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Initial Public Offerings in China: Underpricing, Statistics and Developing Literature

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Abstract

We review more than two decades of literature on initial public offerings (IPOs) in China, discussing the research hypotheses that have been studied as well as the main findings. We summarize past and current developments in the literature and highlight the research problems which have not yet been adequately resolved. We provide updated information on the popularity of IPOs and allocation mechanisms over the last 25 years as well as on the underpricing that is associated with the usage of each IPO allocation mechanism. We also suggest new avenues for future research, based on the identified gaps in the extant literature.

Keywords: Allocation Mechanisms, China, IPO, Underpricing, Governance, Underwriter Reputation.

JEL classification: G32, G38, N25

1. Introduction

This paper reviews the literature on initial public offerings (IPOs) in China, summarizing the research hypotheses that have been tested and the main findings as well as the successes and

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shortfalls of the current literature to date. A significant part of the literature examines the determinants of the uncommonly high underpricing. We note that the average IPO underpricing in China over the time period between 1990 and 2000 is 256.9%, whereas in the U.S., for the time period between 1980 and 2001, it is 18.4% (Ritter, 2003).

The IPO market in China has peculiarities which have drawn the attention of researchers. Specifically, in the last two decades, it has passed through various major regulatory reforms and used a wider set of allocation mechanisms and types of shares. In addition, the corporate governance of Chinese firms is poorer than that of firms in developed countries, and the quality and reputation of the auditors/underwriters is in general more heterogeneous than those of the auditors/underwriters operating in developed countries (see, e.g., Fan et al., 2007). Therefore, a considerable part of the current literature examines whether the above distinct features justify the high IPO underpricing. The empirical evidence reveals that IPO underpricing is affected by the market conditions and the allocation mechanism (Ma and Faff, 2007), the stock exchange and financial market regulations (Cheung et al., 2009; Tian, 2011), and the reputation of the auditors and underwriters (Ma and Faff, 2007; Su and Bangassa, 2011).

It is also suggested that the type of allocation mechanism used in the IPO, as well as its popularity and effectiveness in terms of underpricing, varies significantly across countries. For instance, in the U.S., IPOs are based primarily on the bookbuilding (BB) mechanism, whereas in in France the auction (AU) and the fixed price (FP) mechanisms are also popular. In addition, the most effective mechanism in China is the BB (see Figure 3) whereas in France it is the FP (Vandemaele, 2003), and in Japan it is the AU (Kaneko and Pettway, 2003).

Two of the first empirical studies on IPOs in China are those of Mok and Hui (1998) and Su and Fleisher (1999), and the literature has grown enormously since then. Yet, there is no literature

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review study that identifies the research hypotheses of the empirical papers and summarizes their main findings.

There is also empirical evidence suggesting that IPO underpricing is affected by the information asymmetry between i) private and state shareholders, ii) foreign and domestic investors, and iii) issuers and investors (Su and Bangassa, 2011; Su and Brookfield, 2013). Some studies suggest that information asymmetry also plays a role in the selection of the allocation mechanisms (Ma, 2007) and the underpricing difference between A-shares and B-shares IPOs. It is suggested that because B-shares are required to follow international accounting standards, foreign investors (B-shareholders) are better informed about the quality of the firm than domestic shareholders (A-shareholders), which reduces underpricing (Mok and Hui, 1998; Chen et al., 2000).

The winner's curse hypothesis and agency theory are also often used to explain underpricing (Yu and Tse, 2006). Contrary to what happens in most developed countries, the main agency problem in China is between the private and the state shareholders, because the latter do not always aim to maximize value since the offering price strategy is often designed to promote social stability and employment as well as economic growth (Chen et al., 2004). Finally, signaling theory has also been explored in this context to explain IPO underpricing. This view asserts that IPO underpricing is the outcome of a deliberately generous offering price strategy which aims to attract cheaper capital in post-IPO seasoned equity offerings (Su and Fleisher, 1999).

In this literature review, we cite 63 studies on IPOs in China, placing particular emphasis on the research hypotheses that have been studied and the results that have been accomplished in addition to comparing the accomplished results to the known empirical evidence from other IPO markets, where appropriate. We suggest new avenues for future research based on observed gaps in the literature. In Table 1 in the Appendix, we provide a full characterization of the selected articles for this literature review.

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The remaining sections of the paper are organized as follows. Section 2 provides a brief history of the regulatory developments in the Chinese IPO market, with statistics on the popularity and underpricing level of each allocation mechanism over the last 25 years. Section 3 reviews the literature by grouping the papers according to their research focus. Section 4 concludes the paper and suggests future opportunities for research.

2. A brief history of the IPO market in China

The development of the stock markets in China began with the Shanghai (SH) and Shenzhen (SZ) stock exchanges in 1990 and 1991, respectively. In 2009, a new stock exchange was established in the city of Shenzhen, the ChiNext exchange, with the aim of helping small and high-tech enterprises. Currently, the Chinese financial markets operate with a high diversity of types of shares, which are A-shares, B-shares, H-shares, N-shares, and S-shares.

There are tradable and non-tradable shares. Non-tradable shares are not traded on the exchanges, but their ownership can be transferred to other domestic institutions if approved by the Chinese Security Regulatory Commission (CSRC) (see, e.g., Liao et al., 2016). For instance, legal person shares (LPS) are non-tradable shares held by business agencies or enterprises controlled by the local government, and their ownership can be transferred to another "legal person" if approved by the exchange where the firm is listed (Wan and Yuce, 2007). The percentage of non-tradable shares used to be very high, leading to a low market liquidity. This liquidity problem was partially resolved with the 2005 regulation reforms, which led to the privatization of a high number of state-owned firms. Consequently, a total of 1,289 firms were selected for privatization between 2005 and 2006 (Liao et al., 2014).

Only A-shares and B-shares are traded on the SH and SZ exchanges. Specifically, A-shares are traded by domestic investors, or foreign investors if approved by the CSRC, and B-shares are traded by foreign investors on the SH and SZ exchanges in US dollars and HK dollars,

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respectively. The stock markets are therefore highly segmented between A-shares and B-shares, and the IPOs of A-shares tend to be more oversubscribed than those of B-shares (Mok and Hui, 1998; Chan et al., 2004). Furthermore, H-shares, S-shares and N-shares are shares of domestic firms listed in Hong Kong, Singapore and New York, respectively (Wu, 2014). More recently, a new type of share certificate was created: the American Depositary Receipts (ADR). This is a negotiable certificate issued by a U.S. bank and traded on a U.S. exchange which represents a share (or a specific number of shares) whereby the underlying share(s) is (are) not listed on the issuer's home market (Cao-Alvira and Rodríguez, 2017).

