Chinese domestic IPO over-issuance

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Abstract:
We find that since the regulator abolished its issue-price intervention in the Chinese domestic IPO market, issuers have raised huge amounts of excessive capital, i.e. funds above those needed for their investment projects (over-issuance). In fact, the average IPO firm has been raising equity 2.55 times the amount that is needed. Aggregately, RMB 307 billion of capital was raised in 590 IPOs in 2010 and 2011 without corresponding projects. Based on behavior finance theory, we offer a market-timing explanation on this phenomenon and our empirical results complies with this explanation. We thus conclude that over-issuance evidence that issuers and investment banks time the market to exploit overoptimistic investors.

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1. Introduction

Since June 2009, the Chinese regulator has abolished its control over issue prices in Chinese domestic IPOs. In the two years after that (2010 and 2011), Chinese domestic IPOs, i.e. the IPOs in Shanghai and Shenzhen stock markets, topped the world in terms of IPO number and gross proceeds (Ernst & Young, 2012). However, a new phenomenon has drawn the attention of the public: issuers raise much more capital than what is necessary for their planned investments. We henceforth call this phenomenon '*over-issuance*'. Moreover, issuers seem to pay higher fee rates to their underwriters when more excessive capital is raised. One of the biggest financial newspapers in China, China Securities Times, revealed in its June 2010 edition: "…most issuing firms include an 'over-issuance clause' in their underwriting contracts with investment banks; the clause allows fee rates to increase with over-issuance... The existence of such clauses has encouraged investment banks to pursue high issue prices and raise unnecessary capital." In spite of the attention from the media, academic research on over-issuance still falls short.

In this paper, we first demonstrate the facts of over-issuance. The unique Chinese IPO mechanism allows us to formally document this phenomenon. By law, Chinese IPOs are all *primary* share offerings, collecting new funds for the IPO company. Issuers have to apply for IPO permission from the Chinese Securities Regulation Committee (CSRC). In their IPO application documents, they need to specify the capital needed for their investment projects and the number of shares they intend to sell. The CSRC publishes those applications on its website since 2009. So, we can collect the capital needed for investment projects, i.e. the total capital issuers intend to raise from those applications. Dividing the capital intended to raise by the total shares planned to sell, we obtain the issue price intended by issuers at the time of application (intended issue price). After the approval, issuers and their underwriters conduct a price inquiry in road shows to institutional investors and finally decide on the final issue price and the number of issuing shares. We define over-issuance by the multiple of total

net proceeds raised in an IPO to total capital required for the firm's investment projects described in the prospectus. We find that among the 590 IPOs for which we could collect over-issuance data,[1] the mean (median) over-issuance reached 2.55 (2.36). In total, RMB 307 billion of capital was raised without corresponding investment projects. Among the 590 IPOs, only 25 firms (4.23% of sample firms) raised less capital than initially planned. We also find that two years after IPO, the cash and cash equivalent held by an average issuer still amount to 72% of the capital raised in IPOs.

Why do issuers raise much more capital than needed in IPOs? Under efficient market[2] and rational agency framework, text-book corporate-finance theories tell us that external financing incurs costs. Mayer and Majluf (1984) argue that due to the existence of asymmetric information, issuers have to sell their bond or shares at the price lower than intrinsic value to attract uninformed investors. Habib and Ljungqvist (2001) suggest that the more shares issued to the market, the more wealth loss incurred to the issuer. Ritter (2012) estimates that, in the last decade in the US, including underwriting fee and first day abnormal return, an average issuer have to give up 18 cents for every dollar he raises. In China, the average underwriting fee in 2010 and 2011 was 5.4% and the average first-day abnormal return was 32.8%. So, for every RMB raised, issuers have to give up 38.2 cents either to their underwriters or to their primary-market investors. With such a high cost, one would expect issuers to reduce issuing shares to avoid raising excessive capital and thus to minimize their wealth lose. However, the reality in Chinese domestic IPO market in the past two years is the opposite: not a single firm reduced its issue shares; all firms issued at the maximum number of shares they were approved to offer by the CSRC.

Behavioral finance theories argue that capital market misprices the securities from time to time and mangers took those opportunities to exploit investors by issuing (or repurchasing) over/under-priced securities (e.g Baker and Wurgler, 2002; Rajan and Servaes, 2003). Applying to IPOs,

[1] In total, 622 IPOs happened in Chinese domestic stock markets in 2010 and 2011.

2 The efficient market mentioned hereunder in this paper is of its semi-strong definition: all public information is incorporated in stock price but private information is not.

behavioral finance theories predict that in certain periods, issuers consider their firms to be over-valued by investors. They price IPO shares over their intrinsic value to exploit the overoptimistic investors. As Loughran and Ritter (1995) suggest: 'firms take advantage of transitory windows of opportunity by issuing equity when, on average, they are substantially overvalued'. Selling overpriced shares increases the wealth of issuers and so, issuers sell as many initial shares as possible to maximize their benefit, which explains the over-issuance phenomenon. Hereunder, we name this explanation as 'market timing explanation based on behavioral finance theory' and abbreviate it by 'market timing'. [3]

Though market timing seems plausible in explaining over-issuance, this explanation assumes irrationality, or 'limited rationality', of investors. Criticism on this kind of explanation is that when resorting to irrationality, one can explain everyting. Rajan and Servaes (2003) argue that the scientific way to verify this kind of explanations is to examine the predictions under these explanations. In other words, if market-timing is the true explanation to over-issuance, it should be able to predict other phenomena relevant to over-issuance. We tested the predictions under market-timing theory and contrast those predictions against what efficient market and rational agent theories would make. Our empirical results support the former and against the later.

First, if market-timing explanation is valid, the stock price in the aftermarket should also be partly driven by investor enthusiastic. Thus, the sentiment of investors should play a role in determining subsequent stock returns. Under efficient market and rational agent theory, Beta, size of the firm and book-to-market ratio are sufficient to explain excessive stock returns (Fame and French, 1992). Using the ratio of stock price in the aftermarket divided by intended issue price as the measurement of investor sentiment on a proper stock (MOI), we run Fame-Macbeth regression for

[3] In a broader sense, market timing does not necessarily imply asset misprice and investor exploitation. Subrahmanyam and Titman (1999) suggest that firms go public when information cost is relatively low in the market. In this paper, we use the term 'market timing' in accordance with Loughran and Ritter (1995), Pagano et al. (1998), Purnanandam and Swaminathan (2001), Baker and Wurgler (2002) , Rajan and Servaes, H (2003) and Ljungqvist *et al*. (2006). That is: issuers time the market when asset is mispriced.

every 20-days excessive stock return from the 100th trading day after IPO till the 360th trading day after IPO. We find that investor sentiment is the most influential factor affecting subsequent stock returns, among Beta, firm size, book-to-market ratio and momentum factors.

Second, we form an arbitrage portfolio which shorts the stocks with high investor sentiment (measured by MOI) and longs the stocks with low investor sentiment. Market-timing would predict that this portfolio brings positive arbitrage return (before transaction fee), efficient market and rational agent theory would predict no arbitrage profit. We do find significant arbitrage profit with this portfolio (before transaction costs).

Moreover, under market timing assumption, over-issuance, first-day abnormal return and underwriting fee become endogenous. Higher underwriting fee encourages investment bankers to price IPO shares more aggressively and thus increases over-issuance. Higher over-issuance requires investment banks to exercise more marketing efforts and to suffer bigger reputation lose when the intrinsic value of issuing firm is revealed the aftermarket. Thus increases underwriting fee. Keeping market overvaluation constant, bigger first-day abnormal return means lower issue price and thus negatively correlates with over-issuance. Under efficient market and rational agent assumption, over-issuance should happen as a random mistake by issuers and their underwriters. So, *Ceteris Paribas*, over-issuance should have no explanatory power on underwriting fee and underprice. Our empirical results do confirm the endogenaity among over-issuance, underprice and underwriting fee.

We thus conclude that over-issuance evidences that issuers and investment banks time the market to exploit over-optimistic investors in IPOs. We notice that investor exploitation and market timing is not unique in China. Purnanandam and Swaminathan (2001) find that "the median IPO is overvalued at the offer by about 50% relative to its industry peers." They further conclude that investors sell over-valued IPO shares to take advantage of overly optimistic investors. Pagano *et al.*

(1998) document that in Italy, firms are more likely to go public when the market price-to-book ratio is high and they explain it by issuers' attempt to exploit sectoral mispricing by investors.

However, empirical evidence about market timing and investor exploitation is subject to critics. The research of Purnanandam and Swaminathan (2001) and Pagano *et al.* (1998) compare the multiples of IPO firms with listed firms. One would argue that firms going for IPOs may have higher growth potential than their listed peers; the multiples of listed industry peers may not reflect the true value of the IPO firms. Other researchers study the after-market stock performance of IPO firms. In general, they find that IPO firms perform worse than their benchmarks. But Ritter (2003) points out, finding *ex-post* underperformance does not necessarily imply *ex-ante* overvaluation. As Carlson *et al.* (2006) points out, firms become less risky after stock issuance and so their required return reduced.

