms of total annual trading volume the ranking was opposite: two Chinese exchanges had the highest volume followed by Tokyo Stock Exchange. In terms of trading volume, these three stock exchanges ranked among the 10 major stock exchanges worldwide by the end of 2017.

In order to better compare the size of the stock markets, Table 4 relates market capitalisation to GDP. When benchmarking against the size of the economy, the ratio of market capitalisation to GDP was highest in Hong Kong, China; Singapore; Chinese Taipei and India; and lowest in Mongolia, Pakistan and Bangladesh. Table 4 also includes two simple indicators to illustrate stock market liquidity. The first one is the ratio of the total value of shares traded divided by GDP while the second relates the total value of shares traded to the market capitalisation (turnover ratio). Similarly to the stock market capitalisation ratio, turnover ratios for China, Korea and Japan far exceed those of most other countries. The liquidity ratios are lowest in the Philippines, Pakistan, Indonesia and India. Interestingly, with a relatively low market turnover and a high market capitalisation, Hong Kong, China's turnover ratio is comparatively low. The same is true for Singapore.

Table 4. Key indicators for Asian exchanges, as of end 2017

	Stock exchange	Market capitalisation/GDP	Total value traded/GDP	Turnover
Bangladesh	Dhaka SE and Chittagong SE	0.33	0.11	0.33
China	Shanghai SE and Shenzhen SE	0.72	1.39	1.92
Hong Kong (China)	Stock Exchange of Hong Kong	12.73	5.73	0.45
India	National SE and Bombay SE	1.79	0.44	0.25
Indonesia	Indonesia SE	0.51	0.09	0.18
Japan	Tokyo SE	1.28	1.19	0.93
Korea	Korea Exchange	1.15	1.24	1.07
Malaysia	Bursa Malaysia	1.44	0.41	0.28
Mongolia	Mongolian SE	0.09	0.03	0.35
Pakistan	Pakistan SE	0.26	0.04	0.15
Philippines	Philippine SE	0.93	0.11	0.12
Singapore	Singapore Exchange	2.43	0.66	0.27
Chinese Taipei	Taiwan SE and Taipei Exchange	2.05	1.77	0.86
Thailand	Stock Exchange of Thailand	1.21	0.72	0.59
Viet Nam	Ho Chi Minh SE and Hanoi SE	0.57	0.20	0.35

Source: World Federation of Exchanges, stock exchanges' websites and IMF World Economic Outlook database.

3.3. Regional and global integration of Asian stock markets

Stock markets have four key elements; (1) primary markets where companies offer their securities to investors, (2) secondary markets where securities are traded, (3) the activities of intermediaries, including underwriters and brokerage houses, and (4) investors, including institutional investors and asset managers. The integration of national stock markets is multidimensional, covering aspects of stock markets ranging from corporations' use of to investors ability to invest in non-

domestic markets. It also includes the ability of exchange operators and capital market intermediaries to operate in foreign markets.

The increase in Asian capital markets activity since 2000 has triggered several national and regional initiatives aiming to increase integration within regional and global capital markets. As one of the fastest-growing stock markets combined with the rising interest of foreign investors, the Chinese market has recently implemented important changes.

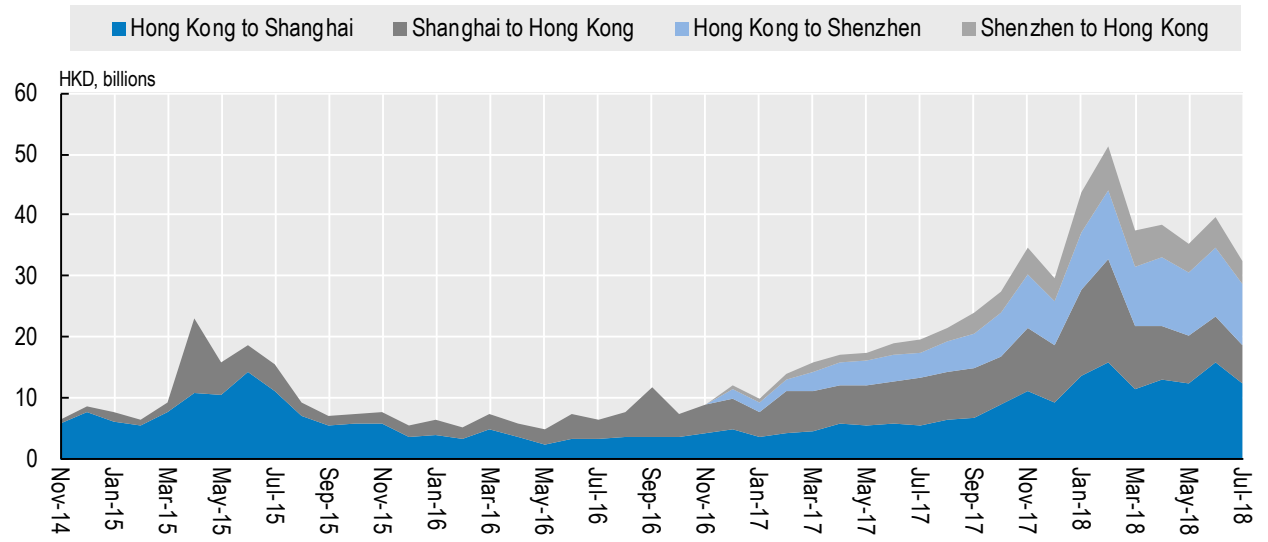
Foreign investors had been historically restricted from directly investing in the China Mainland stock market. They were only allowed to invest in foreign currency denominated shares – known as B shares – which are less liquid compared to Renminbi-denominated ones. To grant foreign investors access to the Chinese market, several programmes were introduced such as the Qualified Foreign Institutional Investor (QFII) and Renminbi Qualified Foreign Institutional Investor (RQFII), which allow foreign institutional investors to participate in the mainland domestic market. However, these two programmes only give access to institutional investors, but not to retail investors. In 2014, the Stock Connect Programme was initiated under the Mutual Market Access Programme between the Hong Kong and Shanghai Stock exchanges, which provides, among other investors, non-Chinese retail investors with access to mainland Chinese stocks. Later in 2016, a similar programme was introduced between the Hong Kong and Shenzhen Stock exchanges.

Under these two stock connect programmes, international investors, both institutional and retail, are able to access the mainland China market via the Hong Kong exchange, while mainland investors can trade Hong Kong H shares via Shanghai/Shenzhen exchanges. However, there are still certain limits as quotas are applied to the daily trading. The maximum daily trading volume was originally set to be RMB 13 billion for the Northbound trading (from Hong Kong into Shanghai/Shenzhen) and RMB 10.5 billion for the Southbound trading (from Shanghai/Shenzhen to Hong Kong), which was increased to RMB 52 billion and RMB 42 billion respectively in May 2018 to meet the increasing investor demand, especially after the inclusion of Chinese A shares in MSCI index. Moreover, mainland investors are required to have at least RMB 0.5 million in trading account balance to participate in the programmes.

These stock connect programmes have also paved the way for the MSCI inclusion as they have significantly improved institutional investors' access to A shares. Under the QFII and RQFII programmes, only licensed institutional investors are eligible to trade in mainland China's stock market via a quota-based scheme and there are criteria to obtain a trading license, such as having at least five years of experience in securities business. At the same time, the stock connect programme is a less-restricted mechanism for institutional investors, providing them an additional channel and easier access to the mainland China market.

Figure 28 illustrates the average daily trading volume through the stock connect programmes between the two mainland exchanges and the Hong Kong Exchange. As seen from the figure, the total turnover volume through the stock connect has increased from HKD 4 072 billion in 2015 to HKD 7 619 billion in 2017. Importantly, it has not only increased international investors' access to mainland stocks, but also mainland investors' access to Hong Kong listed stocks. Indeed, while the share of mainland to Hong Kong trading volume was 28% of the total in 2015, it increased to 40% in the first six months of 2018.

Figure 28. Stock Connect average daily trading volume



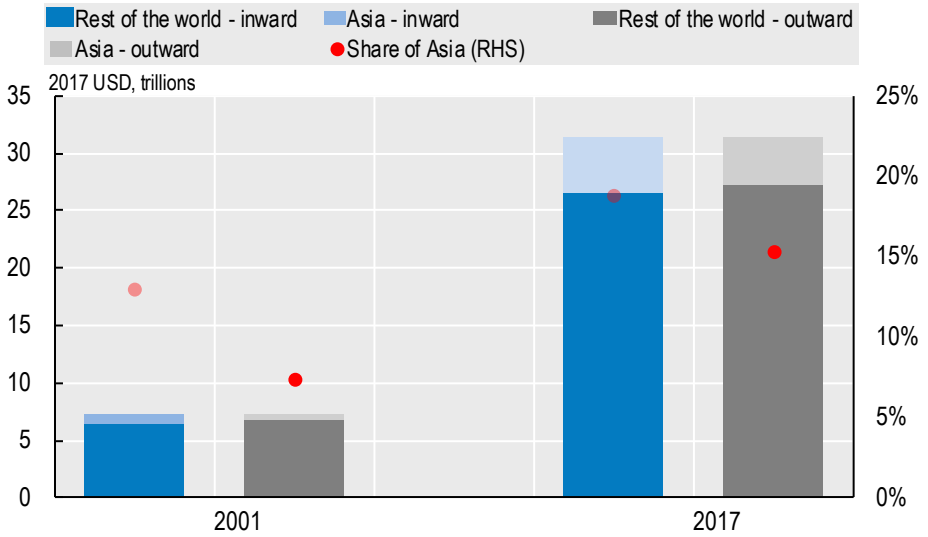
Source: Hong Kong Stock Exchange.

As mentioned, supported by the improved market accessibility to the A shares market as a result of the stock connect programmes, MSCI has decided to partially include A shares in its emerging markets index after four consecutive years of consultation. After the initial inclusion of 5% of A shares in May and August 2018, China stocks, including H shares listed in Hong Kong, already accounted for around than 31% of the index. Since the MSCI index is tracked by a large number of passive institutional investors, the inclusion may in the future significantly change the investor landscape in the mainland market, which is currently dominated by domestic retail investors. Recently, MSCI has launched another consultation round with an aim to increase the China inclusion factor from 5% to 20%, which will further increase the Chinese stock share in the index. According to MCSI, a hypothetical 100% inclusion in the future would increase the Chinese shares' weight in the index from 31% to 42%, based on May 2018 market capitalisation (MSCI, 2018).

The trend towards greater foreign investor participation has not been limited to the Chinese stock market. For example, Tokyo Stock Exchange, the largest exchange in the region by total market capitalisation as of end 2017, has also seen a surge in foreign ownership of listed shares. Foreign investors' share, mostly institutional investors, has increased from 6% to 30% between 1980 and 2016 (BoJ, 2018). To broaden the perspective to the regional level, cross-border portfolio investments can be used as an indicator of both regional and global integration.

Figure 29 shows that, at the global level, foreign equity portfolio investments have increased from USD 7 trillion in 2001 to USD 32 trillion in 2017, with Asia's share of both inward and outward portfolio investment growing steadily. Asia's share of outward portfolio equity investment increased from 7% in 2001 to 15% in 2017, while the inward share increased from 13% in 2001 to 19% in 2017, making Asia a net recipient of foreign portfolio equity investment.

Figure 29. Global foreign portfolio equity investment

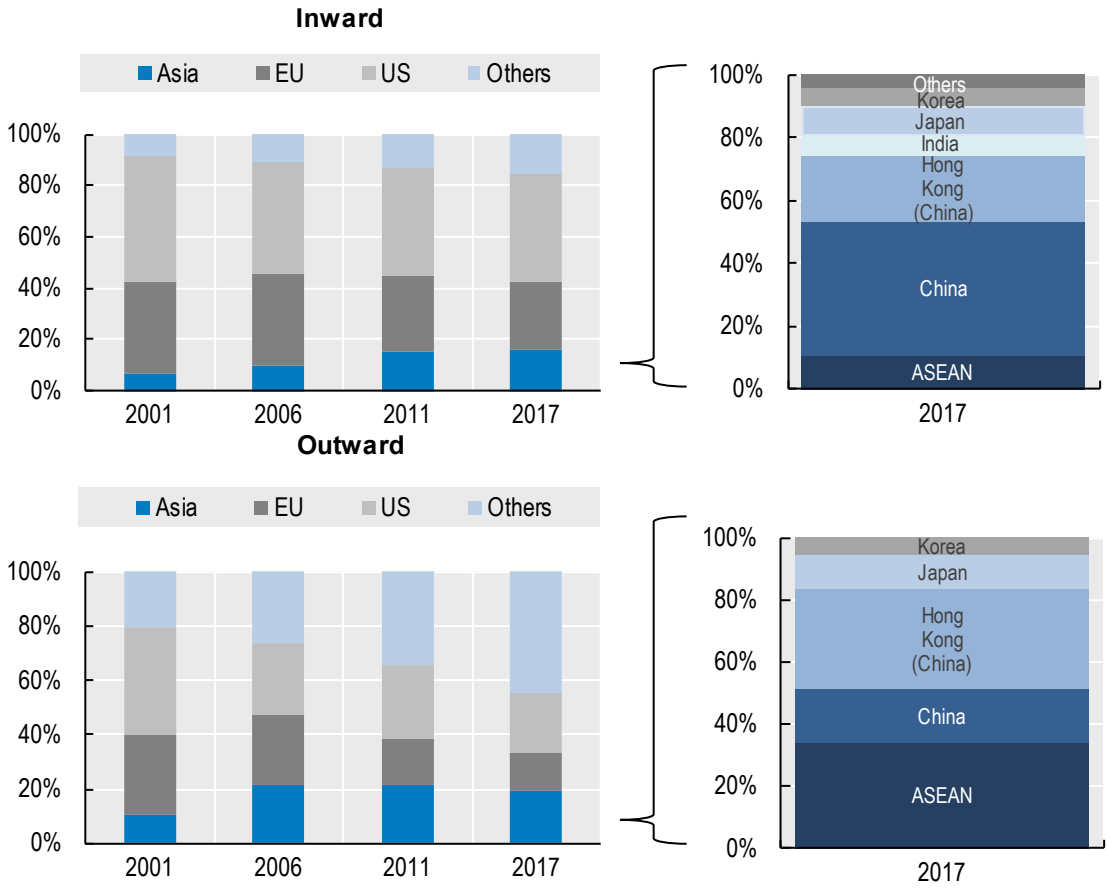


Source: Coordinated Portfolio Investment Survey, IMF.

Figure 30 provides a detailed picture of the distribution of foreign inward and outward portfolio equity investments in Asia. It shows the United States is a major source of Asia's inward portfolio equity investment, accounting for 42% of the total inward portfolio equity investment in 2017. Despite the relative decline from 36% in 2001 to 26% in 2017, the European Union remains Asia's second largest source of inward portfolio equity investment. The intra-regional share of inward portfolio investment has steadily increased from 6% in 2001 to 16% in 2017, with China contributing the largest share (42%) of the total regional inward equity investment. The second largest share of regional inward investment came from Hong Kong, China (21%), followed by Japan (9%).

In terms of inter-regional outward portfolio equity investment, Asia's share increased from 10% in 2001 to 19% in 2017, with Hong Kong, China and China together representing almost 50% of the regional destinations. Still, Asia's foreign portfolio equity investments are located mostly outside the region. While the shares of both the US and EU have decreased over the years, there has been a significant rise in portfolio equity investment to other destinations, mainly driven by investments in the Cayman Islands (31% in 2017). From a global perspective, total reported portfolio investment into the Cayman Islands was almost USD 3 trillion by the end of 2017, with the US contributing the largest share of USD 1.3 trillion, followed by Japan (USD 0.65 trillion) and Hong Kong, China (USD 0.58 trillion). As such, Japan and Hong Kong, China are responsible for about 40% of total portfolio equity investment into the Cayman Islands, which is potentially serving as a conduit for investments in the US equity market (see Fitchner, 2016), targeting mainly mutual fund units.

Figure 30. Distribution of Asian foreign portfolio equity investment



Source: Coordinated Portfolio Investment Survey, IMF.

An important initiative at regional level has been the ASEAN's plan for regional capital market integration. The aim is to strengthen regional growth by improving financial intermediation, capacity, and risk management as well as lowering vulnerabilities to external shocks and market volatility. Proposed by the ASEAN Capital Markets Forum (ACMF), the plan was endorsed by ASEAN Finance Ministers in 2009, covering a clear roadmap with strategic initiatives until 2015. This included three broad themes related to the creation of an environment for regional integration, a market infrastructure, regionally focused products and intermediaries and, finally, the reinforcement of the implementation process. By the end of 2015, key milestones had been reached, facilitating cross-border activities such as fundraising, the distribution of products and services, and enlarging ASEAN's investor base (see Box 1).

In order to further drive regional integration, the ACMF set up the ACMF Vision 2025 "of being an inter-connected, inclusive and resilient ASEAN capital market", covering two action plans over a 10-year period. For the first phase (2016-2020), six key priorities have been identified: (1) Improving regional infrastructure and connectivity; (2) strengthening cohesiveness in regulations and practices; (3) promoting ASEAN asset classes; (4) fostering the mobility of professionals; (5) increasing investor participation; and (6) promoting stakeholder interaction, co-operation and co-ordination. By the end of 2020, the achievements of the first phase will be evaluated, forming the basis for the establishment of the second action plan (2021-2025).

Overall, the developments so far suggest that, while the pace of regional integration has increased in recent years, Asian stock markets remain more integrated with global stock markets than at a regional level. The majority of intra-regional cross-border equity portfolio holdings are concentrated in a few Asian economies, with transactions from and to Hong Kong, China and China accounting for more than half of the intra-regional total.

Box 1. Key milestones reached: the ASEAN Capital Markets Forum Implementation Plan 2009

- **Expedited Entry of Secondary Listings**
  In 2012, regulators from Malaysia, Singapore and Thailand signed a memorandum reducing the time-to-market for companies seeking a secondary listing in a participating ASEAN country to 35 business days.

- **Implementation of ASEAN Disclosure Standards**
  This framework enables issuers of debt and equity to comply with a single set of disclosure standards for prospectuses. Implemented by Malaysia, Singapore and Thailand in 2013.

- **Streamlined Review Framework for Common Prospectuses**
  In 2015, a Memorandum of Understanding (MoU) was signed by Malaysia, Singapore and Thailand in order to synchronise the review process of prospectuses for securities offering or listing applications.

- **ASEAN Trading Link**
  In order to promote intra-ASEAN cross-border trading of equity, the ASEAN Trading Link connects stock exchanges in Malaysia, Singapore and Thailand.

- **ASEAN Corporate Governance Scorecard**
  Introduced in 2011, this initiative assesses Corporate Governance standards and practices of ASEAN publicly listed companies, improving the international visibility to well-governed ASEAN companies. Participants of this initiative are Indonesia, Malaysia, the Philippines, Singapore, Thailand and Viet Nam.

- **ASEAN Collective Investment Schemes (CIS)**
  Operationalised in Malaysia, Singapore and Thailand in 2014, this framework allows fund managers of a member jurisdiction to offer cross-border CIS to retail investors under a streamlined authorisation process.

- **Ad-hoc technical support**

Source: ASEAN Capital Markets Forum (ACMF).

PART IV. OWNERSHIP LANDSCAPE AND INVESTORS IN ASIA

The commercial business models, incentives and investment strategies of investors in public equity markets influence both the allocation of capital among different business opportunities and the effectiveness of corporate governance rules and practices. When designing rules with respect to the functioning of public equity markets and corporate governance it is therefore important to understand the ownership structure of listed companies. This includes both the overall distribution of ownership among different categories of owners, such as physical direct owners, institutional investors and governments, as well as the degree of ownership concentration and control by different shareholders at the company level.

This part provides a summary of the corporate ownership structures in both dimensions: first, the degree of concentration and control; and second, the distribution of ownership between different categories of owners. The analysis covers 19 jurisdictions including seven non-Asian markets. The analysis is based on a dataset that contains ownership information for the 100 largest companies by market capitalisation in each market as of the end of 2017.

4.1. Categories of owners in Asian listed companies

Much of the legal and economic doctrine that underpins corporate governance policies still assumes the classical case of direct ownership by a physical person where incentives among market participants stem from a direct and simple relationship between a company and an individual physical owner. However, in today's world, ownership in many markets is dominated by different kinds of profit-maximising intermediaries that invest on behalf of the ultimate beneficiaries. These institutional investors, such as pension funds, insurance companies and investment funds, all have their own business models and vary greatly with respect to their incentives to exercise their corporate governance functions in an informed manner. Other important categories of owners are non-financial companies and the government, which in several Asian countries hold substantial stakes in publicly listed companies.

As seen from Table 5, there are notable differences between the countries with respect to the distribution of share ownership among different categories of owners. In the United Kingdom and the United States, institutional investors dominate by holding around 65% of the total capital. In India, Indonesia, Singapore, the Philippines and some other emerging markets, such as Turkey, corporations are important owners holding between one third and half of the total capital. In Japan, Korea, Thailand and Viet Nam corporations are also significant and hold on average between 20% and 25% of the total shares. While they are not as dominant as they are in the US and the UK, institutional investors also play a prominent role in India, Japan, Chinese Taipei and Korea.

From an aggregate regional perspective, corporations are on average the most important owners in large listed Asian companies holding on average 24% of the capital. This indicates the strong presence of company groups and pyramids structures. The second largest category of owners is the government, holding on average 21% of the capital. This is mainly the result of large privatisation programmes during the past 25 years. Notably in China; Hong Kong, China; Malaysia and Viet Nam, where the government is an important owner with average holdings ranging between 30% and 42% of the capital.

The third largest ownership category in the Asian sample is institutional investors. Globally, the share of institutional investors in equity markets has been on the rise since the early 2000s, and their presence is increasing also in Asia where institutional investors at the end of 2017 accounted for 15% of the ownership in the largest companies. However, there are considerable variations between the twelve countries. In Japan, institutional investors hold on average 28% of the capital in the largest 100 listed companies while they only hold 6% of the capital in Viet Nam's 100 largest listed companies. The increased integration of Asian capital markets with global markets has given foreign institutional investors the opportunity to increase their participation in the region. And today, most of the institutional ownership in Asian countries is attributed to foreign institutional investors who on average hold 12% of the capital.

