Do excess funds make financially constrained firms better off? Evidence from IPOs in China

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Abstract

Firms in transition economies often suffer financial constraints. In Initial Public Offerings (IPOs), however, many newly listed Chinese firms raise funds in excess of what is originally planned. This paper examines whether the excess IPO funds are wasted on value-destroying spending or enable firms to take growth opportunities. After controlling for the endogeneity issue, we find that Chinese firms with excess IPO funds have better post-IPO operating performance, especially those with limited financing channels. In revealing the mechanism, we find that excess IPO fundraising alleviates financial constraints and reduces cost of debt.

Keywords: Excessive funds; financial constraints; performance; China; IPOs

JEL Classification: G30; G31; G32

1 Introduction

The impact of firms' excess cash holdings is subject to debate. The free cash flow hypothesis posits the "dark side" of excess cash, in that managers tend to misuse the excess cash for their own benefit, such as by empire building (Jensen, 1986). The majority of the literature provides evidence for the "dark side" of excess cash (Blanchard et al., 1994; Harford et al., 2008). However, Duchin et al. (2010) show a "bright side," where excess cash may benefit firms in times of dislocation in markets for external finance, such as during the subprime mortgage credit crisis. Studies on this topic are mainly based on developed financial markets, with fewer financial constraints, and most of them support the "dark side" of excess cash (Duchin et al., 2010). Firms in underdeveloped financial markets have severe financial constraints, causing them to forego optimal investment opportunities (Love, 2003; Cull et al., 2015). This study therefore examines whether obtaining excess funds improves firm performance by mitigating underinvestment and financial constraints, based on the setting of China.

The IPO firms of China offer an ideal setting for investigating how firms manage excess cash flows in a financially constrained environment. Despite a large pool of financial capital ($16.3 trillion in 2011), the majority of Chinese firms, especially the private ones, have limited access to formal finance (Allen et al., 2009; Guariglia and Yang, 2016). For IPO firms, the China Securities Regulatory Commission (CSRC) has strict regulations on the usage of funds raised as specified in the IPO prospectuses. IPO applications are rejected if the CSRC believes the proposed projects to use the raised funds are not appropriate. Profitability is not the sole criterion for the CSRC to consider. The CSRC promulgated the *Measures for the Administration of Initial Public Offering and Listing of Stocks* on 17 May 2006. It regulates

that the raised funds in IPOs should be spent on the firm's main business; should be in line with the firm's scale, financial situation, and technological and management levels; and should adhere to policies and laws. To reduce the risk of being rejected, IPO candidates strategically choose not to report all projects in which they would like to invest in their applications. Unreported projects that also generate positive NPVs can only be pursued if firms have raised excess funds in IPOs. In fact, around 89% of A-share IPO firms raised funds above the amounts specified in their prospectuses during 2006-2012, amounting to RMB 480.6 billion Yuan ($70.7 billion), presumably because of the rigid control of IPO supply. This setting enables us to examine whether excess funds from IPOs enhance firms' post-listing performance.

To perform our analysis, we construct a sample of 1,115 IPO firms that were listed on the Chinese A-share market from 2006 to 2012. We use a difference-in-differences approach to compare firm performance before and after IPO for IPO firms with various levels of excess funds. We find that excess funds from IPOs significantly improve firms' operating performance in the post-IPO period. To establish causality, we use bull markets as instrumental variables for excess funds. The results of the two-stage least squares (2SLS) regression, propensity score matching (PSM) and fixed effects confirm our baseline results. The finding supports Myers and Majluf (1984) that firms in countries with underdeveloped capital markets tend to retain cash reserves to serve shareholders' interests by funding value-increasing investment opportunities.

In addition, we find that the positive effect of excess IPO funds on post-IPO operating performance is more pronounced for firms whose home provinces or lead underwriters have a lower approval rate for IPOs, implying more conservative proposals from these firms and

inadequate financing from IPOs. Meanwhile, the positive effects of excess IPO funds on post-IPO operating performance are more pronounced for firms without political connections or bank connections, which tend to face more severe financial constraints under China's weak institutions (Lu et al., 2012; Cull et al., 2015). The results suggest that financial constraints explain the effectiveness of excess IPO funds in China. Finally, we find that IPO firms still face financial constraints subsequent to IPOs, and excess IPO funds can alleviate these constraints during post-IPO years.

Our study contributes to the literature of excess cash. While most prior work focuses on its "dark side," suggested by the free cash flow hypothesis that the excess cash may be misused by managers for agency problems (Blanchard et al., 1994; Harford et al., 2008), we provide original evidence of a "bright side" of excess cash (e.g. Duchin et al., 2010), based on the IPO setting in China. This is attributed to the financial constraints faced by Chinese firms. Firms effectively use excess IPO funds to enhance post-IPO performance.