As for the IPO allocation mechanisms, three main methods have been used in China, namely the bookbuilding (BB), auction (AU) and fixed price (FP) mechanisms. The FP mechanism encompasses six slightly different procedures: "online fixed price offer" (OL), "online fixed price offer plus secondary market proportional offering" (OLSM), "private placement" (PP), "saving linkage offerings" (SL), "secondary market proportional offering" (SM), and "selling subscription warrants" (SSW).

Initially, there was a "quota system" through which the CSRC decided which firms should be listed by assigning a quota to each province or ministry (Du and Xu, 2009). However, under this system, the demand for IPO shares was usually well above the supply, leading to a very high level of underpricing (Wan and Yuce, 2007). Before 1990, stated-owned firms were privatized using the PP mechanism, through which shares were sold to preferred investors such as employees, local public authorities and government offices, or institutions which had a preferred business relationship with the issuer.

With the arrival of the stock exchanges, several more sophisticated mechanisms were adopted, such as the BB and the AU (Gao, 2010). In the BB mechanism, the issuer and the underwriter agree in advance to a share price range so as to seek feedback from potential investors for the

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share demand and offering price, whereas in the AU mechanism investors bid for the shares (price/quantity) they would be willing to buy; the bids are then ranked and the offering price is set as the bid price of the last share sold plus a price margin previously approved by the government.

There is also the FP mechanism, through which the issuer and the underwriter agree in advance to a fixed offering price that is then disclosed to the market, and investors specify their share orders and are usually required to make a pre-payment. This mechanism encompasses six slightly different procedures (Yu and Tse, 2006). Initially, the procedure used was based on a quota system where investors had to buy a warrant subscription or make a deposit in a saving account opened specifically for the IPO shares transaction in order to be eligible for the IPO shares. As the underpricing levels and the oversubscriptions were both very high, the system was replaced by the "selling subscription warrants mechanism" (SW) and the "saving linkage offering mechanism" (SL), a lottery system which identifies the investors that are entitled to the IPO shares and through which investors can buy a subscription warrant and make a deposit. These were initially offline trading systems, but an online system, the "online fixed price offering mechanism" (OL), was made available in 1995.

The issue with the OL system was that too much capital was frozen, which weakened trading activity (Chiou et al., 2010). Subsequently, a new procedure called the "secondary market proportional offering" (SM) was adopted to help mitigate the market illiquidity problem. In this procedure, the shares which investors could subscribe to depended on the market value of the shares they held in the secondary market. Concomitantly, a mixed procedure was also made available, the "online fixed price plus secondary market proportion" (OLSM), which allowed

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investors to trade online or through the secondary market subscription.[1] According to the available information, the BB is the cheapest allocation mechanism and the PP is the most expensive.[2]

Figure 1 provides updated information on the IPO activity in China between 1990 and 2015. Over this time period there were 2,556 IPOs, with a particularly high activity between 2010 and 2011.

[Insert Figure 1 about here]

Figure 2 provides information on the popularity of the IPO allocation mechanisms used in China over the time period between 1990 and 2015. The figure reveals that the AU and PP were the most popular mechanisms (roughly) between 1990 and 1995. The FP mechanism used the OLSM, SL and SM procedures only between 1998 and 2000, 1996 and 1997, and 2002 and 2005, respectively. The FP mechanism using the OL procedure was used between 1996 and 2001, and the FP mechanism using the SSW procedure was only used between 1992 and 1994. The BB was adopted in 2005 and has been the most popular mechanism since 2006.

[Insert Figure 2 about here]

Figure 3 provides information on the average values of the IPO underpricing across allocation mechanisms over the time period between 1990 and 2015. From the information in this figure we can conclude that the PP is the mechanism with the highest underpricing (i.e., 880%) followed by the FP using the SSW procedure and the AU mechanisms. On the other hand, the BB is the mechanism with the lowest underpricing level (i.e., 51.50%).

[Insert Figure 3 about here]

[1] See http://www.cninfo.com.cn, Jiu Chao Information Company for further information on the IPO share trading rules related to each of the allocation mechanisms.
[2] See: "The Notice of the Trial of Bookbuilding mechanism on Chinese IPOs", released by the China's Securities Regulatory Committee.

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Figure 4 provides information on the IPO underpricing level in percentage per allocation mechanism (left-hand side) and the number of IPOs across the mechanisms (right-hand side) for both the Shanghai and the Shenzhen stock exchanges. The figure depicts that the PP is the mechanism with the highest underpricing in both markets. With the exceptions of the BB and the FP mechanism using the SSW, the underpricing associated with the various mechanisms is roughly the same in both markets again. For the BB and the FP mechanisms, the underpricing is significantly higher in the SZ exchange. In terms of popularity, the BB mechanism is clearly more popular in the SZ stock exchange, whereas the AU and the FP mechanism using the OL and SM procedures are more popular in the SH stock exchange.

[Insert Figure 4 about here]

3. Literature review

We review 63 studies on IPOs in China. A significant proportion of the articles reviewed in this section examines the determinants of IPO underpricing. It is suggested that market conditions, such as market return and stock price volatility, firm size, allocation mechanism type, industry classification, regulations, time lag between the IPO announcement date and the listing date, market segmentation due to the existence of a dual-class of shares, corporate ownership structure, corporate governance and political connections, are among the most important causes for the high level of underpricing in China.[3]

3.1 Regulations and allocation mechanisms

In the last two decades, several financial regulation reforms have been implemented in China with the aim of promoting economic growth and improving market efficiency (Wan and Yuce, 2007). These reforms led to the adoption of new financial rules and the development of new IPO

[3] Listed Chinese firms have a dual independent governance structure: a supervisory board/committee and the board of directors (see, e.g., Farag and Mallin, 2016).

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allocation mechanisms (Cheung et al., 2009). The BB is currently the most popular and effective allocation mechanism, although other mechanisms were also popular in the past (see, e.g., Chiou et al., 2010). The occurrence of various financial market reforms attracted the attention of academic researchers.