Table 5. Ownership of large listed companies by category of owner as of end 2017

	Corporations	Governments	Institutional investors	Strategic individuals
China	12%	35%	9%	13%
Hong Kong (China)	11%	41%	12%	7%
India	31%	21%	22%	7%
Indonesia	36%	20%	11%	11%
Japan	20%	7%	28%	3%
Korea	23%	13%	21%	9%
Malaysia	22%	42%	12%	6%
Philippines	52%	1%	10%	19%
Singapore	29%	14%	14%	9%
Chinese Taipei	14%	7%	25%	5%
Thailand	21%	21%	13%	14%
Viet Nam	19%	30%	6%	10%
Asia average	***24%***	***21%***	***15%***	***9%***
France	15%	8%	29%	10%
Germany	15%	7%	30%	7%
Mexico	19%	1%	36%	27%
Poland	21%	18%	32%	8%
Turkey	36%	15%	17%	10%
UK	7%	6%	60%	2%
US	2%	2%	68%	3%

Note: The table shows market capitalisation weighted average ownership by categories of owners. Calculations are based on ownership data for the 100 largest listed companies in each market.
Source: OECD Capital Market Series dataset, FactSet, see Annex for details.

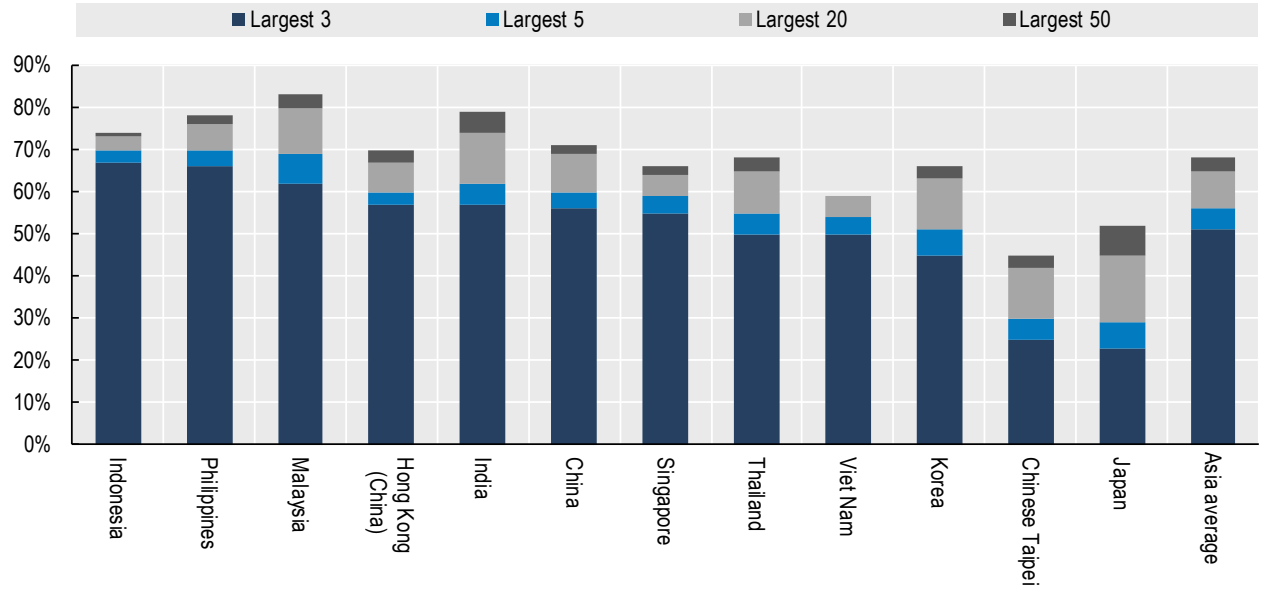
4.2. Ownership concentration at company level

The focus of corporate governance in situations with dispersed ownership has mainly been on the so called agency problem between the managers of the company and the many small shareholders that may have problems coordinating their actions to monitor the hired executives. Having a large controlling owner would in principle overcome this problem. But it also gives raise to other types of governance challenges, including the treatment of minority shareholders and the risks that controlling shareholders may extract undue benefits from the company at the expense of other shareholders.

In order to illustrate the degree of ownership concentration at company level, Figure 31 shows the average holdings of the largest shareholders in the 100 largest listed firms in each of the jurisdictions. Indonesian corporations display the most concentrated ownership at company level with the 3 largest shareholders holding an average of 67% of the capital. Indonesia is followed by Philippine companies with 66% and companies from Malaysia and Hong Kong, China with around 60%. Japanese and Chinese Taipei corporations have the least concentration of ownership at 23%

and 25%, respectively. In more than half of the Asian countries shown in the Figure, the 3 largest shareholders on average hold the majority of the company's capital.

Figure 31. Ownership concentration at company level, as of end 2017



Note: The table shows percentage owned by the largest holders. Calculations are based on ownership data for the 100 largest listed companies in each market.
Source: OECD Capital Market Series dataset, FactSet, see Annex for details.

Table 6 shows the number of companies out of the 100 largest companies where the largest shareholder alone holds at least 50% of the capital. It also shows the number of companies where the two largest or the three largest shareholders together hold at least 50% of the capital. Defining controlling owner as somebody who holds more than 50% of the capital, in Indonesia, for example, 69 out of the 100 largest companies measured by market capitalisation have a single controlling owner. In 84 companies, the two largest owners together hold more than 50% of the capital and in 87 out of the 100 largest companies, the three largest shareholders hold more than 50% of the capital.

Table 6. Companies with controlling shareholders, as of end 2017

	Largest shareholder	2 Largest shareholders	3 Largest shareholders
China	40	54	63
Hong Kong (China)	51	56	61
India	47	56	62
Indonesia	69	84	87
Japan	8	10	10
Korea	11	21	30
Malaysia	40	66	82
Philippines	52	71	81
Singapore	37	48	54
Chinese Taipei	2	5	8
Thailand	23	39	50
Viet Nam	28	42	47

Note: The table shows the number of companies out of the 100 largest companies where the largest, or the two or three largest, shareholders hold at least 50% of the capital. Calculations are based on ownership data for the 100 largest listed companies in each market.
Source: OECD Capital Market Series dataset, FactSet, see Annex for details.

To further broaden the perspective, Table 7 shows how often different categories of owners show up as the largest owner in the sample of 100 largest listed companies by market capitalisation. In Chinese Taipei for example, 50 out of the largest 100 companies have another corporation as their largest shareholder. The bracket shows that when a corporation is the largest shareholder, it on average holds 18% of the capital. As a matter of fact, corporations are the most common category of large shareholders in Asia. Almost half (48%) of the 1 200 companies sampled in Table 7 have a corporation as the largest holder. Again, this can be seen as an indicator of the strong presence of group structures, pyramids and cross-holdings. In particular, corporate ownership is quite strong in the Philippines where 78 of the 100 largest listed companies have a corporation as the largest shareholder with an average holding size of 51%. Similarly, in Indonesia 67 of the 100 largest companies have another corporation as their largest shareholder. In 24% of the companies overall in the region, the government is the largest shareholder with an average holding of 43% of the capital. In China, the government is the largest shareholder in 50 of the 100 largest listed companies holding on average 47% of the capital.

Table 7. The largest shareholder by category of owner, as of end 2017

	Corporation	Government	Individual	Institution
China	14 (43%)	50 (47%)	33 (37%)	2 (11%)
Hong Kong (China)	23 (47%)	51 (51%)	24 (42%)	2 (5%)
India	55 (40%)	28 (51%)	15 (37%)	1 (33%)
Indonesia	67 (53%)	22 (62%)	11 (47%)	-
Japan	48 (15%)	7 (51%)	7 (20%)	36 (6%)
Korea	52 (33%)	18 (23%)	29 (24%)	-
Malaysia	55 (45%)	32 (42%)	13 (41%)	-
Philippines	78 (51%)	1 (32%)	19 (54%)	1 (10%)
Singapore	51 (45%)	22 (40%)	24 (46%)	3 (24%)
Chinese Taipei	50 (18%)	12 (24%)	17 (9%)	21 (6%)
Thailand	49 (38%)	15 (44%)	33 (28%)	3 (6%)
Viet Nam	39 (34%)	25 (51%)	25 (25%)	8 (9%)

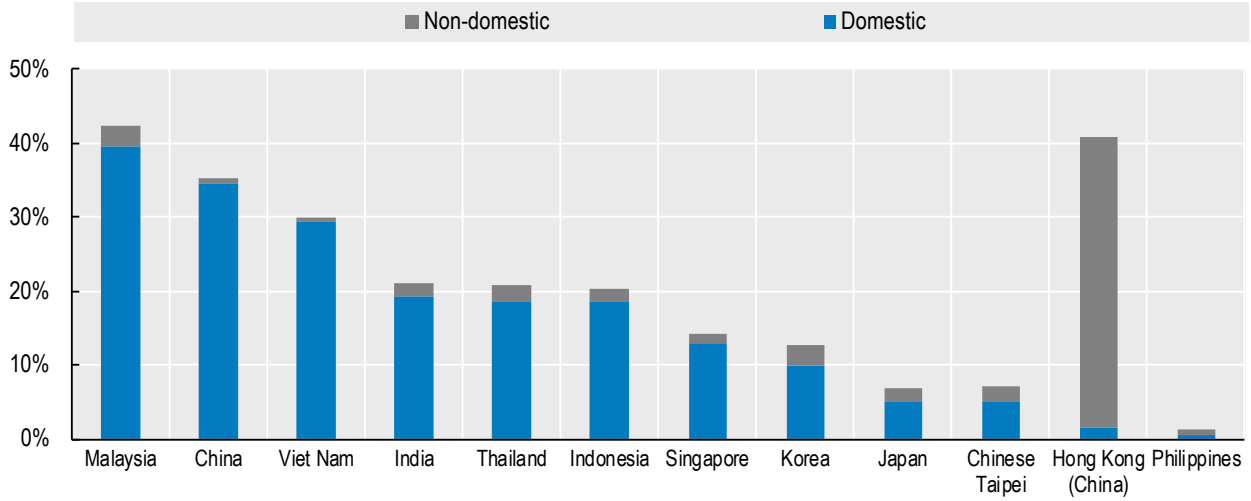
Note: The value in the columns represents the number of companies where that category of investor is the largest holder and the percentage in parenthesis represents the average ownership of the largest shareholder.
Source: OECD Capital Market Series dataset, FactSet, see Annex for details.

4.3. Governments as owners

Partial privatisations through public equity market listings have resulted in a growing presence of government ownership. In many cases, privatisation through stock market listings has not led to any change in control and today governments have controlling stakes in a large number of Asian listed companies. In China; Malaysia; Hong Kong, China; India; Indonesia; Thailand and Viet Nam governments retain on average at least 20% of the capital of the companies. In the case of Hong Kong, China, the large ownership represents the Chinese government ownership.

According to some studies, the identity of the controlling shareholder can affect company performance (see Morck, Nakamura, and Shivdasani, 2000; Xu and Wang, 1999; Haniffa and Hudaib, 2006; Wiwattanakantang, 2001; Douma, George, and Kabir, 2006; Chen, Firth, and Xu, 2008; Sarkar and Sarkar, 2000). There are also studies that claim a relationship between ownership structure and leverage (see Ben-Nasr, Boubaker and Rouatbi, 2015; Lean, Ting and Kweh, 2015; Su, 2014).

Figure 32. Government ownership in Asia, as of end 2017



Note: The table shows market capitalisation weighted average ownership for governments. Calculations are based on ownership data for the 100 largest listed companies in each market.
Source: OECD Capital Market Series dataset, FactSet, see Annex for details.

In order to provide a preliminary assessment of how any government ownership may relate to company performance and company leverage, Table 8 reports the difference between the average size of government ownership in companies that are classified with respect to high/low-performance and high/low leverage. For example, in Malaysia the government holds on average 15 percentage points larger stakes in low-performance companies than in high-performance companies. In all analysed markets, the government holds a higher ownership stake in low-performance companies. In five markets in the sample, the difference in average government ownership between high- and low-performance companies is more than 15 percentage points.

With respect to leverage, the relationship between government and leverage levels varies across markets. In 4 of the 7 markets the average government ownership stake is higher in high-leveraged companies than it is in low-leveraged companies. In Thailand, the differences in government ownership are insignificant and in Hong Kong, China and Viet Nam the government ownership is on average slightly higher in low-leveraged companies compared to high-leveraged companies.

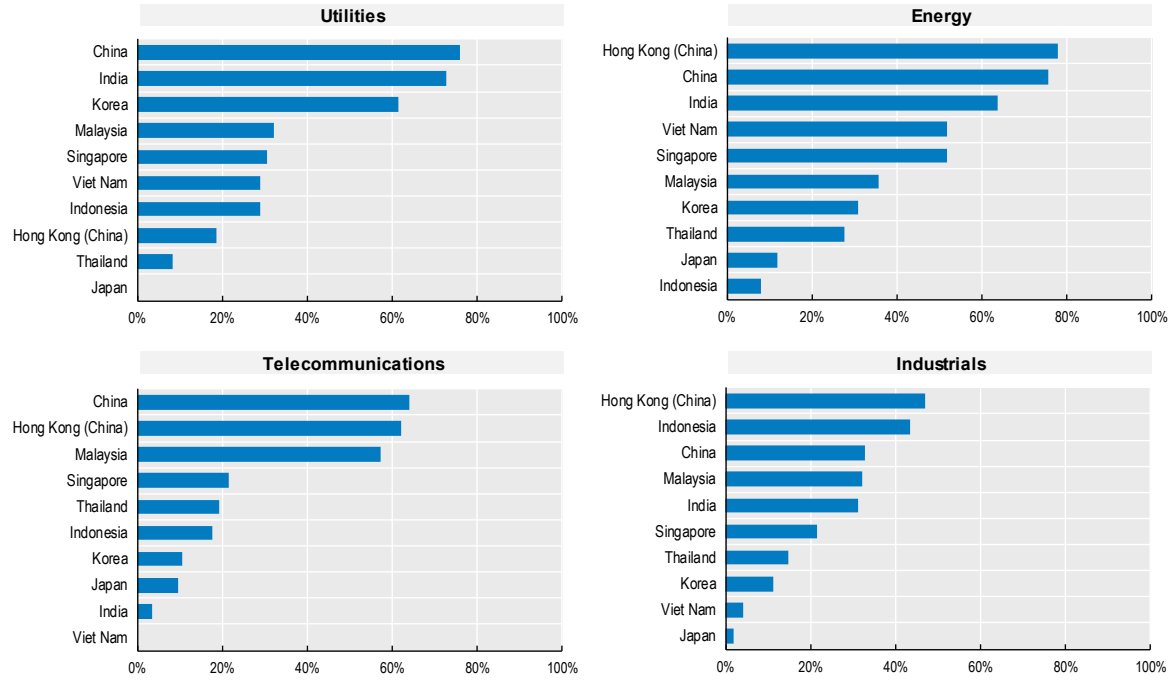
Table 8. Government ownership, performance and leverage, as of end 2017

	Leverage			Performance		
	High	Low	Difference	High	Low	Difference
	Average government ownership			Average government ownership		
China	34%	25%	9	20%	37%	-17
Hong Kong (China)	26%	31%	-5	7%	47%	-40
India	23%	17%	6	11%	26%	-16
Indonesia	30%	18%	12	14%	30%	-16
Malaysia	33%	26%	7	21%	36%	-15
Thailand	13%	14%	-1	8%	17%	-9
Viet Nam	33%	36%	-4	29%	38%	-9

Notes: The table excludes financial companies. High (low) performance companies are defined as companies with a 5-year average ROE above (below) the median. High-leverage (low-leverage) companies are defined as companies with a 5-year average leverage above (below) the median. The difference in the size of government ownership is computed as the difference in average holding in high and low performance companies and high and low leverage companies respectively.
Source: OECD Capital Market Series dataset, FactSet, see Annex for details.

With respect to the industry distribution of government ownership, governments have traditionally held large stakes in the utilities and energy sectors. Figure 33 shows the presence of government ownership in key sectors for the 100 largest non-financial listed companies in 10 Asian markets. Energy, Telecommunication and Utilities account for the largest concentration of government ownership. In China, India and Korea the government holds on average over 60% of the equity of the listed Utilities corporations. The government also shows a significant presence in the Energy industry holding on average more than 50% of the equity capital in half of the markets.

Figure 33. Government ownership by industry, as of end 2017



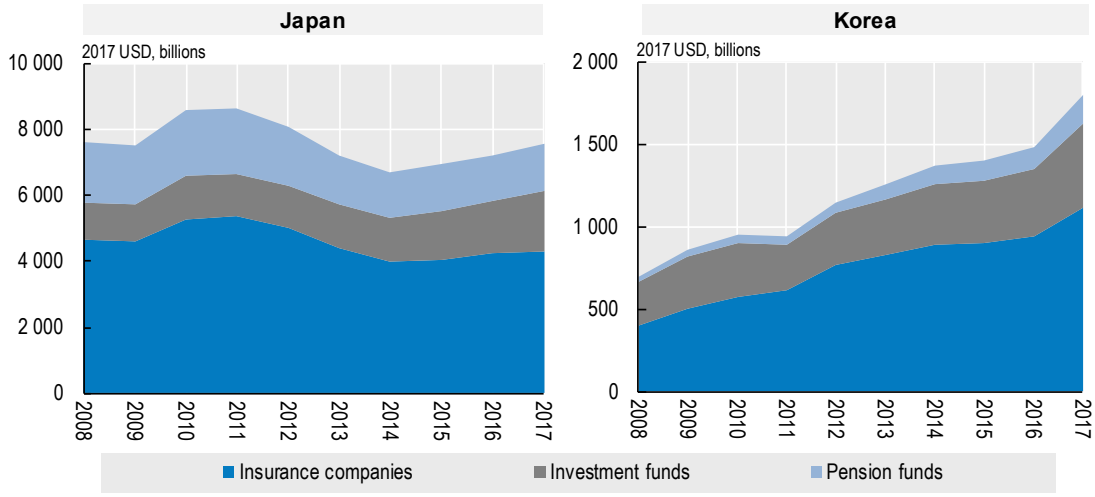
Note: The table shows market capitalisation weighted average ownership for governments in key industries. Calculations are based on ownership data for the 100 largest listed companies in each market.
Source: OECD Capital Market Series dataset, FactSet, see Annex for details.

4.4. Institutional investors as owners

In most economies, there has been an increase in institutional investors' ownership of financial assets since 2000. In OECD countries, the traditional institutional investors, such as pension funds, investment funds and insurance companies, have more than doubled their total assets under management from USD 36 trillion in 2000 to USD 84 trillion in 2017. Figure 34 presents the development of assets under management by institutional investors in Japan and Korea. In Korea, the assets under management by institutional investors increased from USD 0.7 trillion in 2008 to USD 1.8 trillion in 2017. The share of total assets contributed by insurance companies is largest in Korea and Japan.

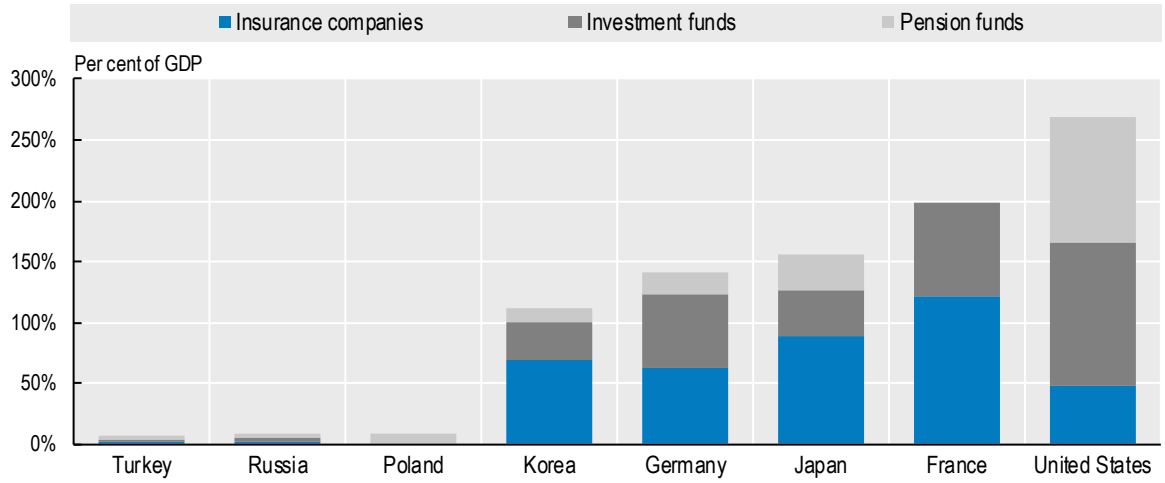
Figure 35 compares assets under management as a percentage of GDP by the end of 2017 and reveals significant differences in advanced and emerging markets. For example, in advanced markets, such as Korea, Germany, Japan, France and the United States, assets under management by institutional investors exceed the national GDP, while they account for less than 10% in emerging markets like Poland, Russia and Turkey.

Figure 34. Assets under management by institutional investors in Japan and Korea



Source: OECD Institutional Investors Database.

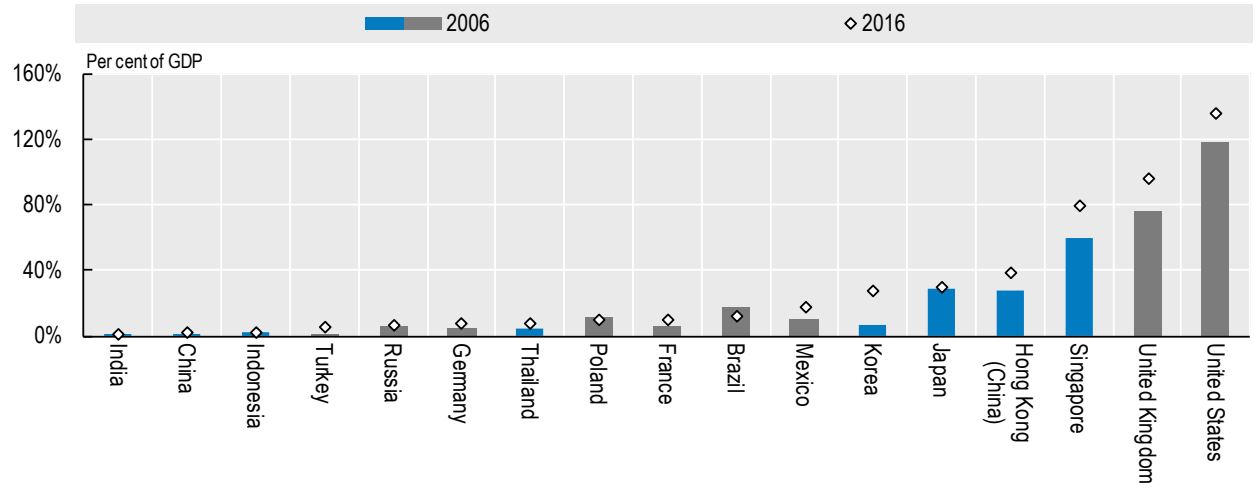
Figure 35. Assets under management, as share of GDP in 2017



Source: OECD Institutional Investors Database.