The other (more) important question which is so far unanswered in literature is: even if IPOs are indeed overvalued, does this necessarily imply that issuers *deliberately* time the market to exploit the over-optimistic investors? Could issuers themselves overvalue their firms as much as investors do? Finding empirical evidence on this question is difficult. The reason is simple: no issuer will publicly announce his real valuation on his firms if he does consider his IPO as overvalued.[4]

Our research, using Chinese IPO data as of 2010, offers evidence on issuer's market timing and investor-exploitation intention. The over-issuance is a decision made by issuers after book-building have revealed investors' higher valuation on the firm. Had issuers agreed with the (higher) valuation by investors, they would have reduced their issuing shares to raise just enough capital for their planned investment. Under rational agency assumption, raising capital incurs costs; raising unnecessary capital incurs unnecessary costs. Only when issuers consider their firms to be overvalued by investors, as predicted by market-timing theory, raising capital become a profitable event in which issuers could sell overpriced shares. So, the over-issuance decision made by issuers reveals that issuers consider their

[4] In the US book building process, issuers do offer an initial price range and adjust offer price according after book-building. However, issuers could well argue that they fully adjust their evaluation on their firms according to investors' bidding during book-building phase. So, the initial offer price range does not represent issuers' final evaluation at the time of IPO.

shares to be overvalued and try to exploit investors by issuing as many shares as possible. Overall, our empirical results add evidence to market timing based on behavioral finance theories.

The uniqueness of our study is that we focus on issue amount; indeed, over-issuance is nothing but actual issue amount scaled by planned investment. In IPO literature, issue amount is often treated as exogenous. Under efficient market and rational agent framework, issuers raise capital to finance their planned investment.[5] So, issue amount in primary-share offering is determined by investment opportunities which are exogenous to either underprice or to underwriting fee. However, once taking into account of market timing and investor-exploitation, issue amount is determined simultaneously with underprice and underwriting fee. Thus, we argue that empirical work that applies market-timing theories should take those endogenaity into account.

The remainder of this paper is organized as follows. In Section 2, we briefly review the institutional aspects of Chinese domestic IPOs that are relevant to our analysis. In Section 3, we formally document over-issuance in year 2010 and 2011. We then present our explanation of over-issuance based on market timing and propose several testable predictions made by this explanation, we also contrast these predictions against what efficiency market and rational agent theories would make. In section 4 we empirically examine those hypotheses and discuss the results. Section 5 offers our conclusions.

2. Institutional background

2.1.Chinese domestic IPO mechanism

5 We focus on primary share offering as all Chinese IPOs are primary share offerings. However, firms do offer secondary shares in IPOs in other countries. Under efficient market and rational agent theory, the issue amount in secondary-share offering depends on the original owner's portfolio diversification request, which is also exogenous to underprice and underwriting fee.

The Shanghai and Shenzhen stock markets were established in 1990 and 1991, respectively. By the end of 2011, 2,392 Chinese companies have become listed on these two exchanges, with a total market capitalization of RMB 21.5 trillion.

A special feature about Chinese IPOs is that all of them are primary share offerings. The Company Law enforced in 1993 stipulates that: "The shares of a company held by the initiators of this company shall not be transferred within one year as of the day of the company's incorporation. The shares issued before the company publicly issues shares shall not be transferred within one year as of the day when the shares of the company become listed and tradable in a stock exchange." Thus, it excluded the issuance of any secondary shares. In other words, any Chinese domestic IPO involves an offering of primary shares to finance specific investment projects. We also confirm this point by reading all the prospectus of the firms listed in 2010 and 2011: all firms offered only primary shares.

Before July 1999, the Chinese domestic IPOs are under a 'quota system'.[6] Since July 1999, with the enforcement of the Securities Law, the quota system was abolished. Any firm that fulfills the conditions stipulated by the Securities Law can engage an investment bank and through the investment bank submit its IPO application with the CSRC. The application should contain the issue price and the number of primary shares to be sold. Once the application is approved, issuers cannot change the issue price but issuing fewer shares than initially planned is still allowed. In the IPO application, issuers should offer details on the planned investments and the amount of capital required for those projects. The same information about the projects has to be disclosed in the IPO prospectus once the application has been approved. Deceiving the CSRC in IPO application brings severe punishment by the regulator, including delisting in the aftermarket. For investment banks, leaving bad impression with the regulator jeopardize their future business. After receiving the IPO application, the CSRC takes three to nine months to decide whether or not to approve it. The CSRC also sets an issuing P/E cap every year, this

[6] For details of this system, please refer to Huyghebaert and Xu (2012).

cap is deliberately set much lower than the contemporary market P/E to attract investors into the primary market.

Starting at 2005, with the publication of 'The notice on several issues related to the trial implementation of cumulative price inquiry' by the CSRC, the book-building method became mandatory for every IPO. Issue prices are supposed to be determined after a book-building period and immediately before share issuance. However, the CSRC still managed an internal guiding issuing P/E cap at 30 (Gao, 2010).

The real change came in June 2009, when the 'Guidance Opinions on Further Reforming and Modifying the Offering Mechanism for New Shares' was published and enforced. With this guidance, the CSRC totally left the determination of the issue price to issuers, investment banks, and investors. After obtaining approval from the CSRC, issuers, together with their underwriters, conduct a price inquiry among the institutional investors in primary-market investors in road shows and finally decide on the issue price and the number of shares to be issued. The number of issuing shares should not exceed the amount that was approved, but firms are allowed to issue less shares.

2.2.Underwriters in Chinese IPOs

Chinese investment banks developed from scratch with the re-establishment of Chinese domestic stock markets. In 1993, the CSRC issued 'The circulation on enhancing the role of securities underwriters and professional intermediaries in stock offerings', which henceforth mandated every issuer to select an investment bank as lead underwriter for its IPO. Upon receiving a qualification from the CSRC, investment banks had to organize the whole IPO process, including consulting the issuing firm on fulfilling issuing conditions stipulated by the CSRC, preparing application materials for the issuing firm and holding responsibility for the validity and accuracy of these materials, deciding on the issue

price and the number of issuing shares and together with issuers, promising to buy any unsold issuing shares and follow-up the issuing firm after its first listing.

Different from the Western market, allocating new shares to primary market investors has never been a task for Chinese investment banks. In case of oversubscription, new shares are rationed to investors by their full prepayment. In other words, Chinese investment banks never obtained the right to discretionally allocate new shares. As another difference from Western markets, where institutional investors typically obtain over 70% of initial shares, the CSRC regulated that at least 50% of initial shares in Chinese IPOs should be sold to individual primary-market investors.

As compensation for their services in IPOs, investment banks are allowed to charge issuers a fee proportional to the total gross proceeds. In 1996, the CSRC issued 'The circulation on issuing measures for the management of stock underwriting business by securities firms'. This regulation mandated that underwriter to charge between 1.5% and 3% of total gross IPO proceeds. This policy was maintained until the CSRC implemented 'The interim measures for stock issuance and listing recommendation' in March 2004. As of that date, investment banks became free to negotiate their fee rates with issuers and set their fee rates in IPOs. For example, they can negotiate a flat fee rate on any proceeds raised; they can also accept the fee rates as a function of actual capital raised or of over-issuance.

2.3. Issuers and investors in Chinese domestic IPOs

In the early years after the re-establishment of Chinese domestic stock markets, Chinese domestic IPO issuers are mainly state-owned enterprises (SOE). Huyghebaert and Quan (2009) report that till the end of 2005, 93% of IPOs in China were initiated by SOEs. In recent years, private firms dominate the population of firms becoming listed. According to the CSMAR database, 84% of the firms becoming listed in 2010 and 2011 are privately owned. 73% of the issuing firms are active in traditional

industries and the second largest issuing group is active in the computer science and telecommunication sector (11%).

As to the investors, a study published on the website of the China Securities Depository and Clearing Corporation Ltd (CSDCC) shows that by the end of 2007, small retail investors still accounted for about 80% of the total transaction volume. About 56 million Chinese citizens were trading in stocks; 70% of them have monthly income below RMB 5,000; over 50% of them hold stocks for less than three months. The 2011 year book of CSDCC shows that by the end of 2010, individuals hold 151 million stock accounts in Shanghai and Shenzhen stock markets while institutional investors hold 0.58 million accounts.[7]

3. Over-issuance, explanation and predictions

3.1. Over-issuance

Over-issuance, defined as the multiple of total net proceeds raised in an IPO to total capital required for the firm's investment projects described in the prospectus, has drawn the attention from Chinese media and from the regulator since 2010. This is a new phenomenon after the final abolishment of the issuing P/E cap as of July 2009. Under the issuing P/E cap, issuers, investment banks, and the regulator knew what the issue price would be when IPO applications were submitted. Once the application was approved, the total proceeds were nailed down at the application level, so the capital raised would not largely exceed the amount that was planned in the application.

However, after the issuing P/E cap was lifted, the issue price was not known until the end of the book-building period. When the price indicated by investors in the price inquiry largely exceeded that estimated by issuers in their IPO applications, issuing shares at the planned number will engender much more capital than what is needed. Although at this stage, issuers could still reduce the number of

[7] The year books do not disclose the stock value held in these accounts.

issuing shares to avoid raising an excessive amount of capital; in practice all issuing firms in our sample issued as many shares as possible at their approved quantities.

Almost all firms became listed after 2010 raised much more capital than the amount required for their investment projects. We hand-collected the amount of capital needed to cover their projects (capital required) from the IPO prospectus in 2010 and 2011 on a firm-by-firm basis. We then divided the net proceeds raised in every IPO (capital raised) by the capital required to measure the over-issuance for every IPO. If the over-issuance exceeds one, then the IPO raised more capital than what is required for its investment projects. We find that among the 590 IPOs in our sample for which we could collect over-issuance data, the mean (median) over-issuance reached 2.55 (2.31), in other words, 61% of capital raised by an average issuer is without investment project. In total, RMB 594 Billion was raised in those IPOs but the total capital required was only RMB 287 Billion — RMB 307 Billion of capital was raised without corresponding investment projects! The highest over-issuance is 11.69 and the lowest is 0.36. Among the 590 IPOs, only 25 IPOs have over-issuance less than one. For details of this analysis, please see Table 1.