Specifically, Wan and Yuce (2007) investigated the effect of regulatory changes on the performance of both IPOs and seasoned equity offerings (SEOs) over the time period between 1991 and 2004. They concluded that the high volume of state-owned shares and LPS decreases both the quality of information disclosure and the protection of the minority shareholders' rights. They further advocate that the privatizations and the new regulations reduced the percentage of non-tradable shares, which had a positive effect on IPO performance. Cheung et al. (2009) studied the effect of regulatory changes on the underpricing of A-shares IPOs and concluded that the new regulations made the IPO market more market-oriented and significantly reduced underpricing. Chalmers et al. (2014) studied the effect of financial market regulatory changes on IPO performance in China, using Habib and Ljungqvist's (2001) wealth loss measure, and concluded that the regulatory changes reduced the wealth loss of the pre-IPO owners who are more actively involved in the IPO pricing. Their findings also suggest that a higher proportion of independent executives on the board of directors mitigates the wealth loss and that there is a positive relationship between state ownership and the wealth loss associated with an IPO.

Some studies investigated the effect of regulatory changes on the underpricing while considering other market variables. For instance, Kao et al. (2009) examined the effect of the new regulations on IPO performance, taking into account the existence of opportunistic behaviors. Their findings suggest that when the offering price is regulated, firms would have incentives to inflate their pre-IPO earnings and accounting performance, which contributes to IPO underpricing. Aharony et al. (2000) and Aharony et al. (2010) studied the presence of earnings management during pre-IPO

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periods and concluded that the incentive for this behaviour varies significantly across industries. Liu et al. (2014) focused on discretionary current accruals and their link with the usage of the FP mechanism while considering managerial ownership and concluded that earnings management is negatively related to managerial ownership if the FP mechanism is used, which supports the view that firms managed by executives who sell shares in the IPO are more likely to manipulate earnings. Tian (2011) studied whether IPO pricing regulations affect underpricing using a demand-supply analytical framework and concluded that the existence of offering price caps or restrictions on the shares supply creates a demand gap that enhances the purchase of shares on the first day of trading.

There are also studies examining the effect of other IPO regulations on underpricing. For instance, Du and Xu (2009) investigated the effectiveness of quota-based regulatory decentralization and concluded that the usage of this mechanism reduces the information asymmetry and improves pre-IPO performance. Chiou et al. (2010) studied the relationship between underpricing and the usage of four different pricing rules and allocation mechanisms. Their findings suggest that the adoption of new mechanisms makes the IPO market more stable and market-oriented and reduces the underpricing. Gao (2010) examined long-term IPO performance over a time period when the BB mechanism was in place and concluded that positive pre-market returns do not necessarily lead to underpricing, as is predicted by the "proxy" theory. He also advocated that both the issuer and the underwriter use the window of opportunity opened by the IPO issuance to maximize the offering price when the investors' sentiments are high, which enhances underpricing. Gao et al. (2017) studied the effect of the regulatory changes related to the practice of IPO lockup (after which institutional investors are allowed to transfer their allocated IPO shares to other investors) and concluded that this increases the institutional investors' bid price and reduces underpricing, in particular when the IPO value is more uncertain or the reputation of the underwriter is low.

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3.2 Ownership structure and ownership concentration

The ownership structure and corporate governance in China are very peculiar. Thus, there are studies which examined whether the high level of IPO underpricing is justified by these peculiar characteristics of the Chinese market. Empirical evidence shows that agency theory may explain the high level of underpricing. It should be noted that, in China, there is an acute conflict of interest between the minority shareholders and the state shareholders because the latter are not always exclusively guided by a value maximization goal. Hence, the higher the state ownership in an IPO firm, the more prone that firm is to not follow a value maximization strategy; therefore, negative long-term IPO performances are more likely (Fan, Wong and Zhang, 2007; Chen et al., 2011).

Chen et al. (2004) studied the effect of the legal entity shareholdings on underpricing and concluded that it is higher in firms with a larger proportion of state ownership and legal entity shareholdings, since the government or quasi-government shareholders do not always follow an offering price maximization strategy. Chi and Padgett (2005a) also examined the effect of state ownership on underpricing, focusing on long-run IPO performance measured by the buy-and-hold return and the average market-adjusted cumulative return over a three-year time period. Their findings reveal that firms with lower state ownership and smaller offering size have a higher long-term performance. Wang (2005) examined the effect of ownership and ownership concentration on underpricing by focusing on the operating performance changes of the listed firms around the IPO and concluded that neither ownership type nor ownership concentration affects the operating performance changes. He found, however, a curvilinear relationship between legal-entity ownership and performance changes as well as between the concentration of non-state ownership and performance changes, which suggests that there are agency conflicts, management entrenchment, and shareholders' expropriation affecting IPO performance.

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There are also studies devoted to the IPO underpricing of non-state-owned enterprises. For instance, Wang et al. (2015) studied the association between ownership structure and long-term IPO performance using information on 636 IPOs and concluded that the existence of a complex pyramid ownership structure enhances the controlling shareholders' rights, which in turn negatively affects IPO performance. Chen et al. (2015) investigated whether IPO underpricing is more acute for private firms than for state-owned firms using a sample with information on 675 IPOs and reported that private firms are less likely to underprice their IPOs. Furthermore, they examined the effect of the institutional environment on the IPO underpricing of firms with different ownership structures and concluded that better institutional environments reduce underpricing.

3.3 Political connections

Another peculiar characteristic of the Chinese IPO market is the role of local and central governments in both the selection of the firms for the IPO and the timing of the IPOs. There are studies testing whether political connections positively affect IPO performance.

For instance, Fan et al. (2007) investigated the effect of political connections on post-IPO performance and concluded that the IPO firms are more likely to have ex-government bureaucrats on the board, while 27% of the CEOs of newly privatized firms are former or current government bureaucrats. It was also asserted that the board members of IPO firms tend to have lower management skills and, consequently, firms with politically well-connected CEOs underperform compared to those with no or little political connections via their executive managers. Francis et al. (2009) studied the benefits of having CEOs with good political connections for the IPO firms. They found that because the Chinese government plays a very important role in the IPO market, for instance via the quota system, the offering pricing cap and several restrictions on the tradable

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shares, firms may benefit from having executive managers with good political connections if it enables them to set a higher offering price or pay a lower IPO cost (see also Liu et al., 2012).