Since assets in funded and private pension arrangements have reached an exceptional level at over USD 38 trillion in OECD countries in 2016, Figure 36 shows the size of assets in funded and private pension plans relative to the size of the economy for different markets in 2016 and compares it with 2006 ratios. The figure reveals that most countries, except Poland and Brazil, have experienced an increase in the ratio of pension assets to GDP. However, the ratio is very uneven among markets, with the highest ratio reported for the US. In Asian markets, the size of assets in funded and private pension plans relative to GDP has been the highest in Singapore, where the ratio increased from about 60% in 2006 to 80% in 2016. Even though the size of funded and private pension arrangements is comparatively low in Korea, this market as share of GDP almost quadrupled its size between 2006 and 2016, while the ratio of pension assets to GDP remained unchanged in Japan. Regarding other Asian markets, both the size and growth of pension assets have been rather limited in India, China, Indonesia, and Thailand.

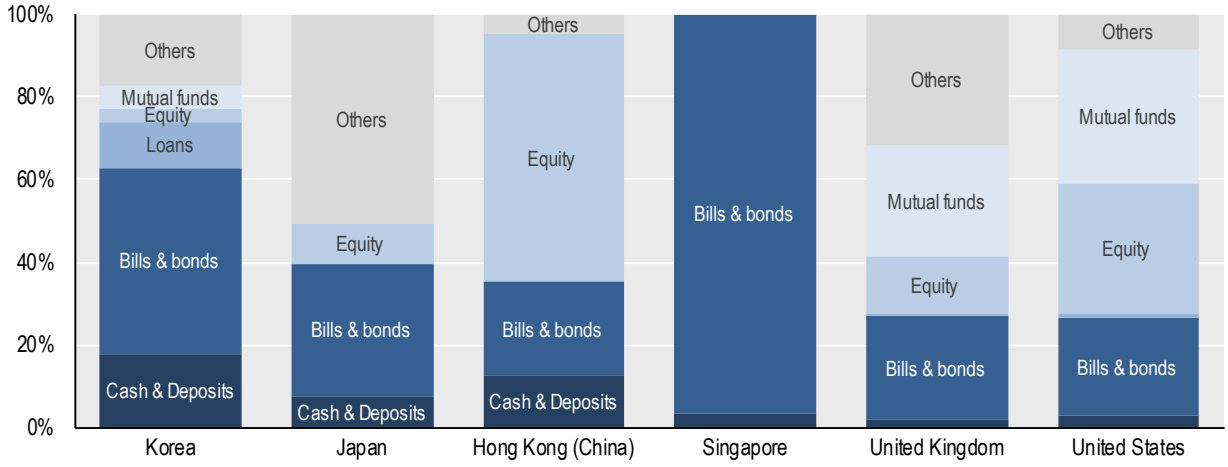
Figure 36. Assets in funded and private pension arrangements, as share of GDP in 2006 and 2016



Source: OECD Global Pension Statistics.

Figure 37 shows the funds asset allocation in funded and private pension arrangements. Equity accounted for the largest investment share in both the United States and in Hong Kong, China; while it has been a minor investment Korea, Japan, Singapore and the United Kingdom. For all countries, bills and bonds represent an important asset class, accounting for 97% of the portfolio value in Singapore and between 23% and 45% in the rest of the countries.

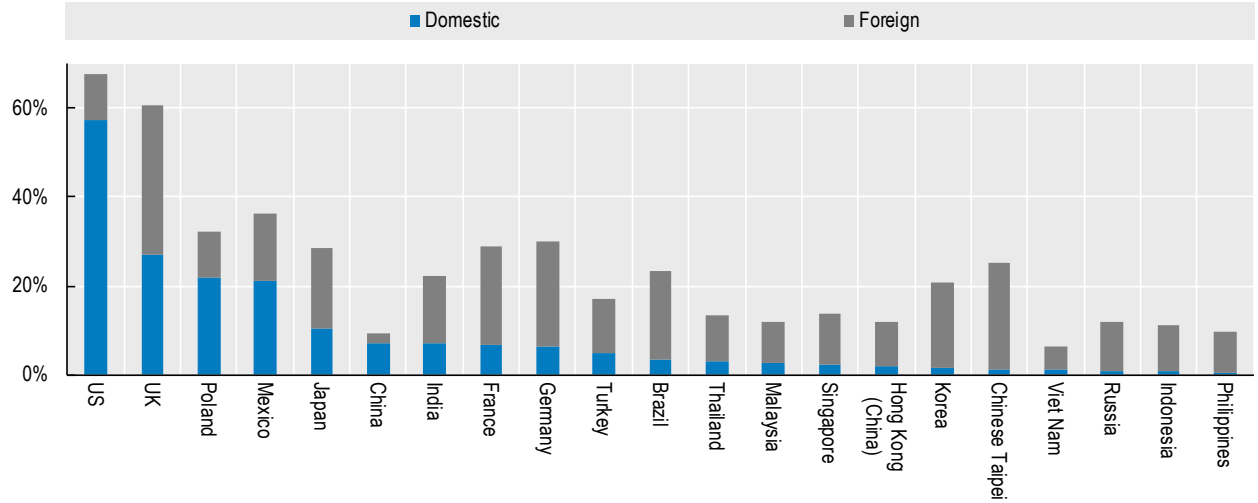
Figure 37. Allocation of assets in funded and private pension arrangements in 2016



Source: OECD Global Pension Statistics.

As a result of the growth in assets managed by institutional investors, they have become important shareholders. Figure 38 shows the ownership of public equity by institutional investors across different markets. For example, in the United States, 68% of the shares are owned by institutional investors. In Asia however, institutional ownership is less common. On average, institutional investors hold about 15% of the capital and most of this capital (12%) is held by foreign institutional investors. In the Philippines, 93% of all institutional ownership is attributed to foreign. Among the Asian countries, the lowest share of institutional ownership in the large companies is found in Viet Nam where institutional investors only hold 6% of the capital. Institutional investors are most prevalent in Japan, holding 29% of the capital in Japan's 100 largest listed companies.

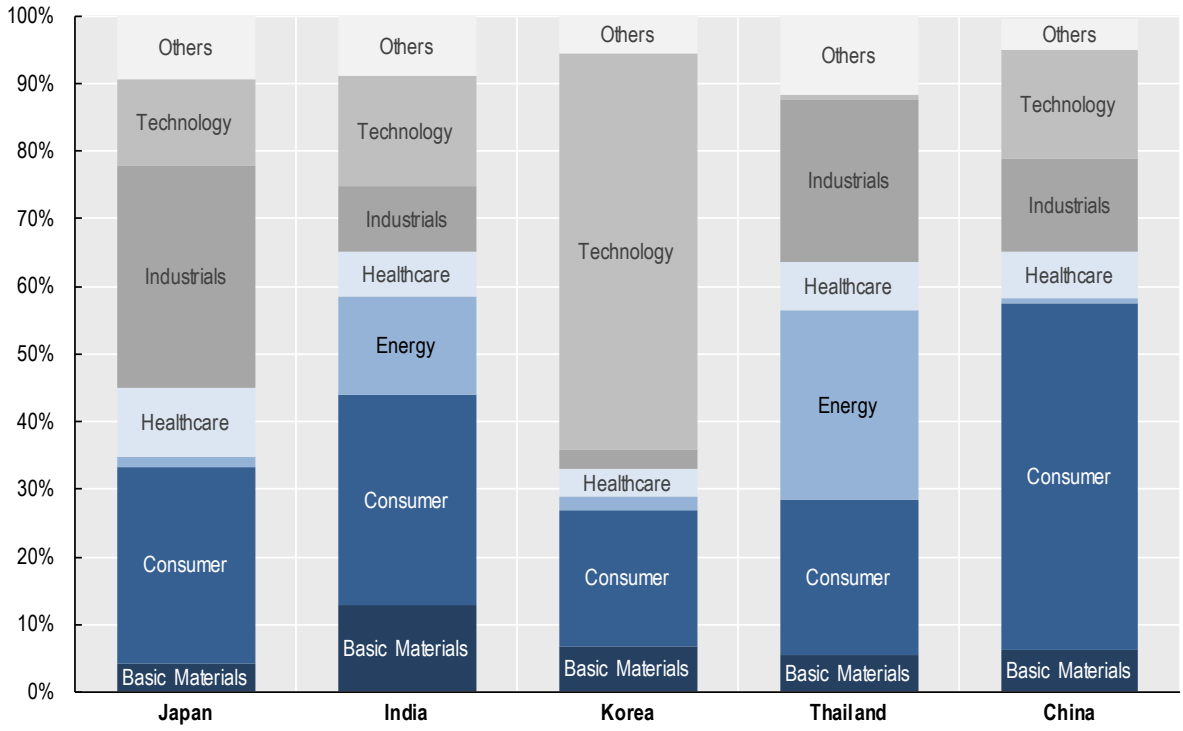
Figure 38. Ownership Institutional investors in public equity, domestic versus foreign as of end 2017



Note: The figure shows market capitalisation weighted average ownership for foreign and domestic institutional investors. Calculations are based on ownership data for the 100 largest listed companies in each market.
Source: OECD Capital Market Series dataset, FactSet, see Annex for details.

Figure 39 presents the institutional investors' portfolio in the region by sector (excluding financials). It shows that it is concentrated mostly in technology firms, industrials and consumer products. In Korea, institutional investors have a preference for technology firms holding 59% of the capital in the industry.

Figure 39. Sectoral distribution of Institutional investors' portfolio, as of end 2017



Source: OECD Capital Market Series dataset, FactSet, see Annex for details.

PART V. INVESTMENT BANKS AND UNDERWRITING IN ASIAN PUBLIC EQUITY MARKETS

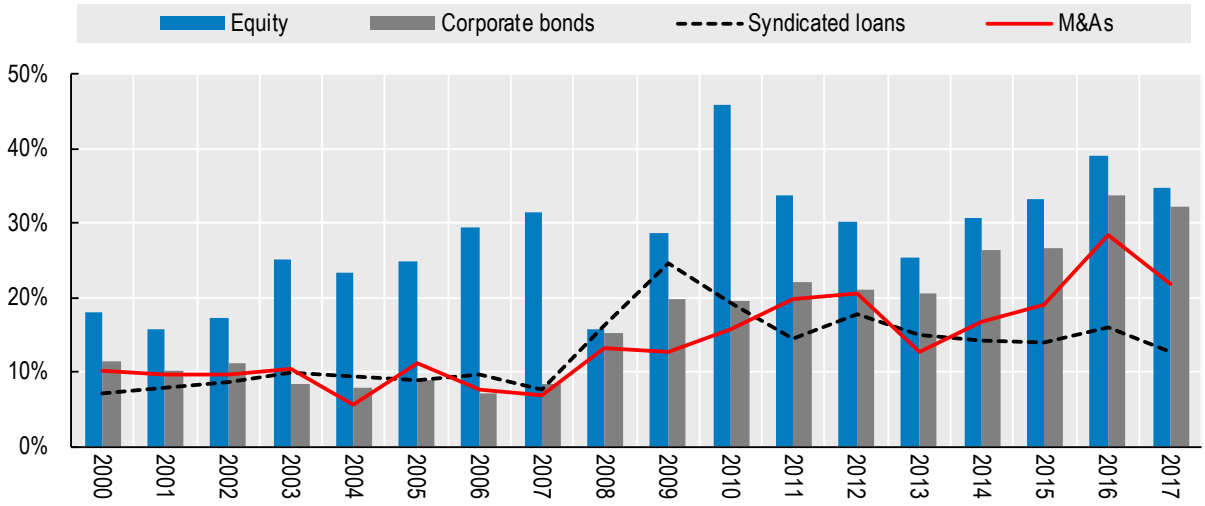
Investment banks perform a number of functions and services in capital markets. Their main services include the underwriting of debt and equity, syndicated loans, and advisory services in mergers and acquisitions (M&As). The underwriting process mainly consists of origination, distribution, risk bearing and certification. During the process, the underwriter advises the issuing firm on the type, timing and pricing of the securities, prepares the required documentation and forms a banking syndicate that markets and distributes the securities to institutional investors and the public.

This part provides an overview of the changing landscape of investment banking activities in Asian capital markets, with a particular focus on equity markets. It also illustrates some trends with respect to the development of national and regional investment banking activities.

5.1. Trends in Asian investment banking activities and the new global landscape

The investment banking industry has experienced important developments since the financial crisis. On a global scale, the landscape looks less concentrated and Asia has become a more important market for investment banking services that to a larger extent are provided by banks from the region. This may be seen as a natural consequence of the fact that Asian companies have become the largest issuers of public equity globally. And as shown in Part I of this report, these share issues are mostly done by using regional markets, turning Asia into major market for equity underwriting. The growth of Asian capital markets has also resulted in an increased use of other investment banking services, such as corporate bonds underwriting, syndicated loans and M&A advisory services. Between 2000 and 2007, about 10 percent of global activities in these three areas were attributed to Asia. Figure 40 shows that a decade later Asia's global share in M&A advisory services had more than doubled to 22% and tripled to 32% for corporate bonds underwriting.

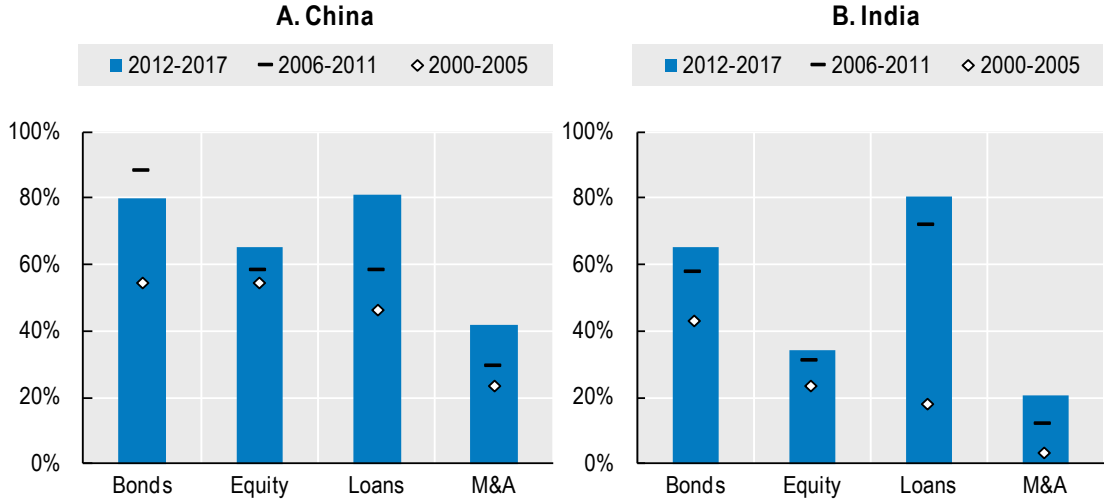
Figure 40. Asia in global capital markets, as share of global volume between 2000-2017



Source: OECD Capital Market Series dataset, Thomson Reuters, see Annex for details.

The increase in Asian investment banking activities has been coupled with an increase in the use of services from domestic banks. In China and India, for example, Figure 41 shows that domestic banks during the last five year period have gained market share in all of the four investment banking activities compared to the 2000-2005 period. The increase has been most marked in corporate bond underwriting and syndicated loan activities.

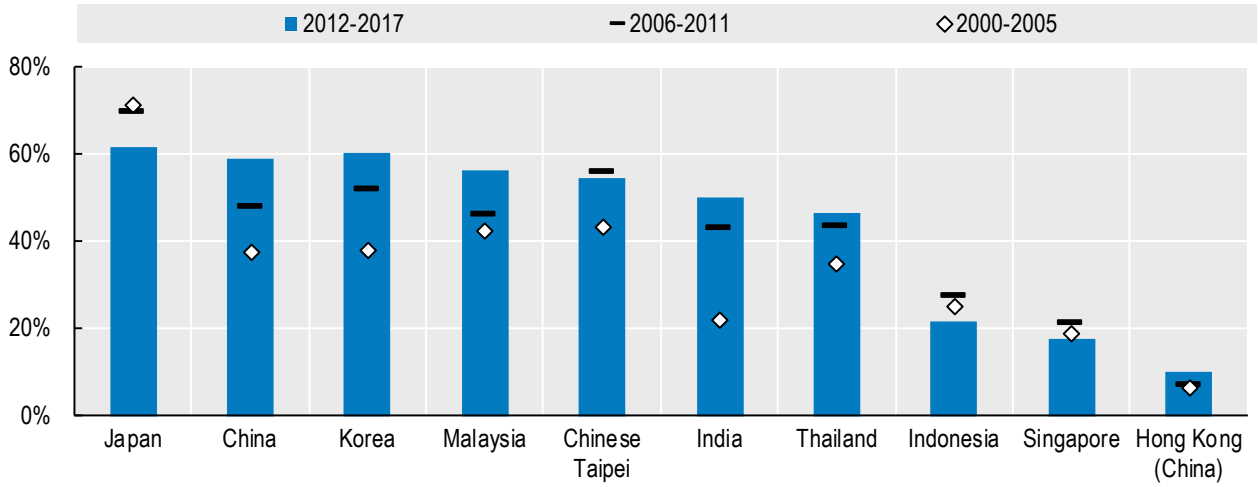
Figure 41. Domestic market share of Chinese and Indian banks, 2000-2017



Source: OECD Capital Market Series dataset, Thomson Reuters, see Annex for details.

A similar trend has been observed also in other Asian markets where the share of local investment banks has increased. Figure 42 provides an overall measure of the market share of domestic banks for ten markets and across all four investment banking activities. With the exception of Indonesia, Japan and Singapore, the market share of domestic banks has increased compared to the 2000-2005 period. China, India and Korea have all witnessed an average increase of more than 20 percentage points in the market share of domestic banks across all four capital market activities.

Figure 42. Market share of investment banks in their home market, 2000-2017



Source: OECD Capital Market Series dataset, Thomson Reuters, see Annex for details.

The growth of Chinese capital markets and the increased presence of domestic banks means that Chinese banks today have a significant market share of Asian investment banking. Table 9 shows

the changes in market share for 100 largest investment banks that are active in Asia based on the nationality of the banks with a breakdown between the four main investment banking activities. While Chinese banks increased their share in Asia by 17 percentage points in public equity markets – both in initial and secondary offerings – Japanese banks have lost 18 percentage points. North American banks have experienced lower market shares across all four activities and most notably in the areas of M&As advisory services and syndicated loans.

Banks from the rest of Asia have experienced modest changes compared to Chinese, Japanese and North American banks. Banks from India and ASEAN have grown their market share in almost every segment. It may be worth noting that Indian banks have grown 7.5 percentage points in syndicated loans underwriting, which mirrors the European banks' loss in market share during the same period. European banks have also experienced a slight drop in their market share for corporate bond underwriting, but a minor increase in equity underwriting and M&A advisory services. Korean banks saw a 2.2 percentage point drop in corporate bonds underwriting and minor increases in equity and M&A services.

Table 9. Changes in market share of the largest 100 banks that are active in Asia; post-crisis versus pre-crisis in percentage points

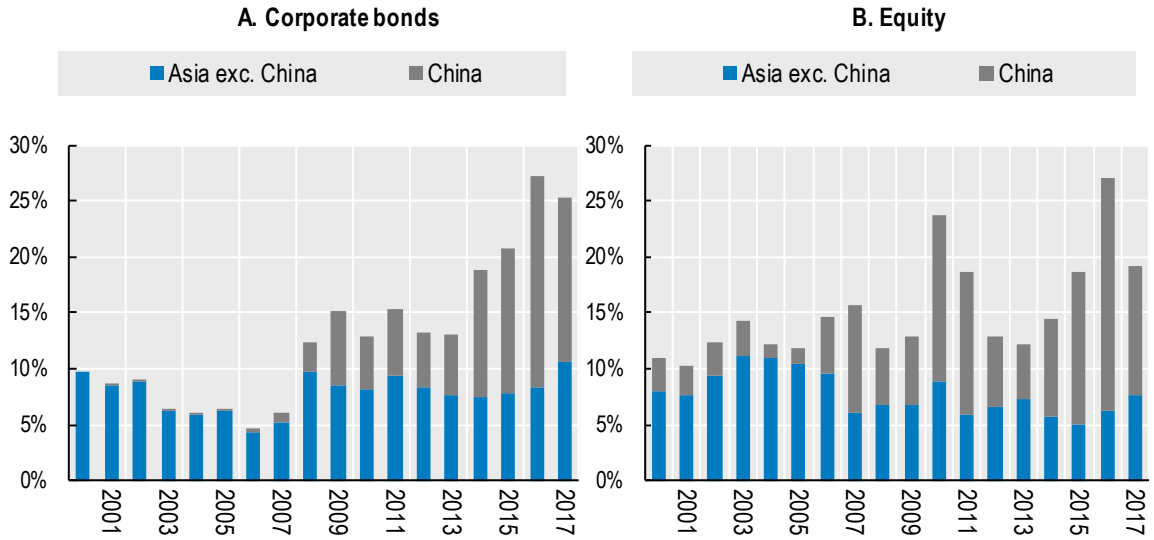
Investment banks region of origin	Equity	Mergers and acquisitions	Corporate bonds	Syndicated loans
ASEAN	0.64	-0.27	0.54	0.81
China	17.16	9.38	32.82	11.98
Europe	-1.23	0.41	-2.57	-8.02
Hong Kong (China)	2.69	5.01	3.84	0.38
India	1.21	0.40	1.40	7.46
Japan	-18.09	-8.53	-29.19	-7.12
Korea	0.82	0.23	-2.20	-0.26
North America	-2.12	-7.06	-2.85	-7.45
Others	-1.08	0.42	-1.78	2.22

Note: The table shows the difference between the average share transaction volume during the post-crisis period (2010-2017) and the pre-crisis period (2000-2007).
Source: OECD Capital Market Series dataset, Thomson Reuters, see Annex for details.