<Table 1>

Complying with the over-issuance observations in Table 1, we find that after IPO, huge amounts of cash are kept idle on issuers' cash and cash equivalent accounts. Two years after IPO, the cash and cash equivalent held by an average issuer still amount to 72% of the capital initially raised. For details, please see Figure 1.

<Figure 1>

3.2. Over-issuance explanation

The over-issuance phenomenon is hard to be reconciled with traditional corporate financial theories based on efficient market (efficiency at semi-strong form) and rational agencies. Mayer and Majluf

(1984) argue that due to the existence of asymmetric information between investors and issuers, issuers have to sell their bond or shares at a price lower than intrinsic value to attract uninformed investors. They further conclude that raising equity is the most expensive external financing method, as equity value is more sensitive to asymmetric information than other securities. Under efficient market and rational agent framework, different theories are raised to explain IPO underpricing, including, but not limited to, the 'signal theory' by Weltch (1989), the 'winter's curse' theory by Rock (1986), the 'book-building theory' by Benveniste and Spindt (1989) and the 'marketing cost replacement' by Habib and Ljungqvist (2001). The common conclusion of those theories is that IPO shares should be priced under their intrinsic value (underprice) and selling shares under their intrinsic value incurs costs to issuers. Besides underpricing, issuers need to pay underwriting fee to their underwriters. Underwriting fees are explained either as 'certification cost' (Booth and Smith, 1986), or as purchasing a put option from underwriters in firm-commitment offerings. Ritter (2012) estimates that, in the last decade in the US, including underwriting fee and first day abnormal return (a measurement of underprice), an average issuer have to give up 18 cents for every dollar he raises. In China, the average underwriting fee in 2010 and 2011 was 5.4% of gross proceeds and the average first-day abnormal return was 32.8%. So, for every RMB raised, issuers have to give up 38.2 cents to either their underwriters or their primary-market investors. With such a high cost, one would expect issuers to avoid raising excessive capital. However, we observe the opposite.

The other strand of researchers question that IPOs are really underpriced. One the contrary, they argue that investors are not always rational, or, investors have 'limited rationality'. The irrationality, or 'limited rationality' comes from certain psychological aspect of human being, such as overweighting ones' own information or overconfidence in one's own experience. So, at times, investors could misprice certain assets (Daniel *et al.* (2001). Issuers and their investment banks are supposed to know the intrinsic value of the firms and they time the market by issuing overpriced shares

to exploit the investors. In an anonymous survey, Graham and Harvey (2001) find that two-thirds of CFOs of Fortune 500 companies agree that when deciding share issuance, "the amount by which our stock is undervalued or overvalued was an important or very important consideration". Pagano *et al.* (1998) document that in Italy, firms are more likely to go public when the market price-to-book ratio is high and they suggest that investors could be overoptimistic about certain sectors and issuers exploit the sectoral mispricing by investors. Purnanandam and Swaminathan (2001) compare the multiples (price to earnings, price to EBITDA and price to sales) of issuing firms with those of industry peers in US IPOs from 1987 to 1997. They find that "the median IPO is overvalued at the offer by about 50% relative to its industry peers." Under market timing theory, if issuers correctly time the market, they can increase their wealth by selling overpriced IPO shares; as Berker and Wurgler (2002) put: 'market timing benefits ongoing shareholders at the expense of entering and exiting ones.' Thus, issuers have no reason to limit their issuing amount by their investment needs. Instead, they would sell as many shares as possible to maximize their benefit, which explains the over-issuance phenomenon.

Though market-timing theory seems plausible to explain over-issuance, this explanation relies on irrationality assumption of investors. Criticism on this kind of explanation is that when resorting to irrationality, one can explain everything. Rajan and Servaes (2003) argue that the scientific way to verify this kind of explanations is to examine the predictions under these explanations. In other words, if the market-timing theory is the true explanation to over-issuance, it should also be able to predict other phenomena relevant to over-issuance. In the next chapter, we propose several predictions under the market-timing theory and empirically exam their validity. As we set up this market-timing explanation in contrast to efficient market and rational agent theories, we also contrast all of its predictions to those under rational agent theories.

3.3. Predictions

3.3.1 Stock returns in the aftermarket

Under efficient market and rational agent assumption, the expected return of a stock should be explained only by its correlation with market portfolio, i.e. the Beta. Fame and French (1992) show that besides Beta, the size of the firm and the book to market value of the firm could also explain the cross sectional stock returns. Fame and French (1996) further show that market excessive return, the small versus big portfolio premium, the high book-to-market versus low book-to-market portfolio premium are sufficient to explains most of the expected stock returns; once controlling for these three factors, other factors become insignificant. So, we should expect that under efficient market and rational agent assumption, Beta, size of the firm and book-to-market ratio should be sufficient to explain the returns for the IPO firms in the aftermarket.

However, under behavioral finance theory, stock return is partly driven by the sentiment of investors. When the enthusiastic of the investors on a certain stock is exceptionally high, the probability that such enthusiastic wanes in the next period is also high. With a reduced enthusiastic, the stock price should decrease from current level. So, on average, the sentiment of the investors on a certain stock should negatively correlate with subsequent stock return. Under market-timing assumption, the intended issue price is a precise measurement of firm value. The higher the market price is in relevant to the intended issuer price, the higher the market sentiment is on the proper stock. So, if we divided market price by intended issue price, we obtain an index on how enthusiastic the investors are on a certain stock and we can compare this index across different stocks in a certain day after IPO. We name the index (MOI). We should expect that the subsequent returns of a stock can be explained partly by MOI, *Ceteris Paribas*.

Moreover, we notice that MOI is nothing but the stock price at the beginning of each period divided by intended issue price. Under efficient market and rational agent theory, past prices should not contain any information about future return; no arbitrage portfolio can be formed based on past

prices. Under behavioral finance theory, one can form arbitrage portfolio to obtain arbitrage profit, however, once transaction cost is taken into account, the arbitrage profit may disappear (Ritter, 2003). Under market timing explanation, low investor-sentiment stocks should outperform high investor-sentiment stocks in the subsequent period and MOI catches the investor-sentiment. So, we can form an arbitrage portfolio by longing the stocks with low MOI and shorting the stock with high MOI at the beginning of each period. If market timing explanation fits the Chinese domestic stock market in our sample period, we should obtain positive arbitrage return; however, such return may disappear once taking into account of transaction costs.[8]

Prediction 1

H0: Controlling for Beta, firm size and book-to-market value, the ratio of market price divided by intended issue price explains part of subsequent cross-sectional stock returns.

H1: Controlling for Beta, firm size and book-to-market value, the ratio of market price divided by intended issue price has no explanatory power on subsequent cross-sectional stock returns.

Prediction 2

H0: By longing low MOI stocks and shorting high MOI stock at the beginning of each period, we should obtain positive arbitrage return, however, such return may disappear once taking into account of transaction costs.

H1: By longing low MOI stocks and shorting high MOI stock at the beginning of each period, we should obtain no arbitrage return.

3.3.2. Relation among over-issuance, underwriting fee and first-day abnormal price

[8] We do not claim that the arbitrage return necessarily disappear, whether it disappear or not is for empirical examination.

Under market timing assumption, higher over-issuance means issuers and their investment bankers take bigger advantage on the overoptimistic primary-market investors. Taking advantage of investors incurs reputation costs to investment bankers, so investment bankers demand higher fee rate for higher over-issuance. On the other hand, higher fee rate encourage investment bankers to price IPO more aggressively. Knowing this, issuers may intentionally offer higher fee rates on over-issuance to encourage aggressive pricing. As one of the biggest financial newspapers in China, China Securities Times, revealed in its June 2010 edition: "…most issuing firms include an 'over-issuance clause' in their underwriting contracts with investment banks; the clause allows fee rates to increase with over-issuance... The existence of such clauses has encouraged investment banks to pursue high issue prices and raise unnecessary capital." So, we should expect that over-issuance, and underwriter fee rate positively influence each other.

Under market timing theory, as suggested by Ljungqvist *et al.*, 2006, investment banks price IPOs over their intrinsic value but below the investors' valuation. In other words, investment banks do not take full advantage of the over optimistic investors. They leave a profit margin to their primary market investors who can in term sell the initial shares to the secondary market investors with a profit. This profit margin 'leaves a sweet taste' in primary-market investors mouth and attract them for future participation in the IPOs underwritten by this investment banker. This profit margin can be measured by first-day abnormal return. So, for a given level of investor (over)valuation, leaving bigger profit margin, i.e. higher first-day abnormal return leads to lower issue price, lower issue price reduce over-issuance. We should expect first-day abnormal return and over-issuance negatively correlate each other.

Higher fee rate encourage investment banks to better time the market. Better timing the market means that on average, the stocks introduced by this investment bank are priced higher beyond their intrinsic value. Once the intrinsic value is revealed in the aftermarket, this investment bank suffer

reputation lose among primary-market investors. To keep their popularity among primary market investors, investment banks that time the market better (and are thus enjoy higher fee rate) may intentionally increase the first-day abnormal return of the IPO stocks they introduce. In other words, investment banks offer their primary market investors better short-term profit to compensate for the potential bigger lost in holding the stocks they introduce in the long term. In this way, the investment banks maintain their popularity among primary-market investors without sacrificing the higher fee rate they obtain by better timing the market. So, higher underwriting fee rate may positively correlate with first-day abnormal return.