There are other studies which focus on the role of the political connections of executive managers in IPO approval. For instance, Liu et al. (2013) studied the effect of "political capital" on the Chinese IPO markets and revealed that there is a positive relationship between the political connections of the executive managers and the likelihood of IPO approval. They advocate that investors see the existence of politically well-connected managers in IPO firms as positive for the firm and, therefore, are able to pay an offering price premium. This finding is consistent with that of Chen and Strange (2012), who suggest that firms with a large proportion of shares held by government organizations have a lower IPO underpricing. Li and Zhou (2015) used hand-collected data with information on 692 IPOs of private-owned enterprises and, in line with Liu et al. (2013), concluded that political connections positively affect the likelihood of being approved for an IPO. Their findings also show that firms with better political connections are more likely to benefit from preferential care from regulatory authorities and are less prone to be selected by regulatory authorities for a pre-IPO on-site auditing.

Piotroski and Zhang (2014) also investigated the role of political connections in the IPO markets by hypothesizing that these influence the access to capital as well as rent-seeking behaviors and concluded that the rate of eligible firms being listed on stock exchanges via IPOs increases for a brief period of time in advance of an imminent political promotion event. This behaviour characterizes both state-owned and private firms and it is stronger in provinces where politicians tend to be rewarded for market activity advancements. Bao et al. (2016) examined the association between the political connections of executive managers with the likelihood of IPO approval by focusing on a sample of start-up firms. Their findings show that political connections reduce the IPO rejection risk and are negatively related to the IPO cost. Chen et al. (2017) examined the effect of politically well-connected underwriters on the success of IPOs and concluded that it

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increases the probability of the IPOs being approved by the CSRC. They also argued that because both the IPO firm and the underwriter understand that they can attain IPO rents from having good political connections, they neglect to use professionals with good qualifications in the IPO process, which negatively affects post-IPO performance. Johansson et al. (2017) studied the effect of political connections considering the effect of interventionistic government policies (e.g., firms from labor-intensive industries are more likely to be selected for IPO) on IPO activity, while Chen et al. (2018) examined the effect of political connections considering the use of government subsidies on the IPO performance, and they concluded that there is a positive relationship between the existence of non-R&D subsidies and IPO performance and a U-shaped relationship between the existence of R&D subsidies and IPO performance.

3.4 Corporate governance and underwriter reputation

Empirical evidence suggests that the quality of corporate governance and the heterogeneity of the underwriters' reputation play an important role in the success and performance of an IPO. Empirical evidence shows that the reputation of the underwriter can improve the efficiency of the IPO market by mitigating the earnings management problem (Chen et al., 2013). Specifically, Ho et al. (2010) suggest that issuers have a considerable discretion when releasing positive news through the manipulation of earnings. Kimbro (2005) advocates that firms manipulate earnings because of high cash flows, which misleads investors and negatively affects the IPO performance (Teoh et al., 1998).

Su and Bangassa (2011) studied the effect of underwriter reputation on underpricing and concluded that it has a significant impact on long-term IPO performance but does not affect IPO underpricing. They advocate that, due to the market inefficiencies, information asymmetry is high, and the usage of a prestigious underwriter mitigates the information asymmetry (Harvey, 1995; Domowitz et al., 1997; Chan et al., 2008). This finding is corroborated by Chen et al. (2013), who concluded that the involvement of an underwriter with a good reputation in an IPO mitigates the

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information asymmetry and disciplines the earnings management activity. Su and Brookfield (2013) also examined the role of the underwriter in IPO underpricing by considering the 2001 reforms and hypothesizing that the rapid improvement of both stock market liquidity and depth is related to underwriter reputation. They conclude that the reputation of the underwriter is important, particularly when market reforms open the listing process to new market solutions. Finally, Rumokoy et al. (2017) showed that political connections lead to the centrality of the underwriters because politically well-connected underwriters are also usually tied to well-connected peers, and this network centrality helps the underwriters to market the IPO more effectively.

Most of the Chinese IPO literature examines the role of the corporate governance mechanisms in the success and performance of IPOs by examining the board of directors' characteristics. Specifically, Li and Naughton (2007) studied the effect of the size of the board of directors and the CEO-chairman duality on underpricing and long-term performance and concluded that a large board of directors and a splitting of CEO-chairman roles improve both the short-term returns and the long-term performance. Wang and Song (2016) also studied the effect of corporate governance on IPO performance but by focusing on the role of business founders on the board of directors. They advocate that there is the perception that the participation of the founders on the board of directors helps firms to act more promptly on their daily challenges, and so investors are more willing to pay an offering price premium. However, it is also asserted that an excessive predominance of founders on the board of directors may induce firms to dismiss good alternative business strategies, leading to a reduction in the offering price premium. Finally, Farag and Mallin (2016) examined the effect of gender diversity on the supervisory board/committee and the board of directors and concluded that there is a negative relationship between state ownership and the representation of females on the boards.

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3.5 Market segmentation

Mok and Hui (1998) conducted one of the first empirical studies on the determinants of IPO underpricing in China, relying on a dataset with information on 101 IPOs with A-shares and 22 IPOs with B-shares covering the time period between 1990 and 1993. They showed that the underpricing of A-shares is significantly higher than that of B-shares (289% and 26%, respectively) and that asymmetric information theory can explain the level of underpricing. Specifically, they advocate that the difference in the underpricing of IPOs with A-shares and B-shares is due to the levels of disclosure required (B-shares IPOs require a higher level of information disclosure; therefore, the investors are better informed about the quality of the firm). Chen et al. (2000) and Chan et al. (2004) also investigated underpricing across A and B shares, and their findings corroborate those of Mok and Hui (1998). Cao-Alvira and Rodríguez (2017) studied the post-IPO and aftermarket performance of single listed Chinese American Depositary Receipts (ADRs) and found that, over the short-term, buy-and-hold abnormal returns following the IPO do not differ significantly from the typical post-IPO performance of stocks in the U.S. exchanges.

Chan et al. (2004) additionally found that the underpricing of A-shares is also positively related to the province where the IPO firm is located and negatively related to the number of issued shares. The effect of the geographic location of an IPO on underpricing was also examined by Liu et al. (2014), who concluded that the IPO underpricing of firms from provinces with more developed legal frameworks (e.g., strong legal protection of property rights) is lower. Busaba et al. (2015) focused on cross-listed firms by studying the IPO performance of firms which were listed first abroad and later returned to the Chinese stock market. They suggest that firms from less-developed capital markets may take advantage of the enhanced visibility and prestige associated with a

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foreign listing to issue shares domestically at inflated prices and favourable terms, having larger proceeds and poorer post-IPO performance in comparison to domestic issuers.