Considering that Asian capital markets have grown relatively faster than the rest of the world and the fact that they are increasingly serviced by Asian banks it is not surprising that Asian – particularly Chinese – banks also have increased their share of global investment banking activities. In 2016 (2017), around 19% (15%) of global corporate bonds underwritings and 21% (11%) of equity underwritings worldwide were served by Chinese banks. These numbers can be compared to the modest global market shares of 0.1% and 1.4% respectively in 2005 (Figure 43).

The increased presence of Chinese banks has not only been driven by the growth of Asian capital markets. It has also been supported by a series of reforms implemented by the Chinese Government. In 2014, the State Council released the "Guiding Principles for the Healthy Development of Capital markets" containing eight goals for capital market developments. One set of goals was to develop a multi-level equity market by reforming the stock issuance registration system, expanding the motherboard and SME board market and by giving self-regulatory functions to the stock exchange. It was also an important objective to actively develop the bond market by improving the competitiveness of underwriters, standardising credit rating systems and improving the issuance system. (The State Council, 2014).

Figure 43. Global market share of Asian investment banks



Source: OECD Capital Market Series dataset, Thomson Reuters, see Annex for details.

Following the release of the guiding principles, the CSRC issued a revised regulatory framework for the implementation of these goals. To promote the competitiveness of intermediaries the CSRC published in 2014 the document "Opinions of Further Promoting the Innovative Development of Securities Institutions" (CSRC, 2014). Importantly for investments banks, the document states as its first measure to support a modern and competitive investment banking industry by improving its financial services capabilities and providing support to improve its functions, broaden financing, develop cross-border business channels, among others. In addition, in early 2015 CSRC broaden the possibilities for bond financing by allowing unlisted companies to issue corporate bonds in the public market (CSRC, 2015). The CSRC has also increased the pace of approval process significantly by reducing the application cycle from 2-3 years to around one year in 2017 (CSRC, 2016). These reforms have contributed to a rapid increase in the issuance of corporate bonds and IPOs of which domestic investment banks have serviced the lion's share.

Despite the growth of Chinese investment banks, their presence in overseas markets is still quite limited. And when Chinese firms tap into foreign markets to raise capital they typically tend to use international, non-Chinese, investment banks. Out of 113 Chinese corporations that became listed in the United States between 1997 and 2017, only 16 companies used a Chinese bank in the underwriting syndicate. Half of the 97 listings that used a non-Chinese underwriter (55 deals) used the five largest US banks as underwriters.

Further integration between Chinese and global capital markets is likely to increase the presence of foreign investment banks in China. In April 2018, the newly released "Administrative Measures for Foreign-Invested Securities Companies" allows foreign investors to gain control of joint ventures in securities companies (CSRC, 2018). These new measures also extend the business-scope of foreign-funded securities companies to include securities brokerage, investment consulting, and asset management businesses.

As indicated in Figure 43 above, the growing presence of investment banks from Asia has also come to influence the global investment banking landscape during the last decade. As illustrated in Table 10, banks from the US and Europe have, during the period 2010-2017, lost market shares in equity underwritings, corporate bonds underwritings and syndicated loans compared to the

2000-2007 period. European banks (excluding UK) have lost market shares in all four investment bank activities, while UK banks have seen a slight increase, notably in M&A activities. Asian banks overall have increased their global presence across all four investment banking activities. Again, this is mainly driven by the relatively faster growth of Asian capital markets that are predominantly serviced by Asian banks.

Table 10. Changes in global market shares for the top 100 banks, post-crisis versus pre-crisis in percentage points

Investment banks region of origin	Equity	Mergers and acquisitions	Corporate bonds	Syndicated loans
China	6.80	2.01	8.44	2.47
Japan	-3.14	-0.76	0.22	5.44
Asia exc. China & Japan	1.89	1.41	2.58	2.08
Europe exc. UK	-7.83	-7.65	-5.15	-4.22
Rest of the World	1.21	0.73	1.36	1.60
United Kingdom	1.85	3.68	0.02	0.94
United States	-0.79	0.57	-7.47	-8.31

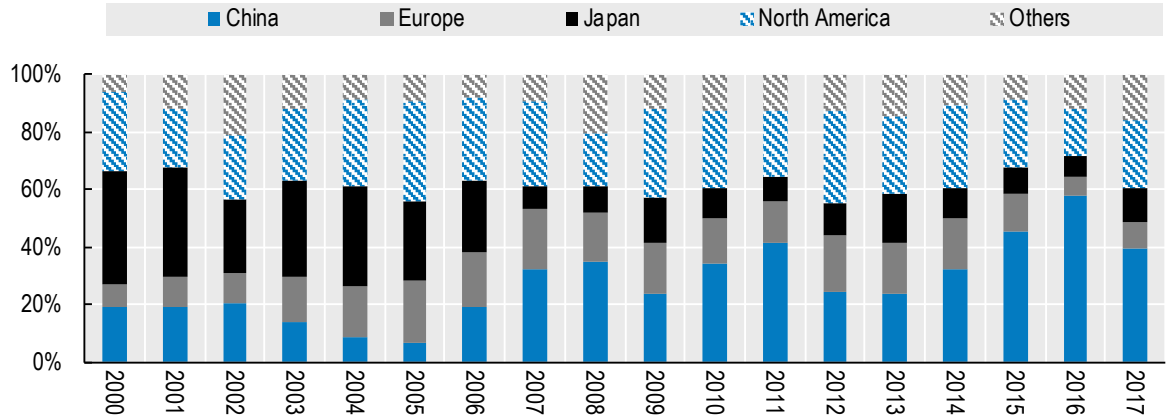
Note: The table shows the difference in the share of the top investment banks by their region of origin in global transactions between post-crisis period (2010-2017) and pre-crisis period (2000-2007).
Source: OECD Capital Market Series dataset, Thomson Reuters, see Annex for details.

5.2. Trends in underwriting in Asian equity markets

Since 2005, Chinese banks have experienced a considerable increase in equity underwritings and in 2016 almost six out of every ten dollars raised in equity deals were underwritten by a Chinese bank (Figure 44). While Chinese investment banks mainly serve the Chinese market, they occasionally serve as underwriters in ASEAN countries. For instance, in Indonesia and Singapore where they accounted for 5.9% and 2.8% of the total equity underwritten over the period 2000-2017.

The relative drop in Asian equity underwritings by Chinese banks in 2017 can partly be explained by the 36% decline in the volume of secondary public equity offerings in the Chinese market. Seen over a longer period of time, Figure 44 shows that the relative importance of Japanese investment banks in Asian equity underwritings has decreased rather substantially since 2000.

Figure 44. Top 100 investment banks in Asia, as share of equity transaction volume

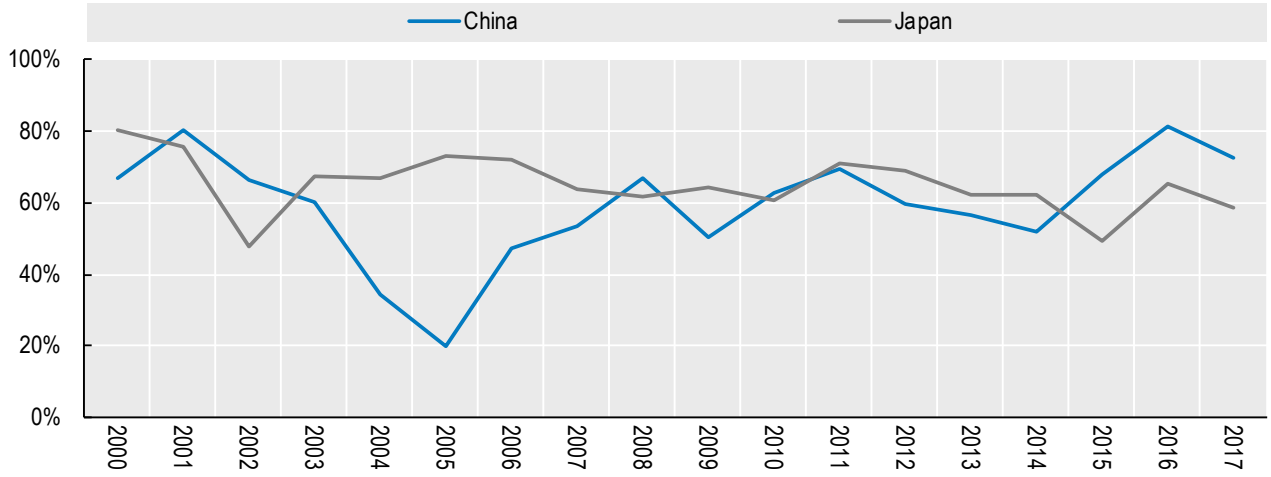


Source: OECD Capital Market Series dataset, Thomson Reuters, see Annex for details.

After scaling back their Asian presence in the aftermath of the financial crisis global investment banks again seem attracted to the growth opportunities in Asia. In 2017, North American and European investment banks opened new offices and increased their headcount in the region to prepare for the expansion, which contrasted the 2012-2015 period trend when foreign banks were reducing total headcount by 10 to15% (Financial Times, 2017a and 2017b).

Taking a closer look at the Chinese market for equity underwriting, Figure 45 shows that during the period 2000-2005, Chinese investment banks lost a substantial share of the business. One explanation was China's commitment to liberalise the financial services industry after joining the WTO in 2001. This opened the door for foreign investment banks to conduct investment business in Mainland China. As a result, North American and European banks gained market share by serving Chinese firms in both China and Hong Kong, China, while the domestic market share of Chinese banks dropped from 80% in 2001 to 20% in 2005. Since then, Chinese investment banks have continuously regained their presence in domestic equity underwriting where they had a market share of 73% in 2017. A similar level to what they had in the beginning of the millennium.

Figure 45. Share of investment banks in their domestic equity market, 2000-2017



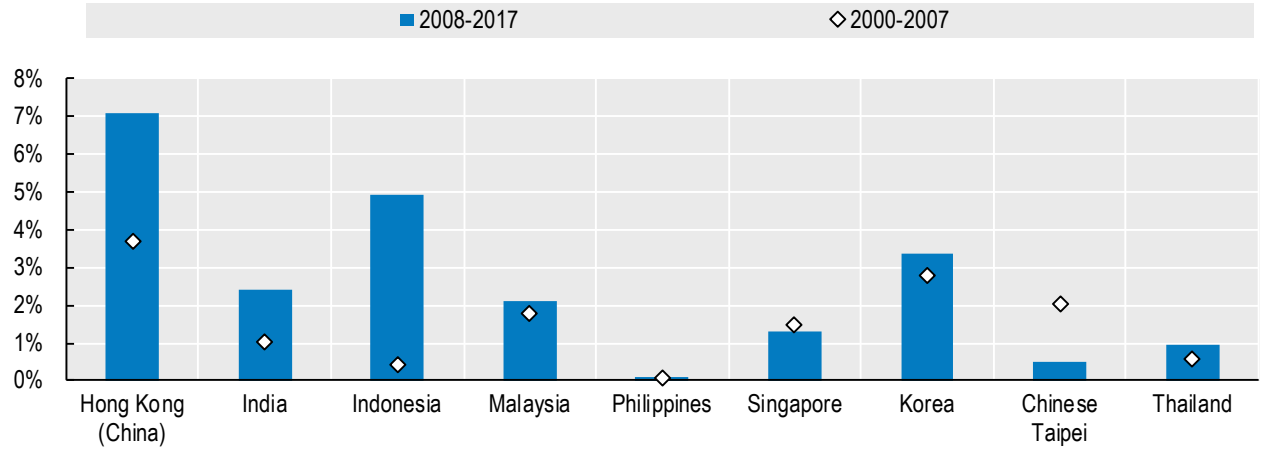
Source: OECD Capital Market Series dataset, Thomson Reuters, see Annex for details.

Also in Japan, underwriting activities are dominated by domestic investment banks. While there has been a slight decrease in their market share in the last few years, they still accounted for about 60% of all equity underwritings in 2017. Investment banks headquartered in the United States also have a prominent role in the Japanese underwriting market with an average market share of about 27% during the period 2000-2017.

Banks headquartered in other Asian jurisdictions have also come to play a role in Asian capital market activities. As shown in Figure 46, most of them have in the last ten years increased their market share compared to the period 2000-2007. Hong Kong, China has seen the largest rise in market share, which is partly driven by Chinese companies' issuance in Hong Kong, China. The announcement by Chinese authorities to remove restrictions on foreign majority ownership securities companies joint ventures by 2018, may have contributed to the establishment of a number of foreign investment bank branches in Hong Kong, China to operate in China, strengthening Hong Kong, China's position as a financial centre and capacity to perform underwriting services. Indian investment banks have also benefited from its growing capital markets and its business has grown two-fold compared with the period 2000-2007. Almost all

ASEAN countries - with the exception of Singapore and Chinese Taipei - experienced a rise in their share of the Asian equity underwriting market. In particular, Indonesia - the largest economy in ASEAN - has more than doubled its market share compared to the previous period due to the rapid development of its domestic equity market. Banks from Chinese Taipei have experienced a significant drop in the market share due to declining issuance volumes in its domestic stock market. Korean banks have kept their place as the third largest regional underwriters of equity in Asia.

Figure 46. Asian market share of regional investment banks in equity underwriting



Source: OECD Capital Market Series dataset, Thomson Reuters, see Annex for details.

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FOCUS

The potential for blockchain technology in public equity markets in Asia

THE POTENTIAL FOR BLOCKCHAIN TECHNOLOGY IN PUBLIC EQUITY MARKETS IN ASIA

Blockchain technology has attracted a lot of attention in recent years, and has been hailed as having the potential to transform the foundations of our societies and economies. To date, practical applications in financial services have largely been limited to payment and exchange; but as companies and institutions rapidly develop blockchain based systems, wider uses for blockchain technology are being explored.

This focus chapter provides an overview of blockchain technology and will explore the extent to which blockchain technology could impact how companies in Asia raise capital, and what influence this could have on public equity markets in the future. Equity financing trends in Asia will be presented with particular focus on public equity markets, private equity, and equity crowdfunding. Alternative financing through initial coin offerings (ICOs) will also be introduced. Each section will address which types of companies use each method, outlining the investors, intermediaries and marketplaces involved.

Technological innovation, including blockchain, is a pertinent issue for Asian economies, which possess a greater influence in today's public equity markets. In the 20-year period between 1997 and 2017, the number of IPOs annually in the United States and Europe has decreased while the number of IPOs in Asian markets has increased. An important part of this success is technology IPOs, which have become more prominent in Asia. Of total IPOs, the share of technology IPOs in Asia has increased from 6% in 2012 to 10% in 2017, while globally, the share of technology IPOs has dropped from 23% in 2012 to 9% in 2017.

The findings of this chapter suggest that national regulators and governments in Asia should be open, but exercise caution when exploring new technologies in order to maintain the integrity and stability of public equity markets. Blockchain technology is still in its infancy and lacks the capacity needed to meet the requirements of today's market infrastructures and maintain the current level of transactions. That said, whether it is blockchain, or a related technology, regulators, authorities and governments should be well informed, and explore appropriate options to address the core opportunities and challenges that technology brings in terms of governance and efficiency.

1. Overview of blockchain technology

Blockchain technology is a subset of the more general distributed ledger technology (DLT) and combines three concepts: cryptography, smart contracts, and distributed ledger design (see Box 2). The overarching blockchain forms a ledger containing a record of transactions (digital or monetary) that are shared among members in the network. The blockchain ledger works as a record book: it records and stores all transactions between users in chronological order. Instead of one authority controlling the ledger (like a bank), an identical copy is held by all network users, called nodes, who verify the blocks in the chain. The network itself can be public-permissionless (open to all), public-permissioned (open to authorised participants), consortium based (restricted

access to authorised participants), or a private-permissioned "enterprise" network (restricted to network operators only).[5]

Blockchain technology in context

To understand the *potential* impact of blockchain technology, parallels can be drawn with the rise of the Transmission Control Protocol / Internet Protocol (TCP/IP)[6] (Akgiray, 2018; Iansiti and Lakhani, 2017; Waldman, 2018). TCP/IP was first introduced in the early 1970s as the emailing protocol for ARPAnet users, and provided the communication system that made the internet possible. In the early days, TCP/IP was met with scepticism by telecom companies, who continued to invest heavily in traditional physical lines and dedicated communication equipment.

In the 1980s, technology firms started using TCP/IP technology to build local peer-to-peer networks for emailing, first within their own organisations and then in other industries. Communication speed and capacity were increased almost infinitely and, as a result, there were significant gains in productivity.[7] In the 1990s, the start of the World Wide Web based on HTTP and HTML protocols opened TCP/IP-based technologies to global public use and began a phase of technological innovation. TCP/IP dramatically reduced the cost of connectivity and enabled global access to information.

There are conceptual parallels between TCP/IP and blockchain technology. Both can be used over local and wide area networks. The development and maintenance of blockchain is open and shared, much like TCP/IP, and users around the world maintain the core software. Early applications of blockchain, notably Bitcoin,[8] also caught on with a small but enthusiastic community, despite struggling with speed, capacity and protocol issues.

Blockchain technology in financial services

Blockchain technology comprises three layers that each add a component to its development and use. The protocol layer lays the foundational structure of the blockchain. It determines the computing language coded into the blockchain and any computational rules that will be used to govern the chain. The networking layer implements the rules within the protocol layer. Finally, the application layer uses networks and protocols to build the applications that users run.

On this foundation, a blockchain forms a chain of information blocks that register a pre-defined process or transaction, with the underlying technology applying algorithmic and computation infrastructure to create, insert and use the blocks. A block records some or all-recent transactions, and once completed, the block goes into the overall blockchain as a permanent record. Each time one block is completed, a new block is created. Each block then becomes a standalone record of

[5] For more information on types of blockchain networks and their use, see the "2018 OECD Blockchain Primer"(OECD, 2018b).

[6] TCP/IP is a suite of communication protocols used to interconnect network devices on the internet. TCP/IP can also be used as a communications protocol in a private network (an intranet or an extranet).

[7] Dedicated lines, circuit-switching equipment, fax machines, telex machines all became obsolete, and TCP/IP allowed for faster data processing time, and information sharing.

[8] Bitcoin is a cryptocurrency; decentralised digital currency without a central bank or single administrator and can be sent from user to user on the peer-to-peer bitcoin network. Bitcoin was invented by an unknown person or group of people using the name Satoshi Nakamoto and was released as an open-source software in 2009.

each individual transaction. In this context, the creation of a blockchain consists of four key elements:

- The transaction
- A record of the transaction (via the shared ledger)
- A process of verification (via algorithmic and cryptographic consensus)
- A method for storing the transaction (via encryption)

Box 2. Key concepts in blockchain technology

Distributed Ledger Technology (DLT)

Distributed ledger technology is a platform upon which a record of transactions (digital and monetary) are spread across multiple sites, countries or institutions, and are typically public. Each record of the transaction is stored one after another in a continuous ledger that can only be added to when participants confirm the feasibility and validity of the transaction.

Nodes

A node is simply a user or computer on a blockchain network that runs the blockchain. The general job of "full nodes" is to store a full copy of a Blockchain ledger, receive data from other nodes, validate the data, and pass it to other nodes on the network when validated. "Mining nodes" perform these tasks, but also publish new blocks to a blockchain through the mining process. Finally, "lightweight nodes" are generally found on devices with limited processing power such as smartphones, and are nodes that do not maintain full copies of a blockchain ledger; instead, they send their data to full nodes for processing and validation.

Cryptography

Cryptography is the act of creating codes that allow data to be kept secret. Cryptography converts data into a format that can only be read and decoded by authorised users. Thus, data can be transmitted without fear of it being decrypted and compromised by unauthorised actors. Authorised actors may decrypt the data using a "key", which is a corresponding private code that only the authorised user knows (see public and private keys below).

Public and Private Keys

Public and private keys are not unique to blockchain technology and are used in cryptography as a cryptographic protocol that is used to confirm the identity of each party in a transaction, thus allowing users to both send and receive transactions. Public keys can be made public and are often used as an identifiable method by which recipients can receive transactions and use as unique identifiers. Private keys are secret keys used by individuals in the network and work as a private digital signature for encryption.

Smart Contracts

Smart contracts are self-executing contracts that include the terms of an agreement between a buyer and seller being directly written into lines of code. The code and the relating agreements contained therein exist across a distributed, decentralised blockchain network. Smart contracts permit trusted transactions and agreements to be carried out among disparate, anonymous parties without the need for a central authority, legal system, or external enforcement mechanism at the time of execution.

Source : Delmolino et al. (2016) ; Eskandari et al. (2015); UK Government, Office for Science (2016); Yaga et al (2018)

The components, and related elements, of blockchain technology make it conducive for application in a range of economic and financial processes beyond traditional payment, transfers and transaction services. These include banking instruments such as loans and mortgages, financial

market instruments such as the trading of stocks, bonds, futures, and derivatives, as well as legal instruments such as titles, contracts and other assets that can be monetised.

Beyond the underlying components of blockchain technology, a key element of its use in financial services is smart contracts.[9] Smart contracts (see Box 2) are computing protocols that can be used within a blockchain to automatically execute the terms of a contract. In practice, when a pre-configured condition in a smart contract is met, the participating parties involved in the contractual agreement can automatically benefit from any specified outcomes of the contract, such as a pay-out.

2. Equity financing trends in Asia

Corporations raise capital for a number of reasons, and therefore require different types of capital. Certain types are more suitable for short-term use, while other types of capital are more appropriate for longer and more uncertain undertakings. Similarly, when a company obtains capital, different conditions will apply based on the type of capital required. Broadly speaking, a corporation can raise two types of capital: equity and debt.

Equity financing is the method of raising capital by issuing company shares (equity) to investors. In return, shareholders become part owners of the company, and expect certain rights, including dividends. Equity financing presents a number of advantages and greater flexibility for companies focused on medium to long-term investment and growth.

Debt financing takes place when a company sells fixed income products, such as bonds, to investors in return for interest and principal at an agreed date in the future. Opting to finance using debt introduces seniority and strict obligations, which may require the corporation to redistribute cash away from other activities or priorities. For example, debt can become constraining in the case of a deterioration in operating performance and cash flow generation. In some cases, debt financing may only be obtainable if the company can provide high quality collateral or agrees to restrictive covenants. This chapter will focus on equity financing.