With those analyses we should conclude that under market-timing theory, over-issuance, underwriting fee rate and first-day abnormal return are endogenous to each other. The essence of this endogenaity is that: under market timing theory, issuing amount is not longer exogenously determined. It is the decision made together with issuing fee rate and first-day abnormal return. While under efficient market and rational agent theory, issuing amount is determined by capital request for their investment, over-issuance is a random mistake made by issuers and their investment bankers. Underprice is determined either by asymmetric information or by possible legal costs or by alternative marketing costs (for details please see Ritter and Welch, 2002). Underwriting fee is determined by the reputation of the underwriter (Chemmanur and Fulghieri, 1994) and by the risk of underwriting (Bohren *et al*, 1997). So, *Ceteris Paribas*, over-issuance should bear no explanatory power on underwriting fee and first-day abnormal return. Moreover, when controlling for investment bank reputation and for the risk of issuing firm, underwriting fee rate should not significantly influence underpice.[9] Now, we obtain the following predictions:

[9] Loughran and Ritter (2004) argue that issuers can compensate investment banks by higher underprice. Investment banks allocate the IPO shares with high underprice to their close clients and the clients pay back part of the profit they make in flipping out the highly underprice IPO stocks to investment banks through their agency fees in other transactions. In this sense, first-day abnormal return compliment with underwriting fee to reward underwriters. However, IPO regulations in China forbid investment banks to discretionally allocate IPO share, which makes it impossible for issuers to compensate investment banks by high underprice. Thus underprice cannot compliment underwriter fee in rewarding investment banks in China.

Prediction 3:

H0: Over-issuance positively correlates with underwriting fee rate.

H1: Over-issuance does not correlate with underwriting fee rate.

Prediction 4:

H0: Over-issuance negatively correlates with first-day abnormal return

H1: Over-issuance does not correlate with first-day abnormal return

Prediction 5:

H0: underwriting fee rate positively correlates with first-day abnormal return.

H1: Underwriting fee does not correlate with first-day abnormal return, once investment bank reputation and the risk of issue firm are controlled.

4. Empirical results on the predictions

In this section, we examine the predictions made in section 4. We obtain stock price from DataStream, issue price and other IPO related information from CSMAR Chinese A share IPO research database. We obtain the accounting information about the IPO firms from Compustat.

4.1. After-market stock return

We adopt Fame-Macbeth (1973) method to examine *Prediction 1*. First, we obtain the Beta of each IPO firms by regressing their daily excessive return on their corresponding daily stock-market excessive return. We use the Shanghai stock market composite index for the IPO firms listed in Shanghai and Shenzhen composite index for the firms listed in Shenzhen. We use the one-year deposit

rate published by the People's Bank of China as risk free rate. We then take the daily returns in the first 100 trading days (about one calendar year of trading) to estimate Beta for each stock. By every IPO firm, we obtain their book value (BV) and market value (MV) of equities by the end of its IPO quarter and the 1st, 2nd and 3rd quarter after the IPO quarter. We calculate book-to-market ratio (BTM) by BV/MV. Following Fame-Macbeth (1973), we take log on MV and BTM.

Next, for every IPO firm, we calculate their excessive stock returns from 101st trading day to 120th trading day (RT). We obtain their MOI by dividing the stock prices one day before the testing period (the 100th trading-day closing price in this case) by their corresponding adjusted intended issue price[10]. We regress RT on MOI, Beta, the logarithm of MV and the logarithm of BTM. We then move the 20-trading-days window on step further,[11]that is we regress the excessive stock return from 121st trading day to 140th working day. Every time we move 20 days further, we update the Beta estimation till the beginning of the testing period. For example, when we use the excessive 20-day returns from 261st trading day to 280th trading day, we estimate Beta using their daily returns from their first trading days till 260th trading day.[12]

Fame and French (1992) take BTM half year before the start of testing period to allow for sufficient time for the financial data to arrive in the market. Following them, we took BTM by the end of the IPO quarter for the regressions starting with 101, 121 and 141 trading days; BTM by the end of the first quarter as of the IPO quarter for the regressions starting with 161, 181 and 201; BTM of the

[10] We should notice that the intended issue price is without over-issuance. While the after-market stock price contains the excessive capital paid in by investors. To make these two prices comparable, we need to adjust intended issue price by adding the excessive capital per share on it, in this way we obtain adjusted intended issue price.

[11] We do not use daily return to run the cross-sectional regressions as daily returns are known to be too noisy. 20-trading days is roughly one month of trade which reduce the noisiness in the cross-sectional stock returns.

[12] Here we use the Beta estimated by daily returns to estimate the Beta in the next 20 trading days. It's not difficult to prove that so long as we can assume: 1) the daily market excessive returns in the next 20-day period do not correlate with each other and 2) market excessive returns only correlate with the stock excessive returns of the same day, the Beta estimated by excessive daily returns is an unbiased estimator for the Beta of the proceeding 20-day returns. Our short data period does not allow us to estimate Beta by 20-day returns, as 100 trading days gives only 5 data points if we use 20-day returns.

second quarter as of IPO quarter for the regressions starting with 221, 241, 261 days; BTM of the fourth quarter for the regressions starting with 281, 301,321,341 days. Thus, the BTM in every regression is about 70 to 110 trading days ahead of the regression period, which corresponds to three to five calendar months.

We run cross-sectional regressions for the 20-day stock returns from 101st day till 360th day after IPO. In total, we run 13 cross-sectional regressions. We end of testing period by the 360th day, as till we run the regression (by the end of 2012), 40% of the firms in our sample have less than 360 trading day records. Our sample becomes less representative the further we extend our testing period. In Table 1, we summarize the statistics of 20-day excessive stock return (RT), MOI, Beta, MV and BTM. As these variables change by firms and by regressions, for every regression, we take the average of RT, MOI, Beta, MV and BTM across all the firms included in that regression. In Table 2, we summarize those average RT, MOI, Beta, MV and BTM in these 13 regressions.

<Table 2>

We list the regression results in Table 3. MOI stand out to be the most influential variable on expected excessive returns. Seven out of the 13 regressions report significant negative coefficient on this variable. On average, if MOI increases by one, the subsequent 20-day stock excessive return will reduce by one percentage point. This finding indicates that when the market sentiment on a stock is too high (comparing to what it is expected to be in certain day after IPO), the next-period stock price tend to decrease. Similar to Fame and French (1992), Beta positively influences expected excessive return but only significant in five regressions, firm size negatively influences expected excessive return but significant only in four regressions, book-to-market ratio negatively influences excessive return and is significant in six regressions, but its sign flips in different regressions. Overall, the strong negative influence of MOI indicates that besides correlation risk (Beta), the expected returns of the stocks are driven heavily by market sentiment. In fact, MOI is nothing but a transformation of the stock price one

day before the 20-day testing periods. Stock price contains information that explains subsequent stock return, this fact refutes efficient market assumption. In all, those results support the *H0* and against of *H1* in our *Prediction 1*.

<Table 3>

Next, we examine whether one can find arbitrage opportunity by using MOI as the measurement of investor-sentiment on a certain stock. Ljungqvist *et al.* (2006) assume that investors keep their enthusiastic on the IPO stock for certain periods as of IPO, this period will allow primary market investors to sell out their initial shares with a profit. This assumption implies that there is a certain pattern of investor-sentiment as of IPOs; in other words, there exists an expectation of investor-sentiment in a certain day as of IPO. Our regression in Table 3 also shows that when the investor-sentiment on a stock is higher than this expected investor-sentiment on the same day as of IPO, the subsequent return of the stock will decline. We thus first estimate the expectation of investor-sentiment in each day as of IPO using the MOIs in the first 240 trading days as of Jan 1, 2010 (roughly all trading days in 2010). That is, for every firms listed in 2010, we calculate its MOI day by day. We then take the simple average of all the MOIs in a certain day as of IPO across all the firms and we obtain the expected MOI *in a certain day as of IPO*. Next, we divide the MOI of every firm on the 240^{th} trading day as of Jan. 1, 2010 by their corresponding expected MOI to obtain an investor-sentiment ratio. We should pay attention that for the firms in the same trading day (e.g. in the 240^{th} trading day as of Jan 1. 2010), their corresponding expected MOI are different. For example, on the 240^{th} trading day as of Jan.1, 2010, firm A has already listed for 90 days and firm B listed for only 10 days, the corresponding expected MOI for firm A is the expected MOI 90 days as of IPO, while for firm B is the expected MOI 10 days as of IPO.

We short the firms in the top 25% percentile of investor-sentiment ratio, those firms are the ones with the highest investor-sentiment in relative to their expected investor-sentiment. We long

firms with the lowest 25% percentile of investor-sentiment ratio. We keep this portfolio for 20 days and liquidate it, we than estimate the expected investor sentiments with the 260 trading days as of Jan. 1, 2010 and form a long-short portfolio by comparing the MOIs of the firms in the 260th trading day as of Jan 1, 2010 to their expected MOI, we keep this long-short portfolio for further 20 trading days. We use the 20 day holding period as we need to allow enough time for the high-sentiment stocks to fall and low-sentiment stocks to raise; on the other hand, we would like to update our estimation on expected MOI as of IPO as often as possible. We also used 10 days and 30 days, results are similar. We stop the test by the 500th trading day as of Jan 1, 2010, that is roughly Jan 2012 and our IPO samples stop at Dec. 31, 2011. Thus, we have 260 daily long-short portfolio returns. In Table 4, we show the statistics of the daily return. In figure 2 we show the histogram of the daily returns and figure 3 shows the accumulated portfolio return. The daily arbitrage return is significantly over zero at 5% confidence level, the sharp ratio of this arbitrage strategy reaches 2.21. In total, we obtain 24.26% of accumulated arbitrage return from the 240th trading day as of Jan 1, 2010 to the 500th trading day. The accumulated arbitrage return never decreased below zero.