3.6 Market conditions

Some of the Chinese IPO literature studies the effect on the underpricing of the stock market conditions, such as the IPO shares demand-supply, market returns and market uncertainty. Specifically, Chi and Padgett (2005b) studied underpricing using a dataset with information on 668 IPOs and reported that it can be explained by a mismatch between the demand and supply of IPO shares caused by the quota system and the existence of a high percentage of uninformed individual investors. They do not find evidence that the government signals the market regarding the quality of the issuer through underpricing. Ma and Faff (2007), on the other hand, investigated the effect of market return and volatility on the selection of the allocation mechanisms using a dataset with information on 942 IPOs covering the time period between 1994 and 2003. They concluded that firms are more prone to set their listings during times of high market return and low stock price volatility. It is also suggested that the FP mechanism using the SM procedure is more effective at minimizing the underpricing level, whereas the BB mechanism is more effective at counteracting adverse market conditions such as high market volatility and low profitability.

Chang et al. (2008) investigated the underpricing of A-shares IPOs for both the primary and the secondary markets and found that the initial returns are negatively related to the subscription or to the lottery ratio in the primary market and positively related with the market return in the secondary market. In addition, Ma (2007) examined the effect of information asymmetry and valuation uncertainty on the selection of the allocation mechanism and concluded that firms with higher information asymmetry and valuation uncertainty are more prone to prefer the PP mechanism to the local public offering, the local public offering to the national public offering, and the national public offering to the BB mechanism. Hussein and Zhou (2014) examined

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monthly IPO initial returns and its conditional return volatility and revealed that both vary over time and are highly auto- and cross-correlated. Finally, Güçbilmez (2015) investigated the characteristics of IPO waves in China and Hong Kong and compared them with those in the U.S. He showed that the IPO activity in China is much less responsive to past market returns and market volatility.

3.7 Other contributions

There are other dimensions to the Chinese IPO literature that are not related to the categories above but are worth mentioning. For instance, Su and Fleisher (1999) examined the correlation between underpricing and post-IPO seasoned equity offerings and found that firms can use IPO underpricing to signal their value to investors and later recoup their costs from the IPOs. Yu and Tse (2006) used information on online fixed-price IPOs and concluded that the winner's curse hypothesis can explain the underpricing, but the signaling hypothesis cannot. Prospect theory has also been tested in the Chinese IPO market. For instance, Wang et al. (2018) showed that left-skewed IPOs have a higher underpricing than right-skewed IPOs and that there is a positive relationship between the offering price discount and the (absolute) skewness.

Feng and Johansson (2015) used an event study methodology to investigate whether mutual funds select the best stocks when asymmetric information and market uncertainty are high. They found that residual mutual funds are positively related to post-IPO stock returns over one- to three-year periods and that the consensus expectations of mutual funds in the IPO market is a good predictor of IPO performance. Gao et al. (2016) studied the effect of retail and institutional investors' sentiments on the first-day and long-term IPO returns and concluded that the former are negatively related to the long-term IPO returns and both are positively related to the first-day IPO returns. Otchere and Vong (2016) investigated the impact of venture capitalists' (VC) participation in IPOs and found that the underpricing of VC-backed firms is higher than that of non-VC firms, which contradicts the empirical evidence in the U.S. IPO literature. Wang et al., 2017) found, however,

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that the participation by VC in an IPO enhances the IPO's long-run performance.

Costa et al. (2013) performed a cross-country analysis to study the effect of culture on underpricing. Moshirian and Wu (2010) examined the short and long-term performance of IPOs based on various benchmarking measures for various Asian countries. Deng and Zhou (2016) investigated the overreaction through the initial return for ChiNext IPOs using a dataset with information on 355 IPOs and covering the time period between 2009 and 2012. They hypothesized that IPO initial returns contain both a fundamental underpricing and an overreaction and concluded that underpricing is guided mainly by both market factors and a short-term view which induce overreactions. Finally, Su et al. (2011) examined the long-term performance of 936 IPOs and concluded that the performance of small firms outperforms that of the large firms.

[Insert Table 1 about here]

4. Conclusion

We review more than two decades of literature on IPOs in China. We focus on 63 articles, identifying their research hypotheses, and summarizing their contributions to the literature. In Table 1 in the Appendix, we provide a full characterization of each article reviewed. The literature on the Chinese IPO market is now very rich and extensive. We note that about half of the articles selected for this review were published in the last five years (see Table 1).

Despite the enormous regulatory development of the last two decades, the Chinese IPO market is still very peculiar when compared to those of other countries that are guided by more market-oriented financial market rules and regulations. These peculiarities encompass both challenges and opportunities for future research. For instance, there is still a high percentage of non-tradable shares, which creates liquidity problems, and a high diversity of shares, which leads to market segmentation. There is also a dual governance structure, with a supervisory board and a board of

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directors, and political connections still play a key role in the selection of the firm for IPOs and can also affect IPO cost. Finally, the allocation mechanisms and types of shares available are more diverse and the information asymmetry is more acute than those existing in countries with more developed financial markets.

We note that due to the peculiar characteristics of the Chinese IPO market, standard empirical research methodologies and frameworks often cannot be applied or yield unsatisfactory results. For instance, in China, the adoption of new allocation mechanisms has been directly related to the implementation of regulatory reforms. Therefore, it is difficult to test whether the popularity of an allocation mechanism or its effectiveness in terms of underpricing is due to its innovative features or is because of the implications of the new financial regulations that were adopted. Somewhat surprisingly, we conclude that there is not yet any theoretical model on IPO timing which captures the unique features of the Chinese IPO markets.

Moreover, we conclude that the existing Chinese IPO empirical literature does not always rely on the most sophisticated econometric techniques and analyses. We note that recent econometric developments could be used to deal with the problems of the unobserved firm heterogeneity, simultaneity, reverse causality and standard endogeneity and selection bias in a more appropriate way, and these are absent from some of the works reviewed in this paper. Future research should also study the relevance for IPO underpricing and IPO performance of managerial overconfidence or over-optimism, or the association between the top management team characteristics and the IPO decision.