Characteristics of equity financing

Equity capital has a number of distinct characteristics that give it a unique advantage over other external sources of capital. First, equity finance is permanent. Once equity has been issued, there is no expectation for it to be retired or paid back. This is in contrast to temporary financing such as bank loans, which have a finite life span. For example, in emerging markets, bank loans have an average maturity of 2.8 years and 6.6 years[10] in global markets (Lorente et al., 2016). After the maturity date, the borrower should be able to pay back the loan or refinance it.

Second, equity capital is patient and returns are not guaranteed. The shareholder will be paid only after all other stakeholders, such as employees, suppliers, tax authorities and creditors have been

[9] The term smart contract was introduced by Nick Szabo in 1994: “The general objectives of smart contract design are to satisfy common contractual conditions (such as payment terms, liens, confidentiality, and even enforcement), minimise exceptions both malicious and accidental, and minimise the need for trusted intermediaries. Related economic goals include lowering fraud loss, arbitration and enforcement costs, and other transaction costs”.

[10] Note: this sample includes companies of all sizes and legal structures, including small and medium enterprises.

paid. Unlike other capital providers, shareholders will be the first to bear the cost of adverse business performance. In contrast, debt lenders have a priority claim on a company's assets in case of default.

Third, since equity only receives residual profits in the form of variable dividends, equity capital is typically more risk-willing than other forms of capital, which yield a strictly defined return regardless of a company's operating performance. This characteristic of equity financing is particularly important for future oriented companies where current cash generation is limited, or where the outcome of research, innovation, product development and market entry is uncertain, and willingness to take risks is imperative.

The permanent, patient, and risk-willing nature of equity capital means that supply and access to equity is not only important for the individual company. Availability of enough long-term capital is of systemic importance to the very structure and long-term dynamics of an economy's business sector. Importantly, the availability of equity allows for a gradual shift in a country's industrial structure towards more future oriented, innovative, knowledge-based and human-capital intensive enterprises (OECD, 2015).

Depending on the stage of development of a company, different types of equity financing may be available and appropriate. The following sections will present equity financing trends in Asia with particular focus on public equity markets, private equity, and equity crowdfunding. Alternative financing through initial coin offerings (ICOs) will also be introduced. Each section will review the types of companies using each method, as well as the investors, intermediaries and marketplaces involved. These sections will provide a foundation for the discussion that follows: to what extent does blockchain technology impact how companies in Asia raise capital, and what influence could this have on public equity markets in the future.

Public equity market trends in Asia

Public markets consist of the primary market and secondary market. Equity financing takes place on the primary market, which is facilitated by underwriting groups consisting of investment banks that set guidance prices for shares and oversee their sale to investors. On the primary market, companies can raise equity capital through an initial public offering (IPO) or secondary public offering (SPO).

An initial public offering refers to the process through which a 'new' company is first introduced and listed on the stock exchange, and a secondary public offering occurs when an already publicly listed company returns to the public equity market to raise additional capital. When the initial sale is complete, trading takes place on the secondary market. There are a number of reasons that companies will turn to public equity markets to raise capital (rather than through other equity financing channels). These include to gain access to capital markets; provide an exit opportunity for the original shareholders (founders, private equity investors, including disengaged family members); or to implement strategies such as selling of non-core divisions of the corporation (making it possible to compensate employees and managers with shares).

Typically, companies will turn to the public equity market to raise capital once the company has already reached a reasonable level of maturity. The decision to issue on the primary market for the first time, through an IPO, is an important one for a company. The company needs to weigh the advantages and disadvantages of becoming publicly listed (see Table 11). In doing this, the company will subject itself to extensive disclosure and governance requirements, and will need to demonstrate a viable business strategy to investors (outlined in the prospectus).

Table 11. Advantages and disadvantages of becoming a publicly listed company

Advantages	Disadvantages
Potential increase in liquidity and share price	High initial cost due to initial fees
Increased public profile and reputational prestige due to the knowledge that the company has met listing corporate governance requirements	High ongoing cost of maintaining the listing, and cost of related listing requirements (financial reporting, disclosure etc.)
Access to alternative sources of finance and increased trust by investors in the company	Potential loss of control in the event that the majority of shares are acquired by a non-founding party
Opportunities to attract talent and incentivise employees with share option schemes	Public pressure on the running and management of the company due to investor expectations
Ability to facilitate acquisitions by using shares as monetary exchange	Increased regulatory and disclosure requirements

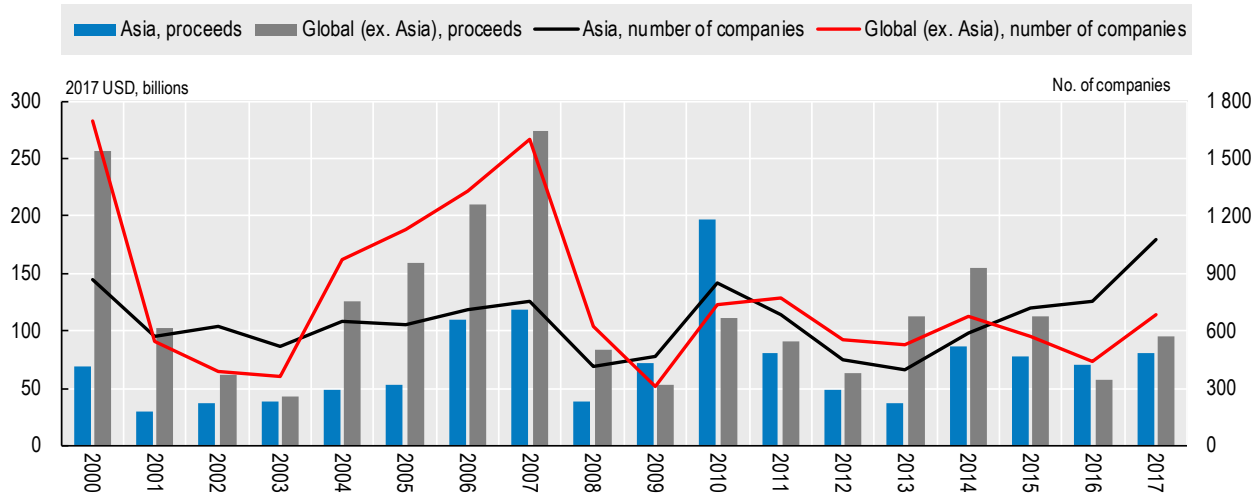
Source: OECD analysis.

Initial Public Offering (IPO) trends in Asia

This section will provide an overview of IPO trends in Asia. Attention will be given to the sectoral distribution of IPOs as well as technology company trends in Asia.

Globally, there are approximately 50 000 listed companies; almost 26 000 of these are listed in Asian markets. Similarly, in the period between 2000 and 2017, the annual number of IPOs in non-Asian markets has decreased while the number of IPOs in Asian markets has increased. Between 2000 and 2008 there were on average 637 IPOs per year in Asia raising a total of USD 543 billion. At the same time in non-Asian markets there were on average 962 IPOs per year raising a total of USD 1 317 billion (see Figure 47). In 2009, the number of Asian IPOs exceeded those in non-Asian markets, and remained at similar levels until 2014 at which point Asian IPOs continued to grow, exceeding those in non-Asian markets in 2015, 2016 and 2017.

Figure 47. IPO trends in Asian and non-Asian markets



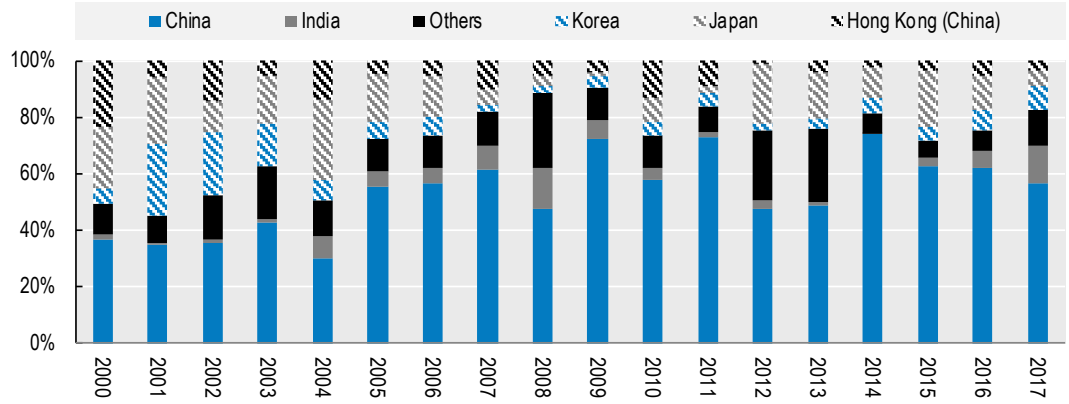
Source: OECD Capital Market Series dataset, see Annex for details.

The increase in the total amount of equity capital raised by Asian companies since the 2008 financial crisis has also influenced the global distribution of IPOs. Reinforced by a downward trend in IPOs by United States and European companies, Asian companies have come to dominate the

global IPO scene. Throughout 2000 to 2007, Asian companies accounted for 29% of all capital raised in the world. This share increased to 43% on average between 2008 and 2017. In 2017, Asian companies were the world's largest users of public equity markets, with Asian IPOs accounting for 43% of all public equity capital raised in the world.

Since 2000, Asian companies have raised USD 1.3 trillion through initial public offerings and USD 2.9 trillion through secondary public offerings. In the same period between 2000 and 2017, companies from the People's Republic of China (China) have been the largest issuers in Asia, raising almost 50% of all public equity capital in the region (see Figure 48), followed by companies from Japan (16%); Hong Kong, China (10%); Korea (8%) and India (6%).

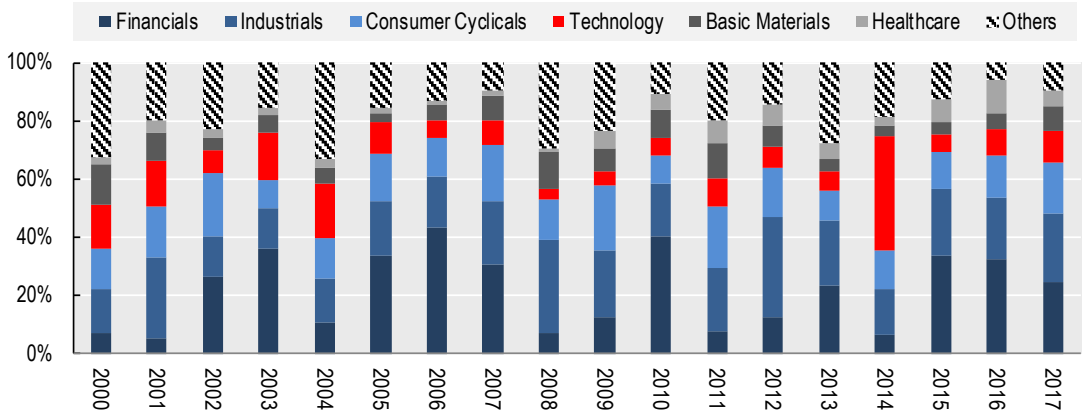
Figure 48. Distribution of IPO proceeds by Asian companies



Source: OECD Capital Market Series dataset, see Annex for details.

Financial and industrial companies dominate as the sectors raising the most capital through IPOs in Asia (see Figure 49). In 2014, IPOs by technology companies surged to almost 40% of capital raised in the technology sector in Asia, albeit skewed by the Alibaba IPO which raised USD 21.8 billion in September 2014. Notwithstanding 2014, IPOs by technology companies have steadily increased as a share of total Asian company IPOs since the 2008 financial crisis, and notably since 2015.

Figure 49. Sectoral distribution of Asian IPO proceeds

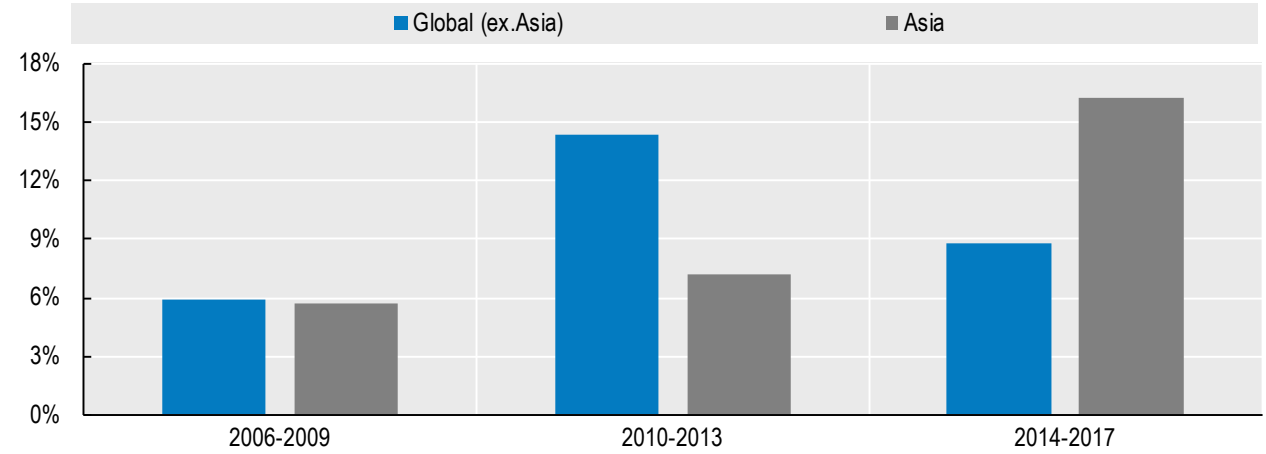


Source: OECD Capital Market Series dataset, see Annex for details.

In global context, Asia has experienced a steady increase in the amount raised through technology IPOs as a share of total IPO capital raised in the last decade (see Figure 50). In the period from

2006 to 2009, technology IPOs represented 5.7% of total IPO proceeds in Asia; this grew to 7.2% from 2010 to 2013, and to 16.2% from 2014 to 2017. In contrast, the rest of the world experienced an increase from 5.9% in 2006 to 2009, to 14.4% between 2010 and 2013, dropping down to 8.8% in 2014 to 2017. A number of large technology IPOs in the United States between 2010 and 2013 in part contributed to the spike in global (excluding Asia) technology IPOs.

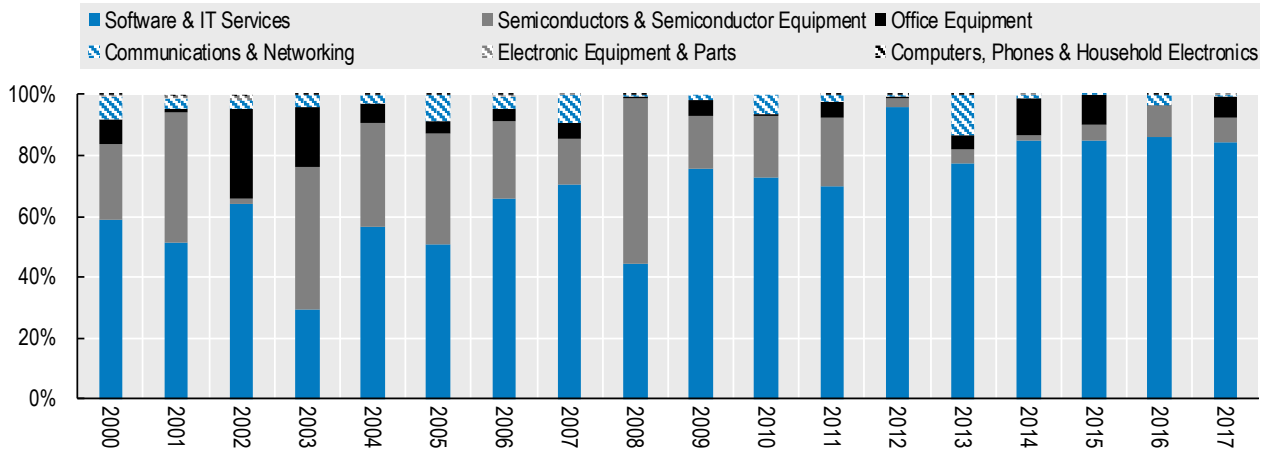
Figure 50. Technology IPO proceeds, as a percentage of total IPO proceeds



Note: Percentage share represents a 4-year average.
Source: OECD Capital Market Series dataset, see Annex for details.

Within the technology sector, companies in software and IT services constitute the largest share of technology company IPO proceeds in Asia (see Figure 51). On average software and IT IPOs represented 68% of total technology IPO proceeds in Asia between 2000 and 2017.

Figure 51. Distribution of Asian technology IPO proceeds, by sub-industry



Source: OECD Capital Market Series dataset, see Annex for details.

Of the 15 largest technology company IPOs between 2013 and 2017, Asian companies represent 6 (see Table 12). Established technology sectors such as computer hardware, e-commerce and telecommunications feature; while the presence of growing technology sectors such as FinTech (Qudian), mobile applications (Twitter, LINE, Fitbit), artificial intelligence (Mobileye), and analytics (IMS health) is notable. The largest technology IPO was by online retail platform Alibaba, which raised USD 21.8 billion (USD 25 billion with green shoe release) in 2014 by offering 320 million shares in the business.

Table 12. Top 15 largest global technology company IPOs, 2013 to 2017

Company	Jurisdiction	Exchange	Year	Proceeds (USD, millions)
Alibaba	China	New York	2014	25 032
Auto Trader	United Kingdom	London	2015	2 350
Netmarble Games	Korea	Korea	2017	2 348
Twitter	United States	New York	2013	2 093
Applus Servicios Tecnologicos	Spain	Madrid	2014	1 675
IMS Health	United States	New York	2014	1 495
LINE	Japan	Tokyo	2016	1 311
Scout24	Germany	Frankfurt	2015	1 145
Delivery Hero	Germany	Frankfurt	2017	1 125
Samsung	Korea	Korea	2014	1 063
Mobileye	Israel	New York	2014	1 023
Qudian	China	New York	2017	900
Worldline	France	Euronext	2014	870
HKBN	Hong Kong (China)	Hong Kong	2015	861
Fitbit	United States	New York	2015	841

Source: OECD Capital Market Series dataset, see Annex for details.

Despite an increase in Asia, the share of technology company IPO proceeds in total IPO proceeds has dropped globally from 23% in 2012 to 9% in 2017. At the same time, the total amount raised by technology companies also dropped globally from USD 5.7 billion in 2012 to just below USD 3 billion in 2017. There are a number of factors that could contribute to the reduction in technology company IPOs globally; this chapter does not attempt to diagnose the drivers, but the following sections will discuss equity financing trends in private equity and equity crowdfunding markets, which may have consumed part of the IPO option.

Private equity financing in Asia

Private equity refers to private capital that is given to a company not listed on a public exchange, in return for an equity share in the company. Private equity is raised to fund capital expenditure and business growth, or to strengthen the balance sheet. It is an opportunity for the company to welcome a strategic partner in the shareholding structure with positive externalities on management performance and business synergies. Private equity is also an important market for investors and corporations on the acquisition side.[11]

Private equity investment does not require the same level of legal and regulatory requirements as the IPO process. Despite private equity investors requiring strict reporting conditions, such as monthly rather than quarterly reporting, lower transaction costs and some flexibility in company management makes it a desirable option for nascent companies that are looking to expand their business. In addition, investors in private equity are generally more patient in their assessment of

[11] Private equity includes corporate buyouts and Leveraged Buyouts (LBO). An LBO is the acquisition of a controlling interest in the shares of a company funded with a significant share of debt. The company's free cash flow is used to repay the interest on the debt and principal that has been used to fund the acquisition.

the management's strategy and less likely to judge a company's performance immediately after the capital is received (as is often the case in public equity markets).

The amount of capital raised globally in private equity markets has increased significantly in the last 20 years, with Asian companies becoming prominent users of private equity markets in the last 10 years. According to Preqin's 2018 Global Private Equity and Venture Capital Report, the amount of private equity raised by Asian companies has more than doubled from USD 25 billion in 2009 to USD 64 billion in 2017. In the same period, the amount of capital raised through private equity in Europe has increased by a smaller 74% of the 2009 value from USD 62 billion to USD 108 billion in 2017. Chinese companies have been the largest users of private equity markets in Asia, representing 32% of private equity capital raised in Asia in 2017 (Preqin, 2018a).

Asian private equity firms have also emerged as global players with around USD 722 billion under management at the end of 2017. Private equity firms in Asia have an interest in the IT sector, with 72% of Asian based private equity fund managers identifying it as the sector of preference underlying investment choices in 2017. Telecoms and communication services are also of interest to Asian fund managers, with 53% identifying it as a preferential sector for private equity investment in the same period (Preqin, 2018b).

Venture capital

Venture capital is a form of private equity capital provided by private investors or specialised financial institutions (development finance houses or venture capital firms). Venture capital firms often focus on new, start-up or growing companies. The venture capital firm provides funding to start-up companies in exchange for equity. Venture capital financing is suitable for and often targeted towards high growth technology industries like biotech, software and online services.

In 2000, venture capital financing was concentrated in markets such as the United States and United Kingdom, with little activity elsewhere. Today, Asia represents an important share of venture capital activity globally; in the period between 2010 and 2017, the amount of venture capital raised by Asian companies was USD 147 billion[12] (32% of total global venture capital proceeds) (Preqin, 2018a).

The share of venture capital has also become a notable proportion of total private equity capital raised in Asia. In the period from 2007 to 2016, venture capital in Asia represented almost 20% of total private equity proceeds. In contrast, venture capital financing represented only 5% of total private equity capital raised in North America, and less that 4% in Europe (Preqin, 2017).

Among Asian economies, China leads in venture capital, accounting for on average almost 20% of total global venture capital proceeds in the period from 2013 to 2017, and India follows with on average 6% of total venture capital proceeds (Preqin, 2018a).

Venture capital firms have a clear interest in the IT sector, with 77% of Asian-based venture capital fund managers identifying it as the sector of preference underlying investment choices in 2017. Telecoms and communication services are also of interest to Asian fund managers, with 54% identifying it as a preferential sector for venture capital investment in the same period (Preqin, 2017).

[12] Excludes add-ons, grants, mergers, secondary stock purchases and venture debt.

Equity crowdfunding in Asia

Equity crowdfunding is a form of financing that seeks to raise capital from a large audience, rather than a smaller group of specialised investors, such as institutional investors, banks, venture capital firms or angel investors. Each individual investor (including private citizens) will provide a small amount of the funding requested (in some cases as little as USD 100), in return for an equity share in the company. Equity crowdfunding deals are typically executed through a peer-to-peer online platform,[13] and can be an appropriate source of financing for early stage new ventures, as well as fulfilling other functions, such as to aid a company in building early marketing strategies.