<Figure 2-3>

<Table 4>

The results clearly show that in theory, arbitrage opportunity does exist: when we use MOI as a measurement of investor-sentiment we can arbitrage on the sentiment of investors. Again, this result refutes the efficient market and rational agent theories. However, once taking into account of transaction costs, the arbitrage return disappears. The transaction fee for every buy or sell order is 0.3% in China. For every 20 days, we need to liquidate our portfolio and form new long-short portfolio, which gives rise to 4 transactions and costs 1.2% for every RMB of portfolio. From 240th trading day to 500th trading day, we have 13 times of portfolio formation which corresponds to 15.6%. Borrowing stocks in China is costly; the current annual rate is from 5% to 10%. Thus, transaction costs and stock-

borrowing costs offset the arbitrage profit. Overall, our results support the market timing explanation built on behavior finance theories.

4.3. Examine the relation among over-issuance, underwriting fee and first-day abnormal return

To detect the relation among over-issuance, underwriting fee and first-day abnormal return, we adopt a 3-equation simultaneous equation system. In each equation, we take over-issuance, underwriting fee rate or first-day abnormal return as dependant variable. We put the rest two variables on the right-hand-side as explanatory variables and control for the variables that are commonly used in literature.

We include the following common explanatory variables in each of the three regression: the logarithm of gross proceeds to control for the scale of issuance; the market return from 30 days before IPO to one day before IPO to proxy the market sentiment before issuance; the last-year market share of the investment bank to control for the reputation of underwriter; the volatility of daily stock-return in the 120 trading days since IPO as a proxy for the risk of the issuing firm[13]; a dummy equals one if the issuing firm is privately owned and zero if state-owned, this dummy is to control for the influence of ownership. We also control for year and industrial effects by year and industrial dummies. In the full sample and Shenzhen sub-sample regression, we take CSRC 13 industry classification for industry dummies. In the Shanghai sub-sampler regression, we control for only informatics sectors due to our sample size.

For first-day abnormal return regression, we add the logarithm of total assets before IPO, which is commonly used in underprice regressions to control for asymmetric information. We also added the difference between the number of IPOs 30 day before issuance and the average monthly IPO numbers in 2010 and 2011 (IPO number difference). This variable is used to control for 'hot' and 'cold' IPO market which may influence first-day abnormal return (Ritter and Welch, 2002). We follow Helwege

[13] We tried with 90 days and 180 days, the results are similar.

and Liang (2004), Loughran *et al* (1994) and Loughran and Ritter (1995) to proxy the hotness of IPO market by the number of IPOs in a period immediately before the issuance.

In underwriting fee rate regression, we add the square of the logarithm of total proceeds. Together with the logarithm of gross proceeds, this variable account for the U-shaped relation between gross IPO proceeds and underwriting fee rates (Dunbar, 2000; Altinkihc and Hansen, 2000; Kaserer and Kraft, 2003). We also add the proportion of star analysts over total star analyst in the previous year into the fee-rate regression. Loughran and Ritter (2004) find that as of the 1990s, issuers in the US market have put a larger weight on hiring lead underwriters with highly ranked financial analysts to ensure research coverage after the firm's first listing. In over-issuance regression, we add issuing P/E as explanatory variable. Over-issuance is driven by market optimism. More optimistic investors are willing to buy shares at higher issuing P/E. We also scale planned investment by total assets. This variable indicates the size of planned investment in relevant to the size of the firm. When the capital demand for planned investment is already high, raising more capital exceeding this capital demand becomes difficult. So we expect this variable negatively correlate with over-issuance. Overall, our regression model is as following:

$$\begin{cases} AR = C_1 + \alpha_1 OI + \alpha_2 FR + \alpha_3 \ln(AS) + \alpha_4 NI + \alpha_5 \ln(GP) + \alpha_6 MR + \alpha_7 MS + \alpha_8 VL + \alpha_9 PO + \alpha_{10} Year + \sum_{i=11}^{22} \alpha_i Ids_i + \varepsilon_1 \\ FR = C_2 + \beta_1 OI + \beta_2 AR + \beta_3 SA + \beta_4 (\ln(GP))^2 + \beta_5 \ln(GP) + \beta_6 MR + \beta_7 MS + \beta_8 VL + \beta_9 PO + \beta_{10} Year + \sum_{i=11}^{22} \beta_i Ids_i + \varepsilon_2 \\ OI = C_3 + \gamma_1 FR + \gamma_2 AR + \gamma_3 \ln(PI) + \gamma_4 PE + \gamma_5 \ln(GP) + \gamma_6 MR + \gamma_7 MS + \gamma_8 VL + \gamma_9 PO + \gamma_{10} Year + \sum_{i=11}^{22} \gamma_i Ids_i + \varepsilon_3 \end{cases}$$

with:

AR: (First-day closing price – issue price) / issue price – first-day market return.

FR: (Underwriting fee + sponsor fee) / gross proceeds.

OI: Over-issuance, net proceeds / planned investment.

AS: Total assets before IPO.

NI: Number of IPOs in the 30 days before public offering – average monthly number of IPOs from 2010 to 2011.

SA: The number of star analyst the underwriter employed in the year before IPO / Total number of star analysts in the year before IPO.

PI: Planned investment / total assets of the firm before IPO.

PE: Issue price / earnings per share.

GP: Gross proceeds

MR: Market index return from 30 day before IPO to 1 day before IPO. Market index is either Shanghai composite index or Shenzhen composite index, depending on where the firm is listed.

MS: Market share of the underwriter in the year before IPO.

VL: The volatility of the daily stock return of the issuing firm from 1st listing day to 120th trading day after listing.

PO: Dummy equals to one if the firm is controlled by private owners, zero otherwise.

Year: Year dummy.

Ids: Industry dummies according to the CSRC 13 industry classification.

In total, 622 IPOs happened in 2010 and 2011 in Chinese domestic stock markets. Our sample contains 559 IPOs over which we can obtain full data.[14] We compared the property of the IPOs not included in our sample with that of the IPOs included in our sample, they do not significantly different from each other. All data are either hand-collected from the IPO prospectus or from the CSMAR database. A statistic summary of the variables and their correlations please see in Table 3 and 4. The correlations among all variables are below 0.7.

<Table 5-6>

[14] We excluded the eight financial firms (banks/insurance companies) that listed in 2010 and 2011 as the purpose of their IPOs is to comply with the capital/debt ratio stipulated by the People's bank of China, not to invest in concrete projects.

We report the regression results in Table 5. We first conduct a full sample regression using all firms listed in both Shanghai and Shenzhen stock market from 2010 to 2011. We then examine the validity of our results by dividing our sample by Shanghai and Shenzhen stock market. In 2010 and 2011, Shanghai stock market listed much less firms than Shenzhen stock market. But on average, the firms listed in Shanghai are much bigger than those listed in Shenzhen. The results of split sample regressions are in line with full sample results.

<Table 7>

Our results comply with the predictions made under market timing theory. Specifically, keeping fee rate constant, over-issuance and first-day abnormal return negatively influence each other. This observation indicates that issue amount is indeed determined simultaneously with first-day abnormal return. Keeping first-day abnormal return constant, higher fee rate increases over-issuance, which confirms the assumption that higher fee rates encourage investment banks to time the market. Meanwhile, over-issuance also increases fee rates. This finding verifies the report by Chinese media that issuer intentionally include 'over-issuance clause' in underwriting contracts to reward investment banks for over-issuance. The coefficient of over-issuance on fee rate is about 0.25%, indicating that if issuers could increase over-issuance increases from one to two, issuers would pay their underwriters additional 0.25 cents on every Yuan raised. The average over-issuance during our sample period is 2.7, which corresponds to an additional 0.425% of underwriting fee rate. The total gross proceeds raised is RMB 622 Billion in 2010 and 2011 IPOs, so issuers paid *additional* RMB 2.64 Billion to their underwriters due to over-issuance; on average, about RMB 4.2 million additional fee per IPO.

We find significant positive influence of underwriting fee rate on first-day abnormal return, confirming that investment banks who time the market better also leave bigger profit margin (higher first-day abnormal return) to their primary-market investors.

The coefficients on other controlling variables are in line with previous literature. Interestingly, we didn't find high-market-share investment banks reduce first-day abnormal return, but those investment banks do demand higher fee rate. Under efficient market and rational agent theories, high market-share investment banks offer better certification on the quality of issuing firms, and thus reduce first-day abnormal return. However, under market-timing theory, IPO shares are sold to the investors who already hold a high valuation on the firm, those investors may not require quality certification from investment banks due to their overconfidence in their own evaluation. So, high-market-share investment banks do not necessarily associate with low first-day abnormal return. On the other hand, as timing market cost reputation and investment bank with higher market share have more reputation to lose, for the same level of over-issuance, high-market-share investment banks may indeed demand higher fee rate.[15]

The riskiness of the firm (measured by daily stock return volatility in the 120 trading days since IPO) increases with first-day abnormal return, indicating that investment banks leave higher margin for primary market investors on riskier firms. This finding complies with both rational agent theories and market timing theories. Howerver, the riskiness of issuing firm does not influence underwriting fee rate. Under efficient market and rational agent theories, investment banks may evaluate the issuing firm too high by mistake and end up buying all overpriced IPO shares. Riskier firm is harder to evaluate and so investment banks demand higher fee rate. However, under market timing theory, it is more important for investment banks to estimate the market sentiment than to evaluate issuing firms. In other words, even the investment bank evaluate an issuing firm too high by mistake, so long as it correctly estimate the market sentiment, it can still sell the IPO shares to the investors who evaluate the

[15] Of course, this positive influence of investment-bank market share on underwriting fee rate can also be explained by efficient market and rational agent theory, under which high reputation investment banks offer better quality insurance and thus demand higher fee rates.

issuing firm even higher. So, the riskiness of the issuing firm does not necessarily induce higher underwriting fee rate.