Our literature review describes the main conclusions from previous studies in order to provide a historical overview of IPO research in the Chinese market. A meta-analysis would be a very valuable complementary research to this literature review, whereby the data from the multiple

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studies reviewed in our paper would be compiled and a statistical analysis on the aggregate data performed so as to draw new conclusions.

We expect that new and more sophisticated empirical studies will be developed in the near future. This literature review and the information in Table 1 might be helpful for these endeavors.

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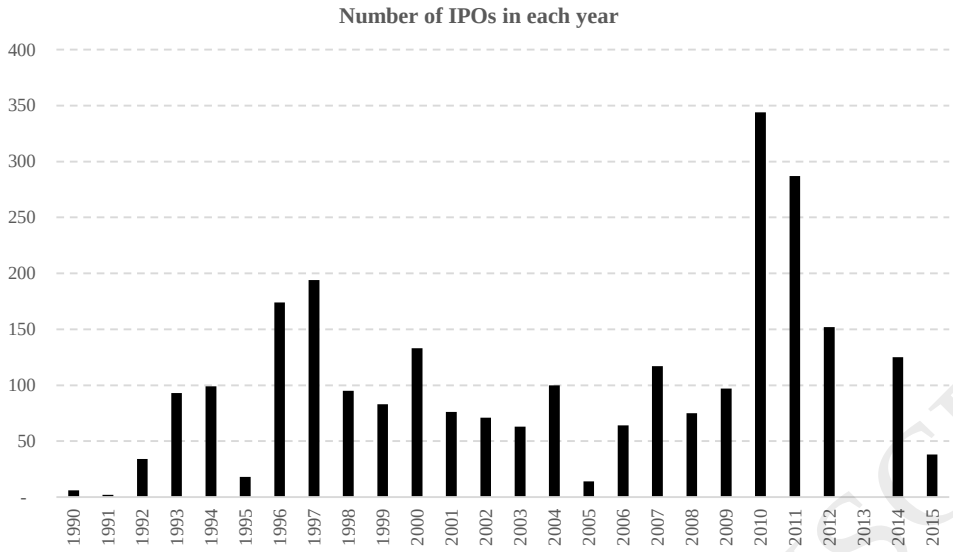
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Figure 1: The activity of the IPO market in China over the time period between 1990 and 2015.

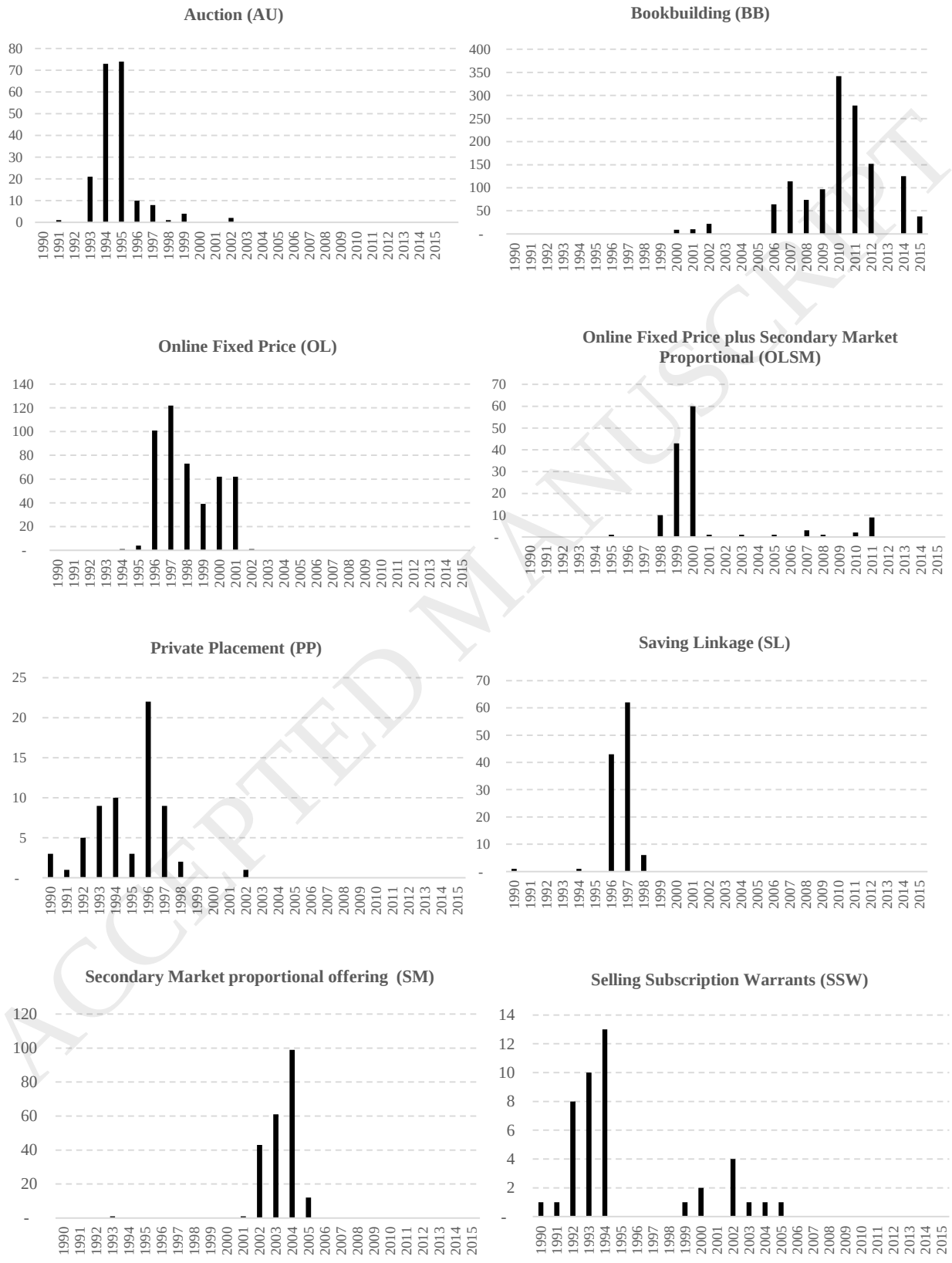


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Figure 2: The popularity of the IPO allocation mechanisms between 1990 and 2015 in China.