The requirements attached to equity crowdfunding differ from other forms of equity financing as borrowers do not have to adhere to reporting requirements from investors. Projects seeking crowd-investors are typically smaller in size; and crowd funding offers direct interaction between investors and borrowers. An emerging practice within equity crowdfunding in Asia is the crowdfunding platform acting as a holding company, termed the "holding model".[14] In this case, the platform creates a subsidiary company, which operates as an individual investor in each of the crowdfunded ventures. The holding company owns the company shares and sells them to the crowd, acting as a single investor in the project.

Since 2012, Asia has been one of the fastest growing regions for equity crowdfunding. From 2012 to 2015, equity crowdfunding activities in Asia increased on average 340% per year to around USD 10 billion in 2015 (OECD, 2016). Despite a lack of reliable data on equity crowdfunding volumes, the amount raised in Asia in 2016 and 2017 has been said to grow substantially since 2015 (OECD, 2018a). China appears to be the largest market for equity crowdfunding, and has recently adopted a regulatory framework for the industry in order to stimulate growth in the market.

3. Initial Coin Offering (ICO) trends in Asia

Initial Coin Offerings (ICOs) are sales of blockchain-based digital tokens that are related to a specific project, company or asset. In most cases, ICO ventures often resemble start-ups that conventionally finance themselves through angel or venture capital investments. One notable feature of ICOs is that the capital investment is not always given in return for an equity share. This section will provide an overview of ICO trends globally, with reference to their use by Asian companies.

Since 2014, ICOs have emerged as a new financing instrument, with some parallels being supposed with equity IPOs, venture capital, and crowdfunding. Despite this, ICOs are a unique funding instrument, and the blockchain-based tokens that are offered in return for capital come in three basic forms (see Box 3). When discussing ICO tokens, this chapter refers to utility tokens.

[13] Some recent developments in equity crowdfunding suggest that mobile applications and direct equity crowdfunding can also take place (i.e. through the company's online website).

[14] First termed as the crowdfunding "Holding Model" by J. Hemer in 2011.

Box 3. Digital financial token classifications

Cryptocurrency tokens

Cryptocurrency tokens are used as general-purpose mediums of exchange, and are a so-called a 'store-of-value cryptocurrency'. These include tokens such as Bitcoin (often termed 'coins')

Security tokens

A security token can be defined as a token that represents a conventional security on a blockchain to reduce transaction costs and create a record of ownership. In most cases, security tokens are available in limited numbers and are bought in return for an equity share in the company.

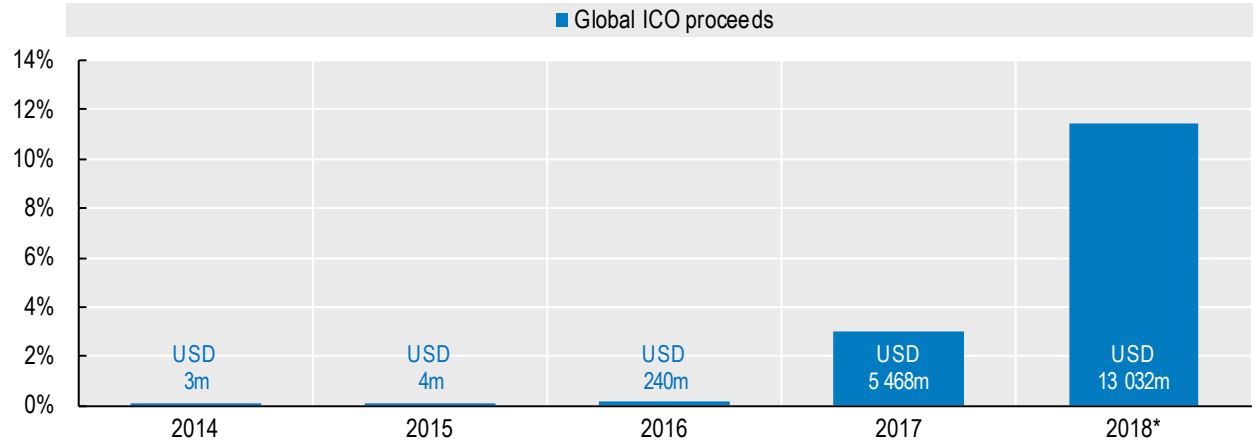
Utility tokens

A "utility" token is a token that represents the right to access a service that the issuer will provide through a new network. Utility tokens comprise the largest and most well-known ICOs and are the most numerous. Utility token ICOs bear some resemblance to crowdfunding pre-sales on platforms like Kickstarter. A closer analogy is buying the rights to a stadium seat before the venue is built, if those rights could be easily traded. While utility tokens can be simple "corporate coupons" that give the holder the right to an issuer's product or service, the most well-known ICOs employ them as the means of payment in a new marketplace.

Source: Howell, S., M. Niessner and D. Yermack (2018).

Globally, ICOs have raised around USD 18.8 billion in the period from January 2014 to August 2018 (see Figure 52). The amount raised in 2014 and 2015 was insignificant, representing less than 0.1% of the amount raised through initial public offerings (IPOs). From 2016 onwards, available data suggests that the amount raised through ICOs has increased significantly. In 2017, ICO issuances raised almost USD 5.5 billion, which represented 3.1% of IPO proceeds, and in 2018 over USD 13 billion has been raised so far (representing 11.2% of IPO proceeds).

Figure 52. ICO proceeds, percentage of global IPO proceeds



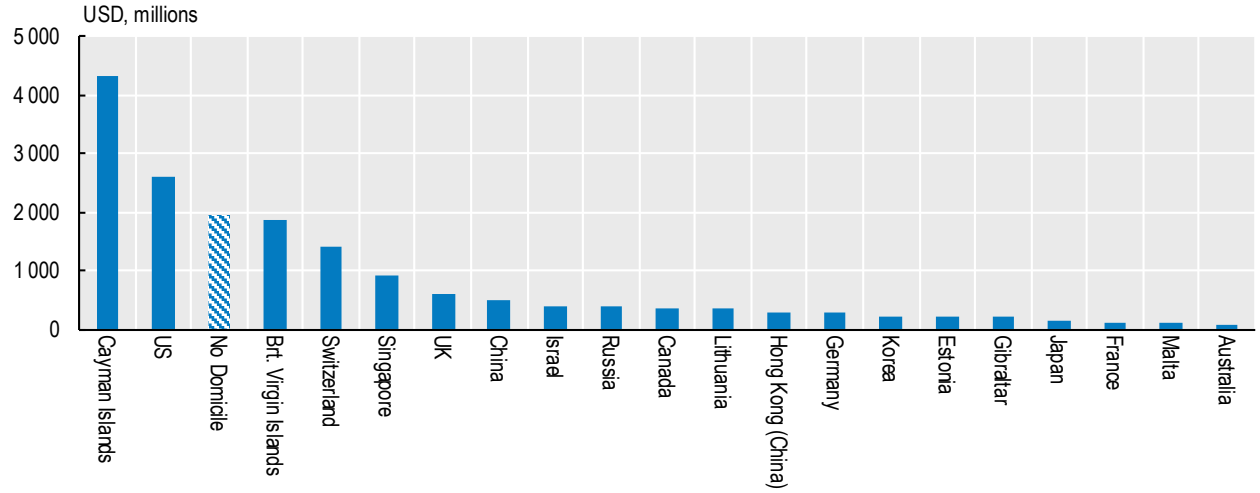
Note: *2018 IPO value is displayed as a share of 2017 January to August IPO proceeds. Note, the graph above represents the USD million amount of 868 completed ICOs. The TokenData dataset includes information on 2 277 ICOs performed between 2014 and August 2018, however only 868 ICOs have a recorded deal value.

Source: TokenData dataset, OECD calculations.

Since 2014, 2 277 ICOs have been issued and recorded globally[15]; with only 859 (38%) of these being successfully completed. Of the total 2 277 ICOs issued, only 1 104 (48%) disclose domiciliation information,[16] and only 868 have a USD deal value on record. Of the 1 104 ICOs with domiciliation information, 11% (249) were in the United States, followed by Russia (6%; 124), the United Kingdom (4.4%; 101), Singapore (3.6%; 81), and Switzerland (2.4%; 54).

Of the total USD 18.8 billion raised through ICOs from 2014 to 2018, the largest share of proceeds were raised by issuers domiciled in offshore financial centres. Figure 53 shows the distribution of USD capital raised by domiciliation (based on 868 ICOs with a USD deal value). Companies based in the Cayman Islands have raised the largest amount of capital through ICOs (USD 4.2 billion), followed by companies in the United States (USD 2.7 billion), no domiciliation information listed (USD 2 billion), and the British Virgin Islands (USD 1.8 billion).

Figure 53. Top 15 ICO jurisdictions, by proceeds



Source: TokenData dataset, OECD calculations.

Asia is a regional destination for ICOs, with USD 2.4 billion (13%) in total being raised since 2014 by Asian domiciled issuers. In the same period, the total value of capital raised through ICOs by companies domiciled in the European Union was USD 2 billion (11%). A cross section of Asian economies feature in the list: Singapore, China (including Hong Kong, China), Korea, Japan, and India lead with over USD 2.3 billion raised collectively. Companies located in Thailand, Malaysia, Chinese Taipei, Indonesia, Philippines and Viet Nam have also raised collectively almost USD 170 million through ICOs.

[15] Based on the TokenData (www.tokendata.io) dataset, which was shared with the OECD in September 2018 and provides a comprehensive record of 2 277 ICOs between 2014 and August 2018. It is difficult to collect comprehensive data on ICOs globally. There is no central platform or authority that records ICOs, and no international data collection mechanisms across governments to date. TokenData has compiled their dataset using a number of international ICO exchange platforms. The price and value information is sourced in co-operation with coinmarketcap.com, and the dataset includes the ICO company name, issuance date, domiciliation (if available), status, symbol, and price at issuance, and value today.

[16] TokenData dataset does not include incorporation information, therefore all ICOs in the dataset with no domiciliation information are classified as no domicile listed.

ICO issuance process

When an ICO is issued, in return for capital, investors receive newly issued digital tokens. Typically, an ICO company will stipulate that investors can use either tokenised fiat currency, or commonly used cryptocurrencies such as 'bitcoin' and 'ether'[17] to make their investment. Once issued, the tokens are programmed to be used exclusively on the network or platform related to the ICO company. Importantly, investors or potential users of the company's blockchain network are only able to use the specific tokens programmed for use on that network, requiring all actors who wish to use the network to purchase the company's unique tokens. Individuals as well as hedge funds and venture capital firms are among those investing in ICOs, and are typically interested in speculative returns or access to the network's services.

Tokens issued by companies through an ICO are represented on the blockchain using unique codes, which can then be used among token holders in return for goods or services on the network. These may also be exchanged with other network users for fiat currencies issued by governments, or other digital tokens. In order to maintain the blockchain network that the ICO company has developed (or operates on), computers (nodes) in the network will run special programming software (known as mining software). In return, these computers are rewarded (paid) with newly created tokens. These computers are known as miners, that mine (the process by which transactions are verified and added to the public ledger) the digital tokens and uphold the network.[18]

In contrast to the equity financing methods discussed in this chapter, ICOs are available to start-ups at a much earlier stage in their company and product development cycle. ICOs can raise substantial funds for start-ups before products are even developed and well before the company reaches the size and level of turnover that an IPO often requires. Companies issuing ICOs are not required to use intermediation services, and can undertake an ICO at a significantly lower cost today than other financing methods. Much like an investment deck, or prospectus in the case of an IPO, companies that wish to issue an ICO will release a white paper (see Box 4), which includes information on the business such as company structure, manifesto and financial plan. Unlike a prospectus, the white paper may also include technical information on the code and governance of the blockchain network (which will indicate token supply management).

Companies will first announce their intention to issue an ICO through a preannouncement, which forms the marketing stage of the ICO process. Following this, a white paper will be circulated publicly. Throughout the offering stage of the ICO, the company will release a final version of the white paper, which may address any concerns highlighted by investors in earlier stages. The final white paper also sets out the terms of the contract for investors (such as capital required, project timeline, expected return etc.). The final stage of the process is the announcement of the release date and final marketing campaign.

[17] Ether is the cryptocurrency token that is used as a form of payment for clients of the platform Ethereum.

[18] The mining process and related technical network maintenance is beyond the scope of this chapter. However, a more technical description of the mining process can be found in Mukhopadhyay et al. (2016).

Box 4. Characteristics of the 10 largest ICO deals

From 2014 to August 2018, the 10 largest global ICOs raised more than USD 7.3 billion in capital. Four companies are legally based in Switzerland, two in the United States, one in Lithuania, one in the Cayman Islands, and one in the British Virgin Islands. One additional company, the Dao, is the only ICO in the top 10 list with no domicile information. Despite all companies operating in the technology sector, not all companies operate blockchain-only businesses. Telegram for example, operates a cloud based messenger service and Sirin Labs offer a range of consumer electronics, including mobile phones.

Table 13. Top 10 largest ICO deals, 2014 to 2018

Domiciliation	Company name	Proceeds (USD)	ICO date	Company description
Cayman Islands	EOS	4.2 billion	June 2017	Blockchain operating system
British Virgin Islands	Telegram Open Network	1.7 billion	March 2018	Messenger application, with integrated payment services
Switzerland	Tezos	231 million	July 2017	Smart-contract software
United States	Filecoin	200 million	September 2017	Data storage and management
Switzerland	Sirin Labs	158 million	December 2017	Open source consumer electronics
Switzerland	The Bancor Protocol	153 million	June 2017	Smart-contract software
No domicile information	The Dao	150 million	May 2016	Cryptocurrency software, venture capital fund
Lithuania	Bankera	150 million	February 2018	Blockchain digital bank
Switzerland	Polkadot	144 million	October 2017	Blockchain network architecture
United States	t0	134 million	August 2018	Blockchain based trading platform

For the companies above, the full ICO process (preannouncement to issuance) took between 2 and 6 months (compared to on average 6 months to 2 years for an IPO). All companies released a white paper (between 17 to 36 pages) outlining the project details, the total amount of capital required, together with project timelines. All outlined in detail the type of financial instrument to be sold during the ICO (tokens) with clarity on the value assigned to it, together with the rights of the investor along with the expected period after which the company will commence returning earnings to investors, in a number of cases through dividends.

Some companies had used financing methods such as private equity and crowdfunding prior to the ICO, for example, Sirin Labs raised USD 97 million in two previous rounds. In 2013, they received USD 25 million in seed funding from one investor, and in 2016 raised USD 72 million from three investors.

Source: TokenData dataset, and ICO white papers.

Global regulatory environment for ICOs

The regulatory environment for ICOs and digital tokens is constantly changing. Currently, the regulation of ICOs varies between countries, ranging from not specifically regulated to an outright ban. Of 99 jurisdictions with available information[19] in June 2018, 8 jurisdictions[20] have banned the trading, issuance, mining and holding of cryptocurrencies and tokens for all citizens, and another

[19] The OECD collected data from government authority and regulator websites, as well as recording official public statements and press releases from senior government representatives or heads of states to compile a compendium of country stances. Given the manual nature of this research, omissions may exist.

[20] Algeria, Bangladesh, Bolivia, Colombia, Ecuador, Egypt, Morocco, and Nepal.

7 jurisdictions[21] have banned the holding of tokens by financial institutions, with citizens being allowed to hold tokens as long as they do not exchange them using financial institutions.

Regulators in 34 countries have made clear statements announcing that financial instruments used in ICOs are not specifically regulated. China, Korea and Viet Nam banned ICOs entirely in 2017, with China and Korea since repealing the bans. A number of countries, including Israel and Russia, that do not currently regulate ICOs are on the cusp of introducing specific legislation addressing a number of regulatory issues relating to ICOs and blockchain payment systems. It is expected that in late 2018 a number of countries will alter their regulatory position.

Among countries with available information, 70% regulate ICOs without banning them, with most countries extending existing anti-money laundering (AML) and counter terrorism financing (CTF) laws to ICOs. Singapore (see Box 5), for example, has released specific guidance outlining the application of pre-existing regulation that can be used to classify and regulate ICO actors in line with entities in the traditional payment and financing systems.

Regulators have raised a number of specific concerns regarding ICO markets; notably, that ICO markets offer less investor protection than traditional securities markets, with greater potential for fraud and manipulation. Several national regulators have released statements and warnings to this effect. In September 2017, the UK Financial Conduct Authority released a statement warning consumers of the risks of ICOs, noting that they are “very high-risk, speculative investments”, with low investor protection, high price volatility and potential for fraud. In May 2018, Valerie Szczepanik, SEC assistant director of enforcement said about ICOs: "they're raising a lot of money, but they're not complying with the rules that are in place to protect investors".

Among jurisdictions in Asia, authorities in China; Hong Kong, China; India; Indonesia; Japan; Korea, and; Singapore have issued warning statements. In September 2017, Hong Kong’s Securities and Futures Commission stated that “Investors should be mindful of the potential risks involved in ICOs and investment arrangements involving digital tokens. As these arrangements and the parties involved operate online and may not be regulated, investors may be exposed to heightened risks of fraud”. In October 2017, Japan’s Financial Services Agency released a warning outlining risks relating to price volatility and potential fraud in ICOs.

As jurisdictions begin to introduce regulation on ICOs, greater regulatory certainty could play a role in improving investor protection. There is incomplete public information available on the application of existing regulation or release of new regulation for ICOs. Of the jurisdictions with available information, including but not limited to Australia; Bermuda; Estonia; Malta; Singapore, and Switzerland, greater regulatory certainty has been met with higher growth in the rate of ICOs (controlling for tax differences). At the same time, ICOs relying on regulatory arbitrage or exploiting loopholes in regulation tarnish the ICO market’s reputation and integrity, impeding fruitful use by legitimate players.

Greater clarity, and the introduction of appropriate regulation on ICOs could attract more legitimate actors and dissuade illegitimate ones in ICO markets. An increase in ICO costs commensurate with the maturing of the instrument and its move toward regulated territory is being observed, particularly for large size offerings. Similarly with IPOs, the cost differential is dependent on the particular jurisdiction of ICO issuance (Nassr and Wehinger, 2016).

[21] Canada, Cambodia, India, Indonesia, Jordan, Thailand, and Viet Nam.

A delicate balance will need to be achieved in the development or application of regulatory and supervisory requirements so as not to deprive the ICO market of its speed and cost benefits, particularly for smaller size offerings. Proportional application of regulatory requirements, as is the case in small public equity offerings in certain jurisdictions, could be considered as the way forward.

Box 5. Monetary Authority of Singapore: Guidance on ICOs and digital tokens

On 1 August 2017, the Monetary Authority of Singapore (MAS) clarified that if a digital token constitutes a product regulated under the securities laws administered by MAS, the offer or issue of digital tokens must comply with the applicable securities laws.

Application of securities laws on offers or issues of digital tokens in Singapore

Offers or issues of digital tokens may be regulated by MAS if the digital tokens are capital markets products under the Securities and Futures Act (Cap. 289). Capital markets products include any securities, futures contracts or arrangements for the purposes of leveraged foreign exchange trading.

Digital tokens which constitute capital markets products

MAS will examine the structure and characteristics of, including the rights attached to, a digital token in determining if the digital token is a type of capital markets products under the Securities and Futures Act (Cap. 289).

For instance, a digital token may constitute a share, where it confers or represents ownership interest in a corporation, represents liability of the token holder in the corporation, and represents mutual covenants with other token holders in the corporation inter se;

- a debenture, where it constitutes or evidences the indebtedness of the issuer of the digital token in respect of any money that is or may be lent to the issuer by a token holder; or
- a unit in a collective investment scheme (CIS), where it represents a right or interest in a CIS, or an option to acquire a right or interest in a CIS.

Intermediaries who facilitate offers or issues of digital tokens

MAS has observed that one or more of the following types of intermediaries typically facilitate offers or issues of digital tokens:

- a person who operates a platform on which one or more offerors of digital tokens may make primary offers or issues of digital tokens (primary platform);
- a person who provides financial advice in respect of any digital tokens;
- a person who operates a platform at which digital tokens are traded (trading platform).

A person who operates a primary platform in Singapore in relation to digital tokens which constitute any type of capital markets products may be carrying on business in one or more regulated activities under the Securities and Futures Act (Cap. 289). Where the person is carrying on business in any regulated activity, or holds himself out as carrying on such business, he must hold a capital markets services licence for that regulated activity under the Securities and Futures Act (Cap. 289), unless otherwise exempted.

A person who provides any financial advice in Singapore in respect of any digital token that is an investment product must be authorised to do so in respect of that type of financial advisory service by a financial adviser's licence, or be an exempt financial adviser under the Financial Advisers Act (Cap. 110).

A person who establishes or operates a trading platform in Singapore in relation to digital tokens which constitute securities or futures contracts, may be establishing or operating a market. A

person who establishes or operates a market, or holds himself out as operating a market, must be approved by MAS as an approved exchange or recognised by MAS as a recognised market operator under the Securities and Futures Act (Cap. 289), unless otherwise exempted.

A "utility" token is a token that represents the right to access a service that the issuer will provide through a new network. Utility tokens comprise the largest and most well-known ICOs and are the most numerous. Utility token ICOs bear some resemblance to crowdfunding pre-sales on platforms like Kickstarter. A closer analogy is buying the rights to a stadium seat before the venue is built, if those rights could be easily traded. While utility tokens can be simple "corporate coupons" that give the holder the right to an issuer's product or service, the most well-known ICOs employ them as the means of payment in a new marketplace.

Source: Monetary Authority of Singapore, A Guide to Digital Token Offerings, November 2017.

4. The initial public equity offering (IPO) process in context

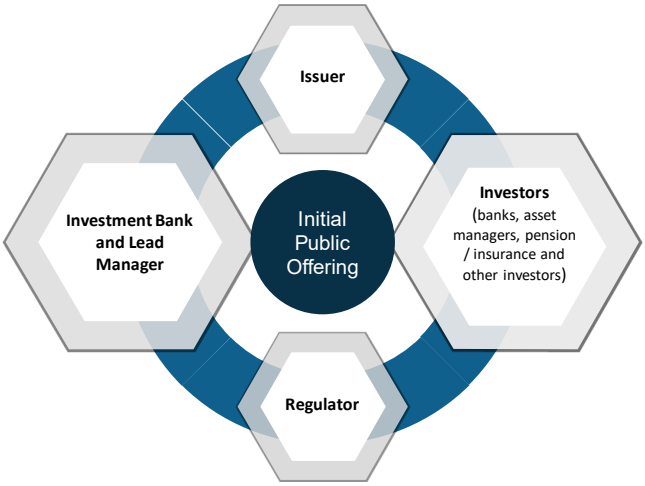
Over the past few decades, there has been a number of changes and technological innovations in the public equity offering process, such as the rise of intermediaries, financial market innovation, and electronic book-keeping. Despite these innovations, the fundamentals of public equity markets - namely why companies choose an IPO and the deal terms (issuance of shares in return for capital), have remained unchanged.