Private ownership reduces first-day abnormal return, showing that private owners care more about issue price than SOE managers. However, private owners have to pay higher fee-rate than the state-owned companies, indicating that investment banks have stronger bargain power on fee rates when facing private firms. Private-ownership also negatively influences over-issuance, indicating that investors may be less enthusiastic on private firms than on SOEs.

Overall, our results comply with the predictions made by market-timing theory and fail to support those by efficient market and rational agent theory. Our results also show that once taking into account of market-timing, issuing amount, underwriting fee rate and first-day abnormal return become endogenous, a correct empirical approach should take the endogenaity into consideration.

5. Conclusions

In this paper, we start from the startling finding that during 2010 and 2011, average Chinese domestic IPO firms raised 2.55 times of capital than that was necessary for its planned investments (over-issuance). When trying to explain this phenomenon, we find the market timing explanation based on behavioral finance to be plausible, while efficient market and rational agent theories are hard to reconcile with our findings. We thus argue that in 2010 and 2011, Chinese domestic IPO issuers did took advantage of the over optimism of investors and successfully sold overpriced initial shares.

Our findings have the following implications. First, we support the assumption raised by Loughran and Ritter (1995) that: 'firms take advantage of transitory windows of opportunity by issuing equity when, on average, they are substantially overvalued'. We offer evidence that in the real life, one of the important reasons of IPO is simply investor exploitation, which corresponds to what is argued by Rajan and Servaes (1993), Baker and Wurgler (2002) and Ljungqvist *et al.*(2006). Second, we find a

measurement of market sentiment on a proper stock (MOI), this measurement proves to be the most influential factor in determining subsequent stock returns and produces arbitrage opportunities (before transaction costs). Third, we show that once taking into account of market timing in IPOs, first-day abnormal return, issuing fee rate and issuing amount become endogenous. Practically, our finding suggests that strict regulation and regulatory enforcement are essential in the primary market. In the case of China, the regulator should be seriously alarmed by substantial over-issuance; individual investors may be extremely cautious when participating in IPOs.

One paper cannot focus on too many issuers, we didn't answer why issuers could systematically sell over-valued stocks to investors in Chinese domestic IPOs in these two years. Possible explanations includes: thanks to the government intervention on issue price (P/E caps), Chinese primary market investors enjoyed huge first-day abnormal returns in the 20 years before 2010. It still takes time for investors to recognize the importance of discovering the intrinsic value of IPO firms. Moreover, Ljungqvist *et al.* (2006) suggest that institutional investors in the primary market could collude with issuers and underwriters to bid up the issue price and gradually sell these over-priced IPO shares in the secondary market to over-optimistic individual investors. Those possible explanations are for future research.

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Table 1
Summary of over-issuance

In this table, we provide summary statistics on over-issuance in 2010 and 2011. Over-issuance is obtained by dividing Capital raised by Capital required. Capital raised is the net proceeds in every IPO, Capital required is the capital that is required for investment projects and hand collected from prospectus. IPOs by financial institutions are excluded from the sample.

Year	Obs.	Total Capital raised (Billion RMB)	Total Capital required (Billion RMB)	Over-issuance (Mean)	Over Issuance (Median)	Over-issuance (maximum)	Over-issuance (minimum)	Number of IPOs with over-issuance<=1
2010	337	359	157	2.80	2.61	11.69	0.36	7
2011	253	234	129	2.21	2.08	5.49	0.60	18
2010—2011	590	594	287	2.55	2.36	11.69	0.36	25

Figure 1.
Cash and cash equivalent before and after IPO

In this figure, we summarize the mean and median of cash and cash equivalent held by the firms that listed between 2010 and 2011, over a period one quarter before IPO (Q-1) to the 8th quarter after IPO (Q8). For every IPO firm, we scale cash and cash equivalent held at the end of every quarter by their corresponding net IPO proceeds. We then take the mean and median of this scaled cash and cash equivalents across all the IPO firms. Thus the data points in this figure represent the mean and median of cash and cash equivalent in relevant to net IPO proceeds of all IPO firm by the end of a certain quarter.

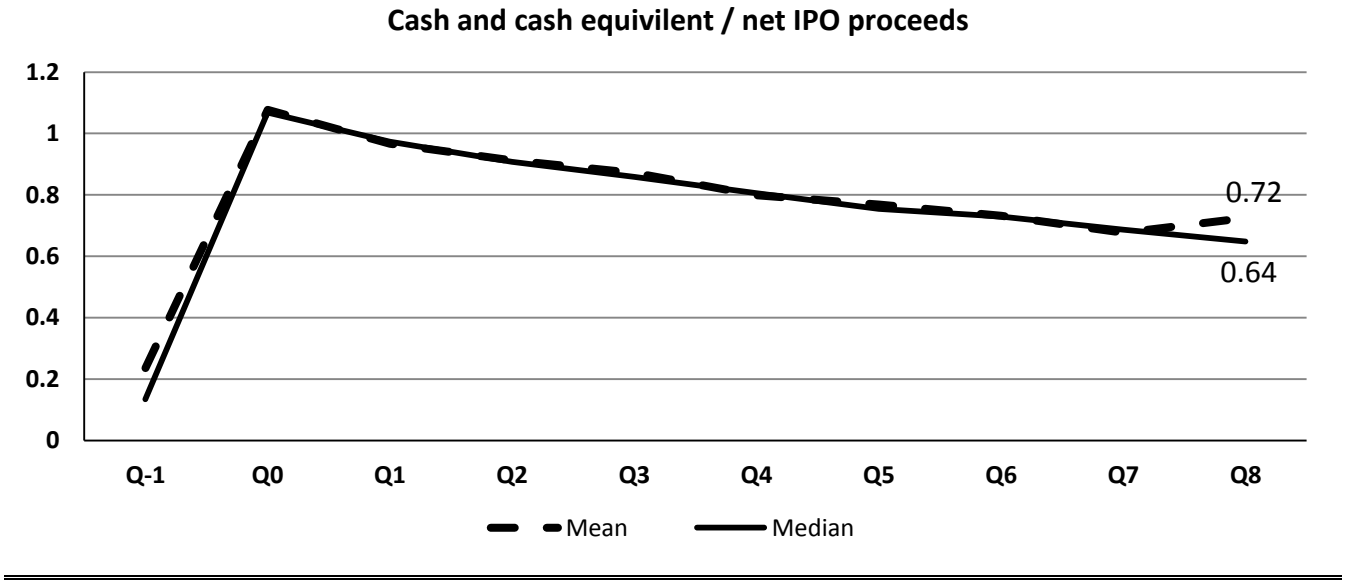

Table 2
Summary statistics for the variables used in Fame-Macbeth regressions.

We summarize the variables we use in the Fame-Macbeth regressions. For all variables, we first take its average across all sample firms in every cross-sectional regression, we then report the statistics of the 13 averages of every variable. **RT** is the excessive 20-day stock return in every testing period, **MOI** is the ratio of the stock price one-day before the testing period divided by adjusted intended issue price, **Beta** is the Beta of a certain stock estimated using its daily return from the first trading day till the trading day before the testing period. **MV** is the market value of equity calculated by multiplying the stock price one day before the testing period by total out-standing shares at that time. **BTM** is the market-to-book ratio by the end of the nearest financial-report quarter ahead of the testing period. Unit of MV is RMB million.

Variable	**Obs.**	**Mean**	**Median**	**Std. Dev.**	**Min.**	**Max.**
Average RT	13	-0.0155	-0.0132	0.0113	-0.0445	-0.0008
Average MOI	13	2.0934	2.1400	0.0810	1.9430	2.1890
Average Beta	13	1.0911	1.0878	0.0151	1.0718	1.1143
Average *ln*(MV)	13	7.6531	7.6700	0.0569	7.5470	7.7238
Average *ln*(BTM)	13	-0.8208	-0.8117	0.0675	-0.9216	-0.7301

Table 3
Fame-Macbeth regressions

In this table, we report the result of Fame-Macbeth regressions on 20-days stock excessive returns. In each cross-sectional regression, we regress the excessive returns on their corresponding MOI, **MOI** is calculated by dividing the stock price one day before the beginning of the testing period by the adjusted intended issue price. We also regress the returns on their Beta estimating using daily excessive returns from the first trading day to the trading day before the testing period (**Beta**), on the logarithm of their market value on the day before the testing period (**MV**) and on the market-to-book ratio by the end of the nearest financial-report quarter ahead of the testing period (**BTM**). Standard errors are reported between parentheses. Coefficients significant at the 10%, 5%, and 1% level are marked with *, **, and ***, respectively. The first row 'regressions' reports the start and the end of each 20-day testing period. The column 'Times ' reports how many significant (*p*-value>=10%) results obtained in the 13 regressions for each explanatory variable. Column 'Average' reports the simple mean of the coefficients of the corresponding variables in the 13 regressions. The standard errors of those coefficient means are calculated using: $\sqrt{\sum_{i=1}^{13}\sigma_i^2}\Big/13$, σ_i being the standard errors of the corresponding coefficient in the 13 regressions.