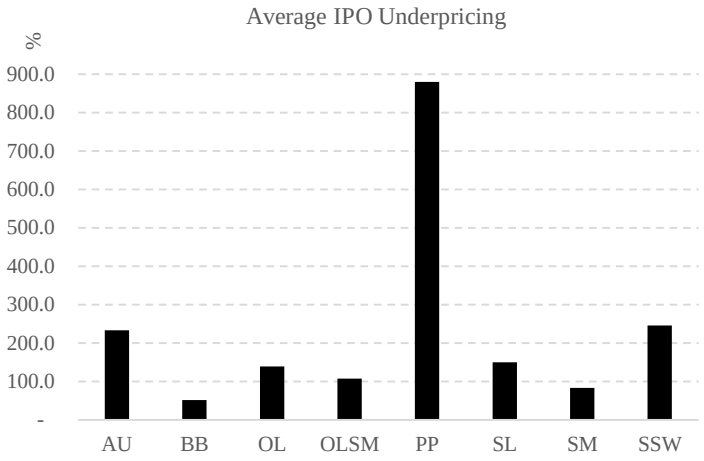
From top to bottom, on the left-hand side, the graphs show the number of IPOs that adopted the Auction (AU), Online fixed price (OL), Private placement (PP) and Secondary market proportional offering (SM) mechanisms, respectively. On the right-hand side, the graphs show the number of IPOs that adopted the Bookbuilding (BB), Online fixed price plus secondary market proportional (OLSM), Saving linkage (SL) and Selling subscription warrants (SSW) mechanisms, respectively.



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Figure 3: The IPO underpricing level per allocation mechanism in China.

This figure reports the average IPO underpricing over the time period from 1990 to 2015 for the mechanisms Auction (AU), Bookbuilding (BB), Online fixed price (OL), Online fixed price plus Secondary market proportional (OLSM), Private placement (PP), Saving linkage (SL), Secondary market proportional offering (SM) and Selling subscription warrants (SSW).

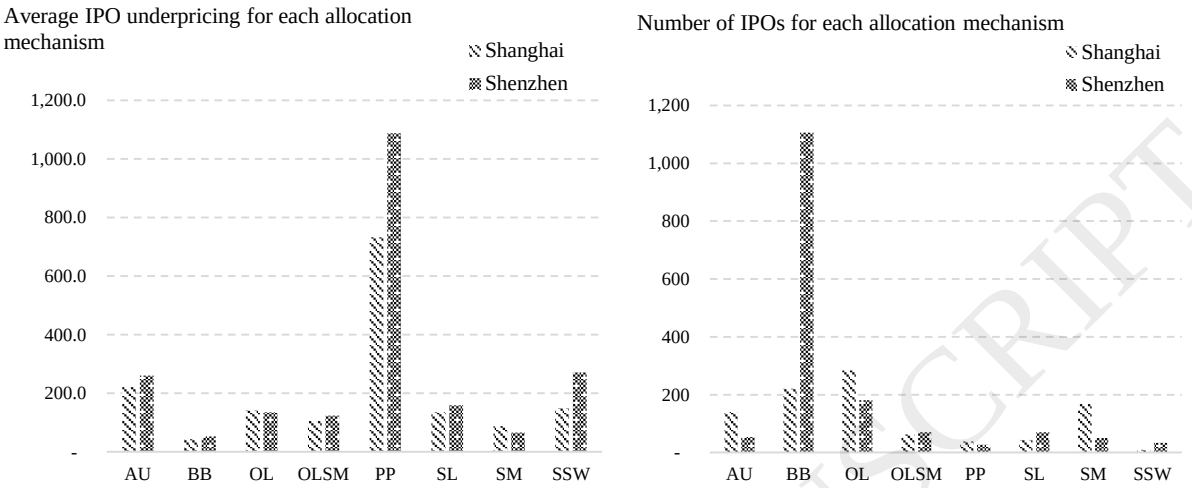


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Figure 4: IPO underpricing and allocation types in China.

This figure shows, for both the Shanghai and the Shenzhen Stock Exchanges, over the time period between 1990 and 2015, the average underpricing level in percentage for each allocation mechanism (left-hand side), and the number of IPOs that used each allocation mechanism (right-hand side), where the acronyms used mean the following: Auction (AU), Bookbuilding (BB), Online fixed price (OL), Online fixed price plus Secondary Market proportional (OLSM), Private Placement (PP), Saving Linkage (SL), Secondary Market proportional offering (SM) and Selling Subscription Warrants (SSW).



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Table 1: Relevant literature on IPOs in China.

The acronyms SH, SZ, HK, ChiN and SME, under the row named "Security Exchange", represent the stock exchanges of, respectively, Shanghai, Shenzhen, Hong Kong, ChiNext and "small-medium-sized firms" (a market created in the Shenzhen exchange for growth enterprises). The acronyms A, B, H, N, S and ADR represent different types of shares, where "A" are shares which can be traded by domestic investors only; "B" are shares which are traded by foreign investors in the Shanghai and Shenzhen stock exchanges; "H" are shares of Chinese firms traded in the Hong Kong stock exchange; "N" and shares of Chinese firms traded in the New York stock exchange; "S" are shares of Chinese firms traded in the Singapore stock exchange; and "ADR" are single listed Chinese American Depositary Receipts.