Today, corporations continue to raise capital by selling equity shares publicly, with the issuance of registered securities. Details of the IPO are legally disclosed to potential investors in the form of a prospectus. Various information asymmetries, however, impact the current IPO process. Extensive record keeping requirements have led to internal and external reconciliations that can contribute to higher issuance costs (see Section 5). In most cases, underwriting banks in an IPO use electronic book-keeping, but are also heavily reliant on direct interactions with investors, market soundings and other physical orders.

The process requires a number of actors and intermediaries (see Figure 54) to ensure all stages of the process run smoothly and that the company receives the best terms. The following actors are involved in the IPO process and each carries out an individual function:

- **Issuer:** raises capital through an IPO.
- **Investment bank and lead manager (with syndicate):** perform due diligence, and assist on the financing, structuring, underwriting, marketing of the transaction, book building, pricing, and allocation process.
- **Investors (including banks, asset managers, pension and insurance funds, with other investors):** provide demand for the IPO; manage a diversified portfolio and pool funds.
- **Regulators:** ensure compliance and regulatory control.

Figure 54. IPO process ecosystem



Source: OECD analysis.

Challenges associated with the current IPO process

In recent years, the challenges associated with the IPO process have received increased attention, including adverse selection problems (Yung and Zender, 2010), moral hazard (Hoque, 2014), and underpricing (Ljungqvist, 2010; Hovey and Li, 2009). Information asymmetry, increasing costs (OECD, 2017), lack of transparency, lack of an audit trail and the manual nature of the IPO process highlights the scope for innovation that can address these challenges and bring efficiency improvements. However, as discussed in later sections, blockchain may be appropriate in addressing only a limited number of these challenges.

The following presents a non-exhaustive list of the IPO process challenges in certain markets, as discussed in the literature:

- **Information asymmetry:** multiple versions of 'truth' exist in the network of issuers, syndicate members and investors, requiring a time consuming reconciliation process between participating systems. Each participant maintains their own version of records; and a continual reconciliation process is required to keep all the participants within the same status quo (Hoque, 2014).
- **Lack of transparency and involvement of costly intermediaries:** the current issuance process is less transparent due to the involvement of intermediaries such as banks and custodians for settlement processing and custody of securities. In some cases, for practical reasons including time difference and varied business hours, the process can become convoluted. The number of intermediaries involved in each transaction may also vary. Having numerous intermediaries (banks/custodians/stock exchanges) increases cost and adds time to a given transaction[22] (OECD, 2017).
- **Lack of audit trail:** in the current system, limited audit trails exist given the manual nature of the securities issuance process. This will result in little to no electronic audit trail of the activities performed throughout the transaction (Wang, 2015).

[22] In the case of IPOs of less than USD 100 million, the average underwriting cost was globally 9% to 11% of the transaction in 2016 (OECD, 2017)

- **Potential counterparty risk** exists in some markets due to the long settlement cycle, which keeps the risk open on both ends of the counterparty until the settlement cycle completes successfully (Yung and Zender, 2010).
- **High settlement risk** occurs when an individual has to pay the purchase price of a financial instrument in advance but receives the security with a time delay. In this case, the individual will pay the purchase price and end up receiving the securities late or not at all. Conversely, when an individual is obliged to deliver financial securities that said person has sold, the individual may not receive the purchase price from the buyer at the same time (Yung and Zender, 2010).
- **Manual asset servicing** is provided in the current financial industry by the custodians handling accounts for large institutions, for example each asset servicing corporate action requires custodians to handle interactions between participants and to ensure the clients account is debited or credited as per the transaction. Any change made to a security has to be cascaded across all the layers of custody (stockbroker, sell-side bank, local custodian, international custodian, etc.), which can lead to further delay and overheads in the execution and ongoing asset servicing (Wang, 2015).

The challenges set out above highlight the time consuming and costly nature of the IPO process, which can be prone to issues and possible manipulation along the chain. These challenges will be further reviewed in section 6 in the context of the application of blockchain technology in the IPO issuance process.

5. Recent trends in financing relevant to public equity markets

In the last ten years, corporations' use of capital markets has changed in a number of important ways. These changes have in part been driven by macroeconomic events that have affected traditional sources of financing. They have also been influenced by regulatory changes that have contributed to a decrease in the use of public equity markets (for instance in favour of debt) by small and medium-sized enterprises. In a low interest environment, where institutional investors are pressed to meet their client obligations, corporations have also had to respond to investor campaigns for higher dividends and share buyback programmes.

The first trend is a market shift toward private placements and private equity activities in advanced economies. Investment banking and intermediation services play an important role in ensuring the healthy functioning of capital markets. These services are integral to the IPO process. In 2016, the IPO market share of the top 10 largest investment banks globally was 45%; for non-investment grade corporate bonds this was as high as 68% (OECD, 2017). Both France and Germany have seen institutional investors increasingly investing directly in private equity, bypassing the traditional intermediated fund structure. Private placements[23] have become a relevant source of funding in recent years, with European companies choosing in some cases to use this channel instead of public equity market financing (for example, through an SPO). In the Euro debt markets, there are several variants of privately placed debt across markets; the German Schuldschein (SSD) market and the French Euro-PP market are the most dominant private placement markets.

[23] Private placements are a financing instrument, classed between bank financing and corporate bonds, which enable companies to choose the most appropriate funding source in terms of maturity, minimum issuance size, rating requirements and others.

Secondly, direct listings have also developed as an alternative to IPOs for large value companies. Direct listings allow companies to be listed on the exchange without conducting an offering, skipping the traditional underwriting process by the investment bank and listing shares directly on the exchange. Direct listings allow companies to avoid underwriter fees, and in some cases there can be fewer regulatory restrictions compared to traditional IPOs. A prominent example of a direct listing was Spotify in April 2018.

Thirdly, IPOs by non-financial companies have declined in the last 20 years. This is largely due to a decline in advanced economies, whereas non-financial companies IPOs in emerging economies have increased. Notably, companies in Asia have increasingly used public markets to raise capital, with both financial and non-financial IPOs increasing. In the last 20 years, the share of smaller company IPOs has also increased in emerging markets (4% in 1994 to 2000, to 7% in 2008 to 2014), but has declined in advanced economies (from 16% to 6% respectively) (OECD, 2015). At the same time, the cost of issuing an IPO has increased in larger Asian markets in the last decade. In Japan, for example, the median IPO issuance fee has increased from 6% in 2000 to 8% in 2016 (OECD, 2017).

Within the IPO process and in financial reporting, electronic book keeping and related technological advances have brought with them efficiency improvements in the IPO and post issuance process. Electronic processes within the book-building, book keeping and financial reporting process have all improved monitoring of transactions and have increased quality of reporting by regulators and enabled quasi ‘smart auditing’ of capital and risk positions of banks and other financial services clients.

6. Application of blockchain technology in public equity markets

Box 6. Blockchain pilot projects in Asian stock exchanges

In Asia, a number of stock exchanges have launched pilot projects dedicated to the integration of blockchain technology in their existing systems. However to date, these have been largely concentrated on clearing and settlement as well as post-settlement activities.

Table 14. Selected stock exchange blockchain pilot projects in Asia

Jurisdiction	Exchange	Project overview
Hong Kong (China)	Hong Kong Stock Exchange (HKEX)	HKEX is working with the Australian Stock Exchange to develop a blockchain platform focused on over the counter trading and to upgrade their post-trade system
India	National Stock Exchange of India (NSE)	NSE, along with ICICI Bank, IDFC Bank, Kotak Mahindra Bank, RBL Bank and HDFC Securities have used Blockchain startup Elemental's blockchain to test know-your-customer procedures and real time information updates using blockchain.
Japan	Japan Exchange Group (JPX)	JPX collaborated with IBM in 2016 to explore blockchain’s use in trade and settlement for low liquidity markets. JPX are also working with Nomura Research Institute to explore the reach of blockchain technology in security market processes.
Myanmar	Yangon Stock Exchange (YSX)	YSX are working with Daiwa Securities Group to test and develop a fully blockchain-based equity trading stock exchange.
Korea	Korea Exchange (KRX)	KRX has launched a Korea Startup Market (KSM) where equity shares of startup companies can be traded in the open market, using blockchain-based document and identify authentication.

Note: Selection drawn from publically available information as of July 2018.
Source: National exchange websites, public press releases, and coindesk.com.

Stock exchanges globally and in Asia have begun to experiment with blockchain technology (see Box 6) for clearing and settlement, post trading, as well as in security issuances (mostly for corporate debt). Despite interest, pilot projects are largely in the development stage and to date there has been no concrete public information on the application of blockchain in the IPO issuance process.

Box 7. Selected case studies: blockchain enabled private issuances

As of July 2018, five cases[1] of private offerings using blockchain had been recorded globally. These were Daimler (Germany), Baidu (China), Overstock (US), Solidum Partners (Switzerland), and Marex Spectron (UK). JD Finance (Hong Kong) and BlockEx (UK) are planning private offerings using blockchain platforms in the near future.

Many of the issuances include the use of private permissioned[2] blockchains with the involvement of intermediaries such as investment banks (limited to underwriting functions) and law firms (to write and oversee the execution of smart contracts). Three examples are outlined below:

Overstock, *June 2015 and December 2016*

In 2015, Overstock issued USD 5 million in bonds to FNY Accounts using blockchain. In 2016, Overstock then completed a USD 10.9 million stock offering that included USD 1.9 million worth of digital shares, which were traded exclusively on the t0[3] private blockchain platform (which issued an ICO in August 2018, see Box 4). The incentives for using a blockchain based system were cited as: near-instant settlement time (as opposed to three days post-trade on traditional exchanges), disintermediation to avoid excessive fees, and an intention to prevent so called 'naked short selling'.[4]

Baidu, *May 2017*

Using blockchain, Baidu's Baiqian Leasing and Huaneng Trust issued asset-backed securities, valued at around EUR 50.5 million. The issuance used a private blockchain in which regulators, investors and issuers were given permissioned access to view project information. The incentives for using a blockchain based system were cited as: the need for monitoring real time data and cash flows on the assets pre- and post-issuance and reduced cost and time involved in the issuance process with benefits of greater peer-to-peer interaction. In March 2018, Baidu listed publicly of the Shanghai Stock Exchange.

Daimler, *June 2017*

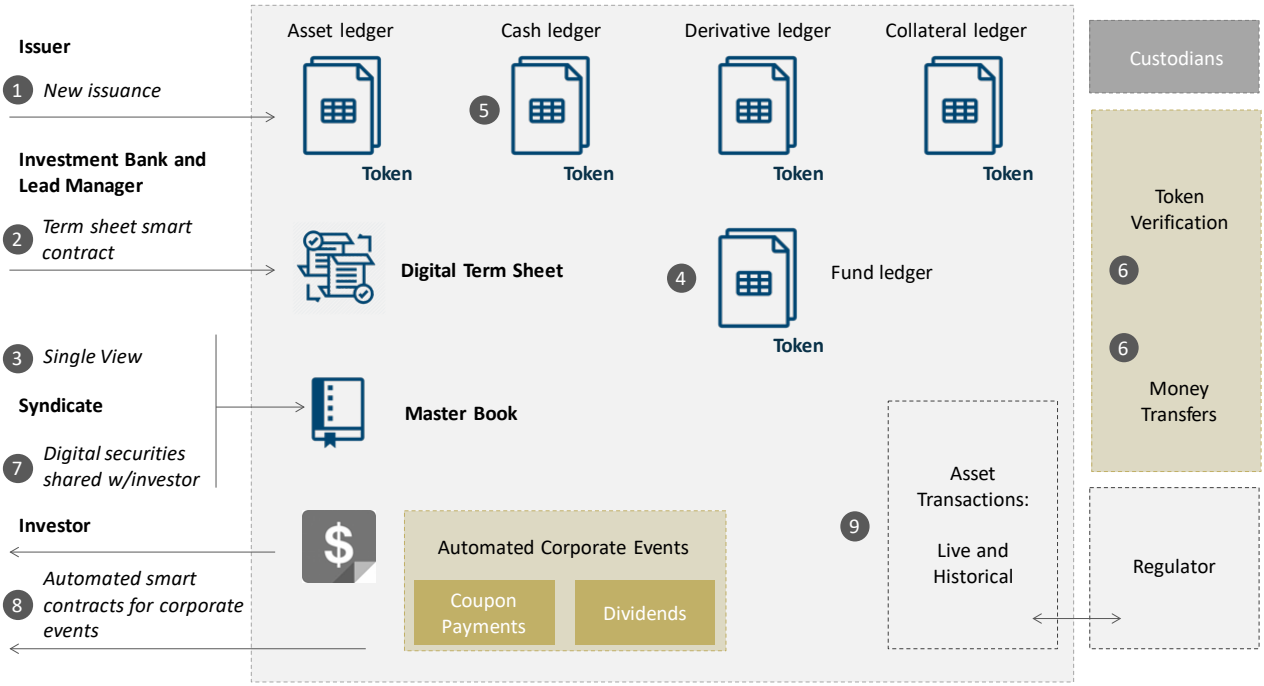
With Landesbank Baden-Württemburg, Daimler AG issued a corporate bond (Schuldschein) worth EUR 100 million using a private permissioned blockchain network. The entire transaction cycle, from origination, distribution, allocation and execution of the loan agreement, to the confirmation of repayment and of interest payments, was automated on the blockchain network. The borrower, bank, and investors all received access to a decentralised customer portal, where drawing certificates and contracts were confirmed, and then a smart contract automated the management of the order book. Digital tokens were generated on the blockchain once the loan contract signed, and the smart contract allocated a number of tokens to investors based on the size and terms of their investment. Daimler stated the reasons for using a blockchain based system as: increased speed of the bond issuance compared to conventional processes, and the need for decentralisation of information to provide greater transparency and to reduce the administrative burden.

Source: Daimler and Baidu websites (2018); DeConinck (2017).

[1] In two cases, issuances occurred twice; note: information is limited given public availability.
[2] Permissioned blockchains maintain an access control layer to allow certain actions to be performed only by certain identifiable participants. These blockchains differ from public blockchains.
[3] t0 is a majority-owned subsidiary of Overstock.
[4] Naked short selling is the practice of short-selling a tradable asset of any kind without first borrowing the security or ensuring that the security can be borrowed, as is conventionally done in a short sale.

Notionally, blockchain technology could be applied at various stages of the IPO issuance process. In theory, blockchain technology may substitute physical documents and provide a fully digitised IPO issued on the blockchain. The remainder of this section will explore the theoretical possibility of using blockchain technology throughout the IPO issuance process.

Figure 55. Schematic for a theoretical digitised IPO issuance using blockchain technology



Source: OECD analysis, with reference to the representation in Capgemini, 2016.

Figure 55 outlines the theoretical process of an IPO issuance using blockchain technology, with reference to post issuance corporate events, such as the digital execution of coupon payments and dividends. In this case, the issuer would issue the IPO into the asset ledger (1). Origination of the asset is represented digitally by a new 'tokenised' asset made by the issuer.

The issuer approaches the investment bank for help with the IPO issuance process and the investment banker initiates a digital term sheet and obtains sign off from the issuer (2). All authorisations of participants in the blockchain are made by digital signatures.

Lead manager and syndicate members have a new single view of the master book on the blockchain platform (3). The master book contains orders or bids from prospective investors with details as to the quantity of shares and their price.

The fund manager would use tokens to manage the investor's holdings that are recorded on the fund ledger (4). The tokens represent cash or security depending on the investor transaction. These tokens are used to determine the investor's portfolio value and represent the investor's holdings on the blockchain platform. These tokens are used in case of trade settlement within the platform or to inform the community when outside the platform.

Participants such as custodians and banks would participate as today when the settlement occurs outside the blockchain platform. In the event that the issuance occurs fully on blockchain, custodians and banks could act as keepers of tokens represented on a blockchain platform and transfer the security/money to the beneficiary accounts corresponding to the tokens represented on the platform (6).

Money transfers would be represented via tokens with buy and sell facilities (6). Tokens would be used to represent credit and debits in corresponding cash/expense accounts on the platform. These tokens are assigned to a stable price and could in theory represent one unit of a particular currency. Digital securities are credited to investor's accounts, replacing paper notes and certificates (7).

Mandatory corporate events and disbursements could be executed by triggering smart contracts (8). These events are initiated by the corporation and affect all shareholders. Dividend payments, coupon payments, interest, stock splits, mergers, return of capital, bonus issues etc. will come under mandatory corporate events and disbursements. These corporate events can be converted into smart contracts that auto-execute updating shareholders of the asset and cash account following the corporate event. These are executed based on the ownership of the asset in the blockchain as well as the due date on timestamp.

Reporting related to the issuance process in theory could be accessible with a complete electronic audit trail providing full transparency to parties involved (9). Regulators could in theory audit live data directly on the permissioned ledger and verify the transaction history and details on the platform.

A lot needs to be done before this could be a feasible application, notably to allow for the level of security, system operations (time) and volume needed in today's equity markets. Importantly, from this research, the application of blockchain in any of these processes does not appear to significantly impact the advantages and challenges of issuing an IPO. Simply, this presents a tokenised version of an IPO with largely the same features as today.

In revisiting the challenges with the current IPO process as outlined in section 4: including information asymmetry; potential counterparty risk; high settlement risk, lack of transparency and involvement of costly intermediaries; lack of audit trail, and; manual asset servicing – a digital IPO goes only part of the way to solving these.

The reduction of information asymmetries and greater transparency is one of the most commonly used examples in support of blockchain technology. However, in this example the blockchain used would be private-permissioned, due to the confidential nature of the IPO process. Therefore, overcoming information asymmetries and lack of transparency would rely on the same mechanisms used today; a variety of institutional and signalling means, such as enforcement of liability, disclosure requirements and monitoring through a third party auditor. This too requires the involvement of intermediaries, and related costs. On a broader note, a company's or an investor's incentives to share information may not be influenced by a more efficient technological tool for doing this, since possession of proprietary information in many cases is what gives businesses and investors a competitive edge.

The introduction of blockchain does not entirely reduce counterparty risk. The use of smart contracts would provide benefits. Yet, the lack of relevant use cases suggests that a rigid proof of concept would need to be developed before it would be possible to significantly reduce counterparty risk with the use of blockchain in an IPO. In addressing counterparty risk, the enterprise blockchain software firm R3 have explored the extent to which settlement risk may be reduced by using blockchain technology, but with limited participation from large scale financial players, gains are not yet realised (Zhao et al, 2018).

A blockchain based IPO issuance does offer financial reporting, audit trail advantages and to some extent digital asset servicing. However, these elements can be applied without the need for a completely digitised blockchain IPO process. In addition to this, existing DLT and other technologies provide solutions in financial reporting and auditing off the blockchain. A number of these solutions, for example electronic book-building software, digital signatures, and online platforms for investors could in theory be implemented on blockchain independently.

Blockchain technology would ultimately need to overcome a number of constraints to be appropriate for wider use in public equity markets. At its current level of development, two key constraints persist. Firstly, proof of work (to allow full use on public blockchains) is time consuming which limits transaction volume. Secondly, tokenised fiat currency is in small and limited supply, which will make it difficult to support large scale IPO transactions. The landscape is however developing rapidly, with private and public actors investing substantial resources into solving current issues with the technology and exploring the wider benefits of its use.

7. Current landscape: international organisations and blockchain technology

The rise of blockchain technology has received interest from international institutions. Some stock exchanges have begun to experiment with blockchain through pilot studies (see Table 14), and international regulators and organisations have published various studies to outline the uses and potential regulatory framework for DLTs and blockchain in financial markets.

The IMF has published two reports on DLTs (in January 2016 and June 2017) urging national regulators to exercise caution when appraising blockchain's use in financial markets. Similarly, IOSCO released a report in February 2017 in which they call primarily for greater co-operation among regulators and notably for DLT, which is in essence an international phenomenon.

The Bank for International Settlements' (BIS) has published two analytical reports (in February and September 2017) on DLTs in payment, clearing and settlement services. The reports provide national regulators and central banks with an understanding of the technology, in order to set out the risks and opportunities of its implementation. Recalling the rules and possible uses of a blockchain registry, the BIS emphasises the immature nature of the technology and the lack of real revolutionary potential given the current market infrastructure.

As of June 2018, ESMA had published three documents on DLT, one of which directly assessed the application of DLT in financial and public markets (with little reference to public equity markets). In October 2018, the Financial Stability Board (FSB) released a report outlining the financial stability implications of ICOs and cryptocurrencies. The report highlighted that G20 Finance Ministers and Central Bank Governors should continue to monitor the risks arising from crypto-assets and ICOs (also discussed in their March and July 2018 meetings).

The Financial Action Task Force (FATF) has several areas of work underway to encourage appropriate and consistent safeguards for blockchain that will contribute to the mitigation of the associated money laundering and terrorist financing risks while avoiding unnecessary barriers to legitimate use.

The OECD has released targeted reports on blockchain relating to its activities in corporate governance (Akgiray, April 2018), public governance (Berryhill. et al, June 2018), competition policy (Pike, August 2018), as well as a primer giving an overview of blockchain technology in finance (September 2018). The OECD's first global policy forum on blockchain concluded that the OECD will continue to engage with practitioners, governments and experts to encourage co-operation in the international policy environment, and identify and share best practices for governments to manage and use blockchain.

Conclusion and issues to be addressed

Despite the potential for blockchain technology in public equity markets, the technology is still in its infancy and lacks the capacity required to meet the requirements of today's market infrastructures and maintain the current level of transactions. More incremental challenges and risks also need to be addressed before the technology could be appropriate for wide-scale use in public equity markets. These include the governance of the networks, protection of data, need for interoperability with existing infrastructures and cost (challenges of scalability).