Regressions	101-120	121-140	141-160	161-180	181-200	201-220	221-240	241-260	261-280	281-300	301-320	321-340	341-360	Times	Average
Constant	0.0211 (0.0563)	-0.0063 (0.0554)	0.0309 (0.0527)	0.0215 (0.0599)	0.0033 (0.0643)	0.1080* (0.0600)	0.0844 (0.0625)	0.0489 (0.0636)	0.0831 (0.0642)	0.1352* (0.0690)	0.1710*** (0.0264)	-0.0594 (0.0695)	0.0011 (0.0627)	3	0.0494** (0.0166)
MOI	-0.0152*** (0.0155)	-0.0032 (0.0055)	-0.0044 (0.0046)	-0.0078 (0.0054)	-0.0123** (0.051)	-0.0095 (0.0069)	-0.0082* (0.0046)	-0.0212*** (0.0047)	-0.0106** (0.0044)	-0.0146*** (0.0055)	-0.0121** (0.0054)	-0.0082 (0.0078)	-0.0085 (0.0662)	7	-0.0104*** (0.0019)
Beta	0.0073 (0.0189)	0.0124 (0.0217)	0.0396** (0.0193	0.0514** (0.0227)	0.0631** (0.0284)	-0.0095 (0.0305)	0.0267 (0.0284)	0.0670** (0.0282)	-0.0195 (0.0306)	-0.0301 (0.0336)	0.0253 (0.0319)	0.0555* (0.0334)	0.0297 (0.0341)	5	0.0245*** (0.0079)
Ln(MV)	0.0031 (0.0066)	0.0027 (0.0064)	-0.0141** (0.0059)	-0.0113 (0.0070)	-0.0051 (0.0074)	-0.0083 (0.0080)	-0.0165** (0.0067)	-0.0184** (0.0078)	-0.0057 (0.0070)	-0.0104 (0.0076)	-0.0250*** (0.0067)	-0.0007 (0.0074)	-0.0031 (0.0065)	4	-0.087*** (0.0019)
Ln(BTM)	0.0294*** (0.0114)	0.0243** (0.0111)	-0.0191* (0.0110)	-0.0081 (0.0115)	0.0220* (0.0119)	0.0209 (0.0142)	-0.0177 (0.0119)	-0.0248** (0.0122)	0.0128 (0.0119)	0.0062 (0.0121)	0.0089 (0.0117)	-0.0017 (0.0136)	0.0215* (0.0122)	6	0.0057* (0.0034)
p-value of F-tests	0.0028	0.2210	0.099	0.0102	0.0004	0.0446	0.0201	<0.0001	0.0294	0.0099	<0.0001	0.4489	0.0600	-	-
Adjsuted R-square	0.0268	0.0101	0.0243	0.0279	0.0397	0.0185	0.0213	0.0668	0.0184	0.0279	0.0654	0.0109	0.0243	-	-
Sample size	563	563	563	544	534	515	496	477	456	430	408	389	358	-	-

Figure 2. Daily portfolio return

In this figure, we present the histogram of daily long-short portfolio return from the 240th trading day as of Jan. 1, 2010 to the 500th trading day as of Jan. 1, 2010.

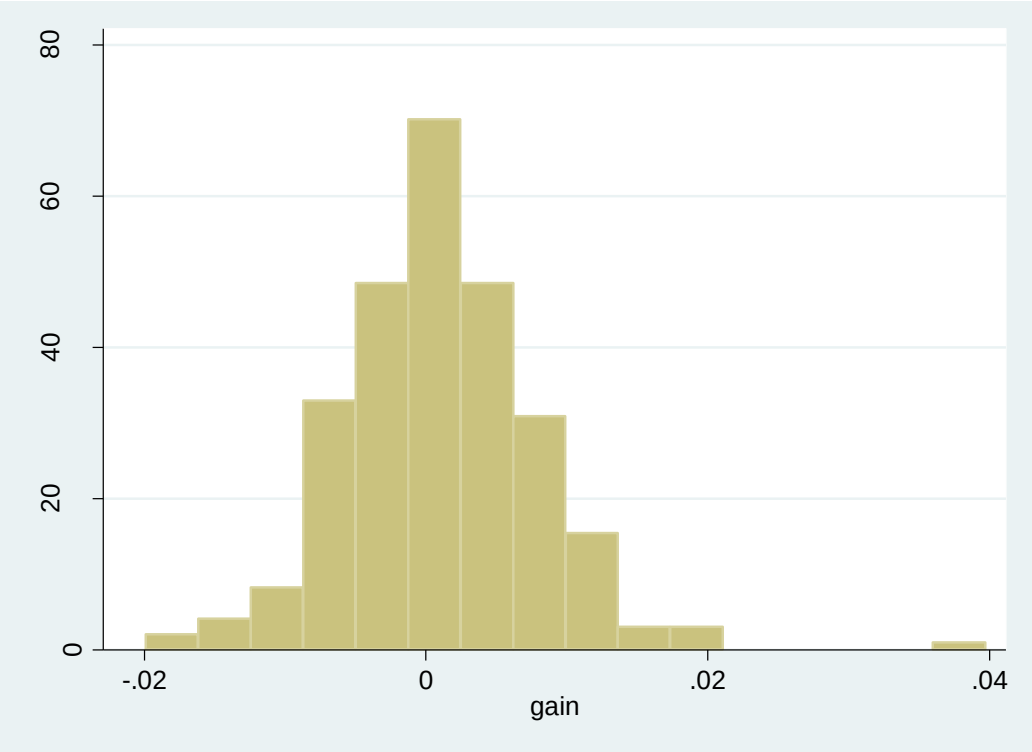

Figure 3 Accumulated long-short portfolio return

In the figure, we represent the accumulated long-short portfolio return from the 240th trading day as of Jan. 1, 2010 to the 500th trading day as of Jan. 1, 2010.

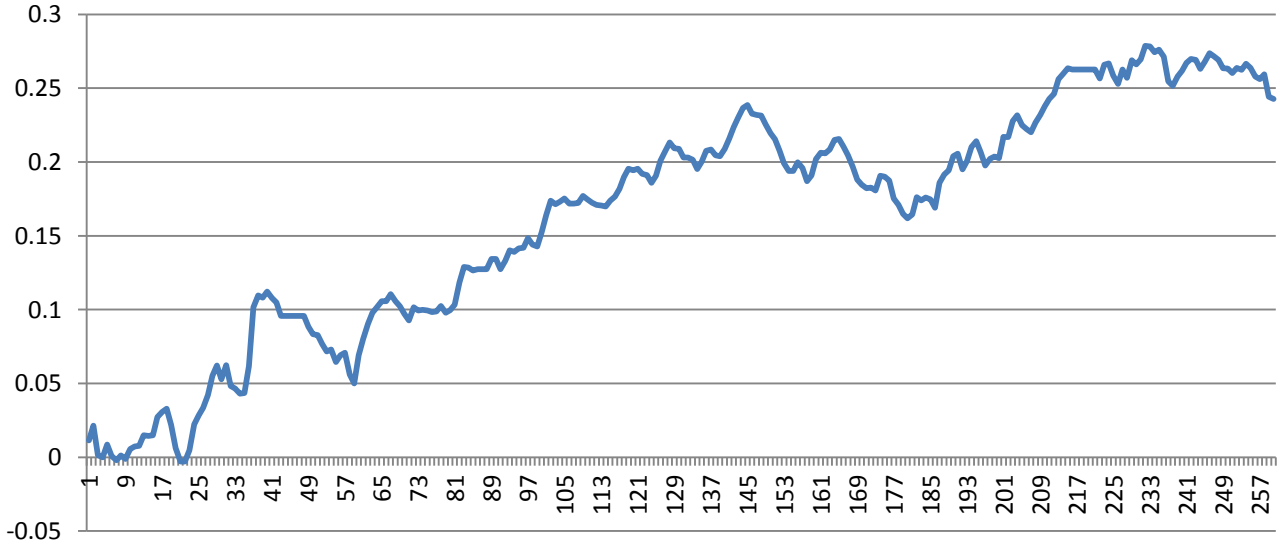

Table 4
Summary of daily long-short portfolio return

In this table, we offer the statitics of the long-short portfolio returns from he 240th trading day as of Jan. 1, 2010 to the 500th trading day as of Jan. 1, 2010.

Variable	Obs.	Mean	t-test H0:mean=0	Median	Std. Dev.	Min.	Max.
Daily return	260	0.0009	0.028	0	0.0068	-0.0198	0.0397

Table 5
Summary statistics for the variables used in first-day underprice, fee rate and over-issuance regresion.

We summarize the variables we use in the regression. **AR** is the first-day abnormal price of every IPO listed in 2010 and 2011. **FR** is the fee rates paid to investment banks in every IPO (including underwriting fee and sponsor fee, divided by total gross proceeds). **OI** is the over-issuance, using net proceeds divided by total intended issue amount. **AS** is the total assets before IPO, by RMB Billion. **NI** is the total number of IPOs in the 30days before the proper IPO minus the average number of IPOs in one month during 2010 and 2011. **SA** is the fraction of star analyst employed by the underwriter in the total number of star analysts in the year before the proper IPO. **PI** is the planned investment divided by total assets before IPO. **PE** is the issuing P/E ratio of proper IPO. **GP** is total gross proceeds, by RMB Billion. **MR** is the market return in the 30 days before IPO. **MS** is the market share of the underwriter in the year before the proper IPO. **VL** is the variance of daily stock returns in the 120 trading days since IPO. **PO** is a dummy equal to one if the IPO firm is privately owned during IPO.