Year	*Author(s)*	*Journal*	**Model Setting**		***Security Exchange***					***Share Types***							**Data Sample**
			Empirical	***Theoretical***	***SH***	***SZ***	***HK***	***ChiN***	***SME***	***A***	***B***	***H***	***N***	***S***	***ADR***	***Time***	***Size (N)***
1998	Mok and Hui (1998)	Pacific-Basin Finance Journal	x		x					x	x					1990-1993	101 A-Share; 22 B-Share
1999	Su and Fleisher (1999)	Pacific-Basin Finance Journal	x		x	x				x	x					1987-1995	308 A-Shares
2000	Aharony et al. (2000)	Journal of Accounting Research	x		x	x	x				x	x				1992-1995	83
2000	Chen et al. (2000)	Review of Quant. Finance and Accounting	x		x	x				x	x					1992-1995	277 A-Share; 65 B-Share
2004	Chan et al. (2004)	Journal of Corporate Finance	x		x	x				x	x					1993-1998	570 A-Share; 39 B-Share
2004	Chen et al. (2004)	Journal of Multinational Financial Mgmt	x		x	x				x	x					1992-1997	701 A-Share; 117 B-Share
2004	Su (2004)	Journal of Int. Financial Mkt, Inst and Money	x		x	x										1994-1999	348
2005	Chi and Padgett (2005a)	Pacific Economic Review	x		x	x				x						1996-1997	409
2005	Chi and Padgett (2005b)	Research in Int. Business and Finance	x		x	x				x						1996-2000	668
2005	Kimbro (2005)	Journal of Int. Fin. Mgmt & Accounting	x		x	x				x						1995-2002	691
2005	Wang (2005)	Journal of Banking and Finance	x		x	x				x	x	x				1994-1999	747
2006	Yu and Tse (2006)	China Economic Review	x		x	x				x						1995-1998	343
2007	Fan et al. (2007)	Journal of Financial Economics	x		x	x				x						1993-2001	790
2007	Li and Naughton (2007)	Corporate Governance: An Int. Review	x		x	x				x						1999-2001	314
2007	Ma (2007)	Applied Financial Economics	x		x	x				x	x					1991-2003	1,064
2007	Ma and Faff (2007)	Pacific-Basin Finance Journal	x		x	x				x	x					1994-2003	942
2007	Wan and Yuce (2007)	Research in Int. Business and Finance	x		x	x				x	x	x	x			1991-2004	Various subsamples
2008	Chang et al. (2008)	Emerging Markets Review	x		x	x				x						1996-2004	891
2008	Guo and Brooks (2008)	International Review of Financial Analysis	x		x	x				x						2001-2005	286
2009	Cheung et al. (2009)	China Economic Review	x		x	x				x						1992-2006	1,446
2009	Francis et al. (2009)	Journal of International Money and Finance	x		x	x				x						1994-1999	423
2009	Kao et al. (2009)	Journal of Banking and Finance	x		x	x				x						1996-1999	366
2010	Aharony et al. (2010)	Journal of Account. Public Policy	x		x					x	x					1999-2001	185
2010	Chiou et al. (2010)	Chinese Economy	x		x	x				x						1995-2007	1,080

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2010	Gao (2010)	Pacific-Basin Finance Journal	x		x	x				x	x		2006-2008	217
2011	Su et al. (201)	Asia-Pacific Journal of Financial Studies	x		x	x				x			1996-2005	936
2011	Su and Bangassa (2011)	Journal Int. Financial Mkt, Inst. & Money	x		x	x				x			2001-2008	590
2011	Tian (2011)	Journal of Empirical Finance	x		x	x				x			1992-2004	1,377
2012	Chen and Strang (2012)	Journal of Chinese Economic and Business Studies	x		x	x				x			1992-2011	906
2012	Liu et al. (2012)	Journal of International Financial Markets, Institutions & Money	x		x	x				x			2000-2007	627
2013	Chen et al. (2013)	Financial Management	x		x	x				x			2002-2008	503
2013	Liu et al. (2013)	Journal of Corporate Finance	x		x	x				x	x		2004-2010	749 IPO applications
2013	Su and Brookfield (2013)	International Review of Financial Analysis	x		x	x				x			1995-2007	1,148
2014	Chalmers et al. (2014)	Journal of Contemporary Accounting & Economics	x		x	x				x			1996-2009	1263
2014	Hussain and Zhou (2014)	Review of P. Basin F. Mkt and Policies	x		x	x				x	x		1992-2011	2,219
2014	Liu et al. (2014)	Accounting and Finance	x		x	x				x			1999–2009	880
2014	Liu et al. (2014)	Pacific-Basin Finance Journal	x		x	x				x			1997-2009	963
2014	Piotroski and Zhang (2014)	Journal of Financial Economics	x		x	x				x	x		2001-2008	440 IPOs; 48 Promotions
2014	Wu (2014)	Review of Quant. Fin. and Accounting	x							x		x	1990-2007	1585
2015	Busaba et al. (2015)	Journal of Banking & Finance	x		x	x	x			x			1993-2008	1500
2015	Chen et al. (2015)	Journal of Corporate Finance	x		x	x				x			1999-2007	675
2015	Feng and Johansson (2015)	Journal of Banking & Finance	x		x	x				x			2005-2010	724
2015	Güçbilmez (2015)	International Review of Financial Analysis	x		x	x	x			x	x	x	1999-2003	2,706
2015	Li and Zhou (2015)	China Economic Review	x		x	x		x	x	x	x		2009-2012	692
2015	Huyghebaert and Xu (2015)	China Economic Review	x		x	x				x			1995-2010	2,064
2015	Pu and Wang (2015)	Applied Economics Letters	x		x					x			2003-2007	170
2015	Wang et al. (2015)	China Economic Review	x		x	x			x	x			2002-2010	636
2016	Bao et al. (2016)	Emerging Markets Review	x					x					2009-2012	355
2016	Cao et al. (2016)	Journal of Business Ethics	x		x	x				x			1996-2007	181
2016	Chen et al. (2016)	Journal of Corporate Finance	x		x	x				x			1997-2004	814
2016	Deng and Zhou (2016)	Review of Quantitative Finance and Accounting	x					x					2009-2012	355
2016	Farag and Mallin (2016)	Journal of Business Ethics	x		x	x				x			1990-2012	892
2016	Gao et al. (2016)	Economics Letters	x		x	x				x	x		2010-2012	479
2016	Otchere and Vong (2016)	Emerging Markets Review	x		x	x			x	x			1990-2008	120 VC-backed IPOs
2016	Wang and Song (2016)	Journal of Management	x		x	x				x	x		2004-2009	274

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2017	Chen et al. (2017)	Journal of Banking and Finance	x		x	x			x	x			2006-2011	1,200 IPO applications
2017	Cao-Alvira and Rodriguez (2017)	Journal of Int. Fin. Mgmt & Accounting	x									x	2004-2010	70
2017	Gao et al. (2017)	Finance Research Letters	x		x	x			x				2010-2012	474
2017	Johansson et al. (2017)	China Economic Review	x		x	x			x	x			2001-2008	432
2017	Rumokoy et al. (2017)	Pacific-Basin Finance Journal	x		x	x			x				2006-2012	1157
2017	Wang et al. (2017)	Pacific Accounting Review	x				x	x					2004-2012	924
2018	Chen et al. (2018)	Research Policy	x				x	x					2004-2015	272
2018	Wang et al. (2018)	Journal of Corporate Finance	x		x	x			x				2005-2013	837