There are, however, related capital market activities that could benefit from blockchain technology. Post-trading activities might present the strongest potential use for blockchain. In theory, this could allow greater accuracy of ownership and changes in ownership (legal insider trading channels, disguised derivatives hedging, backdating and similar undesirable actions may all be limited on a blockchain network). With proper implementation and oversight, smart contracts could facilitate mandatory corporate events (coupon payments, dividends) and disbursements.

Further research and dissemination on results of pilot initiatives using blockchain technology is essential to give regulators and policy makers a stronger position to assess blockchain's potential for equity market activities. In the short term, national regulators will do well to strike the delicate balance between strict regulation and over-embracing innovations. In the medium term however, greater co-operation among regulators and governments could help to develop applications of blockchain technology that can possess the transformational power that TCP/IP did. This is highly relevant for Asian economies, which possess an increasing influence in today's public equity markets. Whether it is blockchain, or a related technological platform, it is in the best interest of regulators, authorities and governments to be well informed, and explore appropriate options to address core governance and efficiency challenges.

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ANNEX 1 – ASIAN PUBLIC EQUITY MARKET DATA

A. Initial public offerings by home jurisdiction of the company

Table A.1. Proceeds, 2017 USD, millions

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Bangladesh	135	38	100	232	191	146	125	167	59	81	18
Cambodia	0	0	0	0	0	22	0	20	5	8	27
China	73 223	18 352	52 086	113 802	59 176	22 859	17 745	64 025	48 205	43 774	45 602
Hong Kong (China)	12 423	2 047	3 071	26 682	7 174	481	1 483	1 825	2 728	3 897	2 718
India	10 270	5 474	4 668	9 236	1 487	1 371	375	302	2 252	4 207	10 568
Indonesia	2134	2905	500	3 564	2 484	1 128	1 707	764	882	1 039	670
Japan	6206	1348	678	16 700	2 272	10 312	6 041	9 925	15 367	8 373	4 763
Korea	2817	1039	3 046	9 375	3 681	1 264	1 263	4 327	3 730	5 040	6 814
Malaysia	754	434	3 943	7 074	1 985	7 988	3 010	1 565	1 138	307	1 860
Mongolia	1	35	0	842	0	0	0	0	0	0	0
Pakistan	228	76	10	60	19	6	26	49	71	26	102
Philippines	1 309	313	0	842	289	836	1 461	305	116	1 022	465
Singapore	1 215	476	133	4 857	739	508	957	933	269	1 325	1 508
Sri Lanka	0	5	15	26	233	9	8	14	7	8	22
Chinese Taipei	1 224	287	237	1 098	465	357	578	464	638	387	665
Thailand	297	767	229	215	189	787	1 505	1 944	1 393	958	3 176
Viet Nam	6 882	4 837	3 093	3 002	562	119	184	163	127	178	1 458

Source: OECD Capital Market Series dataset, see Annex 2 for details.

Table A.2. Number of companies

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Bangladesh	11	12	8	8	7	16	10	20	10	7	5
Cambodia	0	0	0	0	0	1	0	1	1	1	1
China	215	99	169	454	336	190	71	208	296	306	**489**
Hong Kong (China)	47	22	31	36	39	23	42	42	55	68	81
India	103	40	23	65	39	29	40	56	72	101	179
Indonesia	23	18	14	22	25	21	28	23	16	15	35
Japan	118	48	20	22	35	51	55	76	91	82	86
Korea	75	48	63	71	67	30	39	57	83	62	61
Malaysia	24	20	11	29	22	15	17	15	12	18	19
Mongolia	1	4	0	1	0	0	0	0	0	0	0
Pakistan	5	8	3	5	3	3	3	5	4	3	5
Philippines	11	2	1	3	6	5	8	5	4	4	4
Singapore	29	17	17	21	19	18	21	22	13	19	30
Sri Lanka	0	3	3	8	16	3	2	5	2	2	4
Chinese Taipei	19	12	15	16	22	13	24	12	20	20	22
Thailand	12	11	18	11	10	19	28	36	31	23	39
Viet Nam	59	50	67	79	40	14	9	8	5	21	14

Source: OECD Capital Market Series dataset, see Annex 2 for details.

B. Initial public offerings by Asian companies outside local markets

Table B.1. Proceeds, 2017 USD, millions

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Total	47 805	8 081	17 380	35 503	14 987	9 808	18 076	51 288	22 472	21 659	15 450
Non-financial	38 095	8 081	16 169	19 791	13 296	5 917	11 551	47 415	11 154	7 213	9 437
Financial	9 710	0	1 211	15 712	1 691	3 892	6 525	3 872	11 318	14 446	6 013
Asia	37 614	7 586	15 029	30 398	12 655	9 482	17 091	20 582	21 866	18 623	10 807
Hong Kong (China)	34 575	6 882	14 629	29 594	12 381	7 240	16 957	20 445	21 824	18 146	10 706
Europe	1 939	262	17	63	7	88	29	33	26	7	7
United States	8 212	195	2 325	4 654	2 306	222	930	30 631	500	2 986	4 598

Source: OECD Capital Market Series dataset, see Annex 2 for details.

C. Sectoral distribution of initial public offerings

Table C.1. Distribution of IPOs among different sectors, 2017 USD, millions

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Basic Materials											
Volume	10 397	4 746	5 801	18 153	9 712	3 397	1 626	2 882	3 522	4 109	6 527
Share	9%	12%	8%	9%	12%	7%	4%	3%	5%	6%	8%
Consumer Cyclicals											
Volume	23 325	5 284	15 886	18 979	17 298	8 326	3 740	11 995	9 718	10 348	13 930
Share	20%	14%	22%	10%	21%	17%	10%	14%	13%	15%	17%
Consumer Non-Cyclicals											
Volume	5 439	3 544	3 869	8 781	6 031	4 436	7 950	9 970	4 264	2 725	4 494
Share	5%	9%	5%	4%	7%	9%	22%	11%	6%	4%	6%
Energy											
Volume	3 233	3 995	2 965	10 760	3 565	848	1 553	1 989	721	520	544
Share	3%	10%	4%	5%	4%	2%	4%	2%	1%	1%	1%
Financials											
Volume	36 363	2 701	8 799	79 375	6 090	5 959	8 456	5 671	26 037	22 915	19 895
Share	31%	7%	12%	40%	8%	12%	23%	7%	34%	32%	25%
Healthcare											
Volume	1 682	482	4 294	10 627	6 400	3 666	1 912	2 464	6 066	7 838	4 622
Share	1%	1%	6%	5%	8%	8%	5%	3%	8%	11%	6%
Industrials											
Volume	25 903	12 268	16 632	36 482	17 550	16 537	8 261	13 292	17 361	14 783	18 892
Share	22%	32%	23%	18%	22%	34%	23%	15%	23%	21%	23%
Technology											
Volume	9 758	1 495	3 486	12 065	7 726	3 363	2 310	34 039	4 610	6 191	8 829
Share	8%	4%	5%	6%	10%	7%	6%	39%	6%	9%	11%
Telecommunications											
Volume	1 560	77	3 893	600	1 385	901	2	108	643	130	292
Share	1%	0%	5%	0%	2%	2%	0%	0%	1%	0%	0%
Utilities											
Volume	1 459	3 840	6 184	1 785	5 189	758	660	4 380	4 022	1 072	2 410
Share	1%	10%	9%	1%	6%	2%	2%	5%	5%	2%	3%

Source: OECD Capital Market Series dataset, see Annex 2 for details.
Note: Industry classification is made based on Thomson Reuters Industry Classification (TRBC)

D. Largest initial public offerings by Asian companies

Table D.1. Largest 20 IPOs between 1990-2017

Company	Jurisdiction	Exchange	Sector	Year	Proceeds (USD, millions)
Alibaba Group Holding Ltd	China	New York	Technology	2014	25 032
Agricultural Bank of China Ltd	China	Hong Kong /Shanghai	Financials	2010	22 121
Industrial & Commercial Bank of China Ltd	China	Hong Kong /Shanghai	Financials	2006	21 969
AIA Group Ltd	Hong Kong (China)	Hong Kong	Financials	2010	20 491
NTT Docomo Inc	Japan	Tokyo	Telecommunications Services	1998	18 052
Bank of China Ltd	China	Hong Kong	Financials	2006	11 186
Dai-ichi Mutual Life Insurance Co	Japan	Tokyo	Financials	2010	11 159
East Japan Railway Co	Japan	Tokyo	Industrials	1993	9 914
Japan Tobacco Inc{JT}	Japan	Tokyo	Consumer Non-Cyclicals	1994	9 576
China Construction Bank Corp	China	Hong Kong	Financials	2005	9 227
Japan Airlines Co Ltd	Japan	Tokyo	Industrials	2012	8 474
Postal Savings Bank Of China	China	Hong Kong	Financials	2016	7 627
DDI Corp	Japan	Tokyo	Telecommunications Services	1993	7 591
China State Construction Engineering Corp Ltd	China	Shanghai	Consumer Cyclicals	2009	7 343
China CITIC Bank Corp Ltd	China	Hong Kong /Shanghai	Financials	2007	6 495
China Railway Engineering Corp	China	Shanghai	Consumer Cyclicals	2007	5 877
Japan Post Holdings Co Ltd	Japan	Tokyo	Industrials	2015	5 726
China Railway Construction Corp	China	Shanghai	Industrials	2008	5 706
China Unicom Ltd	Hong Kong (China)	Hong Kong /Shanghai	Telecommunications Services	2000	5 656
West Japan Railway Co	Japan	Tokyo	Industrials	1996	5 597

Source: OECD Capital Market Series dataset, see Annex 2 for details.

Table D.2. Largest 10 IPOs in 2017

Company	Jurisdiction	Exchange	Sector	Year	Proceeds (USD, millions)
Netmarble Games Corp	Korea	Korea	Technology	2017	2 348
Zhong An Online P&C Insurance Co Ltd	China	Hong Kong	Financials	2017	1 753
General Insurance Corp of India	India	National	Financials	2017	1 749
The New India Assurance Co Ltd	India	National	Financials	2017	1 486
HDFC Standard Life Insurance Co Ltd	India	National	Financials	2017	1 334
SBI Life Insurance Co Ltd	India	National	Financials	2017	1 290
Guangzhou Rural Commercial Bank Co Ltd	China	Hong Kong	Financials	2017	1 191
Zhongyuan Bank Co Ltd	China	Hong Kong	Financials	2017	1 190
China Literature Ltd	China	Hong Kong	Cons. Cyclicals	2017	1 174
SG Holdings Co Ltd	Japan	Tokyo 1	Industrials	2017	1 135

Source: OECD Capital Market Series dataset, see Annex 2 for details.

E. Secondary public offerings by home market of the company

Table E.1. Proceeds, 2017 USD, millions

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Bangladesh	0	0	0	0	0	0	0	12	0	0	138
Cambodia	0	0	0	0	0	144	164	0	0	125	0
China	90 691	26 724	68 329	110 238	72 052	64 741	69 570	94 978	166 388	177 240	121 705
Hong Kong (China)	31 254	8 886	22 232	27 682	14 215	32 964	11 977	27 520	48 258	14 095	27 616
India	22 866	14 264	18 754	24 658	13 376	22 556	17 054	14 583	24 405	10 845	25 266
Indonesia	3 390	6 828	3 288	11 542	6 474	3 716	4 873	3 612	2 866	3 397	3 688
Japan	20 325	12 973	72 894	47 851	17 705	11 517	26 754	17 350	16 512	12 985	37 297
Korea	20 404	16 256	16 124	12 043	15 910	7 844	11 922	12 273	11 672	14 966	13 905
Malaysia	4 004	2 128	6 466	5 950	3 278	4 880	4 814	8 348	5 945	4 366	4 278
Mongolia	0	0	0	0	0	87	0	219	0	0	0
Pakistan	769	124	0	118	279	11	66	792	1 256	473	372
Philippines	2 939	642	2 279	2 143	2 182	5 135	6 481	3 082	2 324	2 015	3 004
Singapore	5 391	2 156	11 205	2 729	2 953	3 428	5 139	5 062	3 647	2 168	1 163
Sri Lanka	0	2	59	193	346	112	269	153	141	29	551
Chinese Taipei	13 780	2 539	9 945	5 475	7 273	5 790	6 905	4 901	5 141	1 764	4 560
Thailand	2 708	643	1 290	4 050	2 748	9 370	5 582	5 026	3 333	5 116	2 707
Viet Nam	18	1 023	1 293	1 837	1 441	526	744	865	1 109	416	969

Source: OECD Capital Market Series dataset, Thomson Reuters, see Annex 2 for details.

Table E.2. Number of companies

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Bangladesh	0	0	0	0	0	0	0	1	0	0	4
Cambodia	0	0	0	0	0	2	1	0	0	1	0
China	163	111	206	284	222	176	346	479	714	658	485
Hong Kong (China)	466	170	410	455	264	261	306	429	540	321	273
India	91	161	269	353	230	270	299	260	230	233	269
Indonesia	22	24	23	48	35	41	25	16	10	17	15
Japan	247	158	213	159	116	109	197	171	168	120	179
Korea	546	749	750	446	303	249	251	302	364	462	357
Malaysia	72	53	56	88	91	98	106	141	134	93	134
Mongolia	0	0	0	0	0	1	0	2	0	0	0
Pakistan	1	1	0	7	14	3	3	13	11	13	21
Philippines	31	45	29	22	35	43	41	24	14	10	15
Singapore	159	65	134	123	70	98	133	102	77	90	82
Sri Lanka	0	2	14	28	23	17	12	13	15	9	22
Chinese Taipei	13	38	94	90	68	67	64	63	57	41	63
Thailand	30	48	37	50	41	51	93	82	58	44	51
Viet Nam	4	25	82	161	66	26	46	69	68	36	38

Source: OECD Capital Market Series dataset, Thomson Reuters, see Annex 2 for details.

ANNEX 2 – METHODOLOGY FOR DATA COLLECTION AND CLASSIFICATION

A. Public equity data

The dataset is based on transaction and/or firm-level data gathered from several financial databases, such as Thomson Reuters Eikon, Thomson Reuters Datastream, FactSet and Bloomberg.

Considerable resources have been committed to ensure the consistency and quality of the dataset. Different data sources are checked against each other and, whenever necessary, the information is also controlled against original sources, including regulator, stock exchange and company websites and financial statements. The dataset will be continuously updated following a strict protocol in terms of definitions provided below.

Country coverage and classification

The dataset includes information about all initial public offerings (IPO) and secondary public offerings (SPO or follow-on offering) by financial and non-financial companies from 17 Asian economies. This currently amounts to 20 192 IPOs for the period from January 1990 to December 2017, and 31 058 SPOs for the period January 1990 to December 2017.

All public equity listings following an IPO, including the first time listings in an exchange other than the primary exchange, are classified as an SPO. If a company is listed in more than one exchange within 180 days, that transactions are consolidated under one IPO.

The country breakdown is carried out based on the domicile country of the issuer. In the dataset, country of issue classification is also made based on the stock exchange location of the issuer.

It is possible that a company becomes listed in more than one country when going public. The financial databases record a dual listing as multiple transactions for each country where the company is listed. However, there is also a significant number of cases that dual listings are reported as one transaction only based on the primary market of the listing. For this reason, the country breakdown based on the stock exchange is currently carried out based on the primary market of the issuer. Going forward, the objective is to allocate proceeds from an IPO to respective markets where the issue is listed at the same time.

The OECD does not have an official country classification. However, there are several country classification methods adopted by international organisations or credit rating and index companies. The review will follow the IMF country classification, which takes into account multiple criteria, including per capita income level, export diversification, and degree of integration into the global financial system.

The classification of Asian economies based on IMF methodology is presented in Table 2.1.

Table 2.1. IMF classifications

	Advanced economies	Major advanced economies (G7)	Other advanced economies	Emerging market and developing economies	Emerging and developing Asia	ASEAN
Bangladesh				X	X	
Cambodia				X	X	X
China				X	X	
Hong Kong (China)	X		X			
India				X	X	
Indonesia				X	X	X
Japan	X	X				
Korea	X		X			
Malaysia				X	X	X
Mongolia				X	X	
Pakistan				X		
Philippines				X	X	X
Singapore	X		X			X
Sri Lanka				X	X	
Chinese Taipei	X		X			
Thailand				X	X	X
Viet Nam				X	X	X

Currency conversion and inflation adjustment

The IPO and SPO data, and related financial statement data such as total assets before offering, are collected on a deal basis via commercial database in current USD values. The information is aggregated at the annual frequency and in some tables presented at the year-industry level.

Inflation adjustment, or "deflation", is the result of dividing a monetary time series by a price index, such as the Consumer Price Index (CPI), GDP deflator, Producer Price Index (PPI), among others. The deflated series are said to be expressed in constant USD values whereas the original series were measured in nominal USD or current USD. Inflation is often a significant component of apparent growth in any series measured in USD or any other currency. By adjusting for inflation, the real growth in the series in uncovered.

The issuance amounts in this report are presented in 2017 USD adjusted by US CPI.

Industry classification

Financial data providers usually have multiple industry classifications for each company. However, in general only one or a few classifications are available for most companies. The data presented in this report uses Thomson Reuters Business Classification (TRBC).

The main economic sectors and their industry groups are the following:

Economic Sector	Industry Group
Basic Materials	Chemicals Construction Materials Containers / Packaging Metal / Mining Paper / Forest Products
Cyclical Consumer Goods / Services	Automobiles / Auto Parts Homebuilding / Construction Supplies Hotels / Entertainment Services Household Goods Leisure Products Media / Publishing Retailers - Diversified Retailers - Specialty Textiles / Apparel
Energy	Coal Energy Related Equipment / Services Oil / Gas Renewable Energy
Financials	Banking Services Insurance Investment Banking / Investment Services Real Estate Operations
Healthcare	Biotechnology / Medical Research Healthcare Equipment / Supplies Healthcare Providers / Services Pharmaceuticals
Industrials	Aerospace / Defence Air Freight / Courier Services Airline Services Commercial Services / Supplies Construction / Engineering / Materials Machinery / Equipment / Components Marine Services Rails / Roads Transportation
Non-Cyclical Consumer Goods / Services	Beverages Food / Drug Retailing Food / Tobacco Personal / Household Products / Services
Technology	Communications Equipment Computers / Office Equipment Semiconductors / Semiconductor Equipment Software / IT Services
Telecommunications Services	Telecommunications Services
Utilities	Electric Utilities Gas Utilities Utilities - Multiline Utilities - Water / Others

Exclusion criteria

With the aim of excluding IPOs and SPOs by trusts, funds and special purpose acquisition companies the following industry categories are excluded:

- Financial companies that conduct trust, fiduciary and custody activities
- Asset management companies such as health and welfare funds, pension funds and their third-party administration as well as other financial vehicles
- Companies that are open-end investment funds
- Companies that are other financial vehicles

- Companies that are grant-making foundations
- Asset management companies that deal with trusts, estates and agency accounts
- Special Purpose Acquisition Companies (SPACs)
- Closed-end funds

Real Estate Investment Trusts are also excluded from the data presented in this report, but they are followed separately from other financial companies.

Listings on an over-the-counter (OTC) market are also excluded.

In terms of security types, the public offerings of “units” and “trust” are also excluded.

Transactions without any proceeds (such as market/segment/stock exchange changes and admissions to trading without any fund raising) are excluded.

B. Investment banking data

The investment banking data uses as the main source of information the Thomson Reuters League Tables. Each table offers information about the top 100 investment banks in the selected region, their ranking in the table, total gross proceeds allocated to that bank, the market share for each bank and the number of deals in which the bank was involved during the selected period of time.

Inclusion criteria

The information is collected for Bonds (including High Yield, Investment Grades, and Emerging Markets); Equity (includes Initial Public Offerings and Secondary Public Offerings); Syndicated Loans; and Mergers and Acquisitions (M&A). Information is retrieved on an annual basis from 2000 to 2017. Each table provides information for the top 100 investment banks involved in underwriting each of the above mentioned securities. The allocation method chosen is equal to each bookrunner, which means that if there is a USD 1 billion loan and 2 bookrunners on the deal they will get USD 500 million each.

Country coverage and classification

Data are collected by security at global, regional and country level. For the global analysis information is collected for the following eight regions of activity: Global; United States; United Kingdom; China; Japan; Europe excluding United Kingdom; Asia excluding China and Japan; and the Rest of the World.

For the Asia analysis, the information is collected for Asia and the selected countries included in the region were: Bangladesh, Cambodia, China, Hong Kong (China), India, Indonesia, Japan, Korea, Laos, Malaysia, Mongolia, Myanmar, Nepal, Pakistan, Philippines, Singapore, Sri Lanka, Chinese Taipei, Thailand, and Viet Nam. Note that information for Viet Nam is not available before 2006.

Identification of the banks’ country and region

A full list containing each unique bank in the sample is created to identify its country of origin. The list of unique bank names contains almost 6 thousand banks. Their nation of origin is assigned based on the location of the headquarters. Sources of information such as FactSet, Thomson Reuters, Bloomberg and banks websites/annual reports are used to identify banks’ origin nation.

C. Ownership data

The main source of information is FactSet Ownership database. This dataset covers companies with a market capitalisation of more than USD 50 million and accounts for all positions equal to or larger than 0.1% of the issued shares. All Japanese companies are covered, regardless of market value.

To complement the information with additional market information Thomson Reuters is also used. For each of the countries covered in the sample the information about the 100 largest companies by market capitalisation −as of the end of 2017− is collected.

In a second step, the information for the reported owners as of the end of 2017 is collected for each company. Some companies can have up to 5 000 records in the list of owners. Each record contains the name of the institution, the percentage of outstanding shares owned, the investor type classification, the origin country of the investor, the ultimate parent name, among others. Each owner record is re-classified into the following investor class: Corporate, Government, Individual, Institutional and Others. When the ultimate parent was recognised to be a Government, the investor record is by default classified as Government. For example, public pension funds (OECD, 2005) that are regulated under public sector law are classified as government and sovereign wealth funds are also included in that same category.

Country coverage and classification

The sample under study in the analysis extends to the following countries: Brazil, China, Germany, France, Hong Kong (China), India, Indonesia, Japan, Korea, Malaysia, Mexico, Philippines, Poland, Russia, Singapore, Chinese Taipei, Thailand, Turkey, Viet Nam, United States, and United Kingdom.

Currency conversion and inflation adjustment

Data are collected as of end of 2017 in current USD, thus no adjustment is needed in this edition.

Industry classification

For each company in the sample the TRBC Economic Sector classification from Thomson Reuters is used.

www.oecd.org/corporate/capital-markets