Variable	Obs.	Mean	Median	Std. Dev.	Min.	Max.
AR	516	0.3357	0.2437	0.3834	-0.1115	2.6713
FR	516	0.0557	0.0529	0.0202	0.0136	0.1357
OI	516	2.5519	2.3581	1.1559	0.3615	11.6934
AS	516	1.3929	0.5702	7.3553	0.0932	160.6865
NI	516	0.0843	0.2080	5.3222	-14.7912	11.2083
SA	516	0.0345	0.0147	0.0471	0	0.1818
PI	516	0.5820	0.5291	0.3318	0.0479	3.6108
PE	516	53.5576	50.8550	20.0013	12.2200	150.8200
GP	516	0.9917	0.7200	1.0109	0.1701	13.5000
MR	516	0.0015	-0.0085	0.0858	-0.2106	0.1880
MS	516	0.0353	0.0242	0.0406	0	0.3438
VL	516	0.0008	0.0008	0.0004	0.0001	0.0037
PO	516	0.8759	-	-	-	-

Table 6

Correlation among explanatory variables used in first-day abnormal return, fee rate and over-issuance regression.

In this table we report the correlation among the explanatory variables. *p*-values are reported between parentheses. **AR** is the first-day abnormal price of every IPO from 2010 to 2011. **FR** is the underwriting fee rates of every IPO (including underwriting fee and sponsor fee, divided by total gross proceeds). **OI** is the over-issuance, using net proceeds divided by total intended issue amount. **AS** is the total assets before IPO, by RMB Billion. **NI** is the total number of IPOs in the 30days before the proper IPO minus the average number of IPOs in one month during 2010 and 2011. **SA** is the fraction of star analyst employed by the underwriter in the total number of star analysts in the year before the proper IPO. **PI** is the planned investment divided by total assets before IPO. **PE** is the issuing P/E ratio of proper IPO. **GP** is total gross proceeds, by RMB Billion. **MR** is the market return in the 30 days before IPO. **MS** is the market share of the underwriter in the year before the proper IPO. **VL** is the variance of daily stock returns in the 120 trading days after IPO. **PO** is a dummy equal to one if the IPO firm is privately owned during IPO.

	AR	FR	OI	Ln(AS)	NI	SA	Ln(PI)	PE	Ln(GP)	MR	MS	VL
FR	0.1433											
	0.0011											
OI	-0.1341	-0.1969										
	(0.0023)	(<0.0001)										
Ln(AS)	-0.1559	-0.4482	-0.1316									
	(0.0004)	(<0.0001)	(0.0028)									
NI	-0.089	-0.176	0.2224	0.0778								
	(0.0433)	(0.0001)	(<0.0001)	(0.0774)								
SA	-0.1712	0.0219	-0.0805	0.0715	-0.066							
	(0.0001)	(0.6190)	(0.0675)	(0.1046)	(0.1345)							
Ln(PI)	0.0229	0.1874	-0.1407	-0.7069	-0.0469	0.0296						
	(0.6032)	(<0.0001)	(0.0014)	(<0.0001)	(0.2881)	(0.5022)						
PE	-0.0256	-0.058	0.5039	-0.2507	0.3208	-0.115	0.1719					
	(0.5613)	(0.1884)	(<0.0001)	(<0.0001)	(<0.0001)	(0.0089)	(0.0001)					
Ln(GP)	-0.3222	-0.5862	0.3209	0.6973	0.2234	0.0605	-0.2334	0.1542				
	(<0.0001)	(<0.0001)	(<0.0001)	(<0.0001)	(<0.0001)	(0.1703)	(<0.0001)	(0.0004)				
MR	0.4079	0.0083	0.0019	-0.0324	-0.1099	-0.1529	0.0271	0.0955	-0.0113			
	(<0.0001)	(0.8511)	(0.9662)	(0.4622)	(0.0125)	(0.0005)	(0.5390)	(0.0301)	(0.7977)			
MS	-0.0345	-0.0188	-0.0837	0.1538	0.0094	0.3213	-0.0115	0.0099	0.1635	-0.0622		
	(0.4338)	(0.6702)	(0.0574)	(0.0005)	(0.8307)	(<0.0001)	(0.7947)	(0.8232)	(0.0002)	(0.1582)		
VL	0.4873	0.2059	-0.1138	-0.1633	-0.2858	-0.0131	0.0341	-0.1403	-0.3073	0.1091	-0.0216	
	(<0.0001)	(<0.0001)	(0.0097)	(0.0002)	(<0.0001)	(0.7667)	(0.4398)	(0.0014)	(<0.0001)	(0.0132)	(0.6251)	
PO	-0.1282	0.1833	-0.0086	-0.2499	-0.0696	0.0098	0.1483	0.0585	-0.2006	-0.0672	-0.1055	0.0633
	(0.0035)	(<0.0001)	(0.8456)	(<0.0001)	(0.1143)	(0.8241)	(0.0007)	(0.1846)	(<0.0001)	(0.1276)	(0.0166)	(0.1510)

Table 7
Determinants of fee rates in Chinese A-share IPOs.

This table reports the regression results of 3-equation simultaneous equation system. In each equation, we take over-issuance (**OI**), underwriting fee rate (**FR**) or first-day abnormal return (**AR**) as dependant variable. We put the rest two variables on the right-hand-side as explanatory variables and control for other variables. **GP** is total gross proceeds, by RMB Billion. **MR** is the market return in the 30 days before IPO. **MS** is the market share of the underwriter in the year before the proper IPO. **VL** is the variance of daily stock returns in the 120 trading days after IPO. **PO** is a dummy equal to one if the IPO firm is privately owned during IPO. **AS** is the total assets before IPO, by RMB Billion. **NI** is the total number of IPOs in the 30days before the proper IPO minus the average number of IPOs in one month during 2010 and 2011. **SA** is the fraction of star analyst employed by the underwriter in the total number of star analysts in the year before the proper IPO. **PI** is the planned investment divided by total assets before IPO. **PE** is the issuing P/E ratio of proper IPO. Besides the full sample regression, we divide the sample by the IPOs listed in Shanghai stock market and in Shenzhen stock market. We also control for year and industrial effects by year and industrial dummies. In the full sample and Shenzhen sub-sample regression, we take CSRC 13 industry classification for industry dummies. In the Shanghai sub-sampler regression, we control for only informatics sectors due to sample size. *p*-values are reported between parentheses. Coefficients significant at the 10%, 5%, and 1% level are marked with *, **, and ***, respectively.

	Full sample			Shanghai stock market			Shenzhen stock market		
Dependant variable	AR	FR	OI	AR	FR	OI	AR	FR	OI
Intercept	-2.4634 (0.103)	1.8095*** (<0.001)	-33.0210* (0.091)	-7.1263*** (0.001)	-0.1085 (0.962)	-62.9481*** (0.001)	-1.1372 (0.448)	2.4635*** (0.008)	-17.2530 (0.152)
AR	-	**0.0184** **(0.281)**	**-13.0217*** **(<0.001)**	-	**0.0286** **(0.344)**	**-8.6915*** **(<0.001)**	-	**-.02436** **(0.219)**	**-14.8344*** **(<0.001)**
FR	**13.8196*** **(<0.001)**	-	**181.4142*** **(<0.001)**	**28.1791*** **(<0.001)**	-	**243.3574*** **(<0.001)**	**11.5810*** **(0.001)**	-	**172.3212*** **(<0.001)**
OI	**-0.0703*** **(<0.001)**	**0.0029*** **(<0.001)**	-	**-0.0646*** **(0.001)**	**0.0042*** **(0.004)**	-	**-0.0646*** **(<0.001)**	**0.0030*** **(0.301)**	-
Ln(GP)	0.0880 (0.171)	-0.1560** (0.012)	1.3658 (0.107)	0.2014** (0.012)	0.0253 (0.902)	2.6736*** (0.001)	0.3618 (0.577)	-0.2222** (0.011)	0.6323 (0.513)
MR	1.0939*** (<0.001))	-0.0075 (0.744)	14.1641*** (<0.001)	1.2499*** (0.008)	-0.0331 (0.594)	10.1104** (0.024)	1.1207*** (<0.001)	-0.1454 (0.588)	16.5740*** (<0.001)
MS	-0.3290 (0.366)	0.0411** (0.024)	-4.4437 (0.354)	0.2071 (0.666)	-0.0012 (0.969)	1.5703 (0.703)	-0.2669 (0.513)	0.0442** (0.038)	-4.0489 (0.505)
VL	383.6383*** (<0.001)	-6.6757 (0.336)	5007.515*** (<0.001)	149.6564 (0.149)	-3.1438 (0.843)	1106.1000 (0.368)	381.4196*** (<0.001)	-8.9474 (0.238)	5662.9050*** (<0.001)
PO	-0.2154*** (<0.001)	0.0074** (0.034)	-2.8297*** (<0.001)	-0.0313 (0.618)	0.0024 (0.602)	-0.3322 (0.576)	-0.2118*** (<0.001)	0.0079* (0.061)	-3.1536*** (<0.001)
Ln(AS)	0.01135 (0.512)	-	-	0.0993*** (0.005)			0.0053 (0.802)	-	-
NI	0.0050* (0.052)	-	0.0639* (0.056)-	-0.0094* (0.077)		-0.0802 (0.112)	0.0045* (0.098)	-	0.0650* (0.104)
SA	-	-0.0400** (0.042)	-	-	0.0321 (0.321)		-	-0.0405* (0.069)	-
Square of Ln(GP)	-	0.0034** (0.019)		-	-0.009 (0.846)		-	0.0050** (0.014)	-
Ln(PI)	-		-0.1652 (0.520)	-	-	-0.9927*** (0.004)	-	-	-0.0751 (0.804)
PE	-	-	0.0008 (0.345)	-	-	0.0018 (0.746)	-	-	0.0008 (0.366)
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
p-value of Chi-square test	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Adjusted R-square	0.2074	0.3959	-	0.3075	0.5817	-	0.2815	0.3078	-
Number of observations	516	516	516	41	41	41	475	475	475

Adjusted R-squares for OI regressions are negative.