2 Institutional setting

2.1. IPO regulations in China

In 2011, China's stock market became the largest among developing countries in terms of market capitalization. As of 2005, the average number of Chinese A-share IPOs was close to 100 per year. Those IPOs raised RMB 546 billion Yuan ($80 billion) in gross proceeds (Zhou and Zhou, 2010). Unlike the US IPO market, where investment banks play a vital role in determining a firm's IPO price through a discretionary book-building procedure, going public in China is subject to the approval of the China Securities Regulatory Commission (CSRC).

The *Measures for the Administration of Initial Public Offering and Listing of Stocks* was

issued on 17 May 2006, and specifies that the raised funds in IPOs should be spent on the firm's main business (Article 38); should be in line with the firm's scale, financial situation, and technological and management levels (Article 39); and should adhere to policies and laws (Article 40). From 2006 to 2011, there were 1,282 IPO candidates assessed by the Issuance Examination Committee of the CSRC, about one fifth of which did not pass the assessment.[1] In our appendix, we summarize some examples of when the CSRC rejected IPO applications on the grounds of the factors listed above rather than profit prospects. As a result, IPO candidates emphasize the suitability of their proposed projects in their applications. Other feasible projects not shown in IPO applications can only be pursued in the case of excess IPO funds.

While the CSRC revised the IPO regulations and removed the appropriate usage of raised funds as a criterion in considering IPO applications after 1st January 2016, the setting from the previous period provides an ideal sample to examine firms' excess cash holdings in China.

2.2. Pricing mechanism and excess fundraising

Between 1991 and 2000, the Chinese government adopted a quota system for IPOs, under which the CSRC determined a quota of new share issuance on an annual basis and allocated it to 29 central government ministries and 32 provinces, municipalities and autonomous regions. Firms wishing to go public had to compete for the quotas held by the government (Tian, 2011). In 2001, the quota system was replaced with a verification system, in which local governments and ministries were no longer entitled to decide which firms could go public. Instead, they could now recommend IPO candidates in their jurisdictions, with the final decisions made by

[1] See http://finance.sina.com.cn/stock/newstock/zxdt/20140707/175919630477.shtml (in Chinese)

the CSRC. The IPO supply remains restricted.

The restricted IPO supply led to substantial over-subscription from investors and the consequent excess funds raised by IPO firms. The CSRC then introduced a cumulative price inquiry system in January 2005. The system allows underwriters to seek bids from institutional investors, with the final offering price determined based on the retail offering. The goal of the new rules was to limit arbitrary decision-making by the government in allocating a quota, and to shift more power into the hands of investors. Nonetheless, the price inquiry system has resulted in even larger discrepancies between the prices reported in the inquiries and the final offer prices. In 2010, the CSRC further reformed the pricing mechanism toward a more market-oriented approach in an attempt to rein in high IPO valuations. The CSRC allowed issuers and underwriters to recommend select institutional investors to participate in book-building for their IPOs, and gave bidders more incentives to set reasonable prices. Issuers and underwriters also need disclose the fair value of the issue as well as comparison figures for industry peers, making the IPO pricing process more transparent. This reform helps investors to identify firms with better financial prospects, making the excess funds less random than they used to be.

2.3. Financial constraints on Chinese firms

China has underdeveloped legal and financial systems and institutions (Allen et al., 2005), making it difficult for firms to raise external financing (La Porta et al., 1998). Chinese firms often face severe financing constraints (Cull et al., 2015; Guariglia and Yang, 2016). In order to pass the CSRC's assessment, Chinese firms often choose to selectively report the projects in which they would like to invest. As a result, the proposed amount does not fully reflect their needs. Listed firms may still face financial constraints in financing profitable projects that are

not reported in IPO prospectuses.

Political connection helps Chinese firms to secure external financing. Cull et al. (2015) find that Chinese firms without political connections face stronger financial constraints, due to a crowding out effect whereby scarce financial resources are channeled towards politically connected firms. Two types of political connections are prevalent in China, namely state ownership (Xu, 2011; Wang et al., 2008; Chen et al., 2010) and CEOs' work experience in the government (Fan et al., 2007) or bureaucratic titles (Francis et al., 2009).

Allen et al. (2009) argue that China's financial system is still dominated by a large but underdeveloped banking system. Bank connections therefore are vital to ease Chinese firms' financial constraints by alleviating information asymmetry (Hoshi et al., 1991) and by securing insider or related loans (La Porta et al., 2003; Lu et al., 2012). Lu et al. (2012) find that firms that hold significant bank ownership benefit from reduced interest rates and an increased likelihood of receiving loans when the macroeconomic policy is unfavorable.

3 Hypothesis development

Holding cash is not costless. Since cash is the most liquid of assets, retaining it involves the greatest premium or opportunity cost. A prevalent argument is that cash is often reserved or used unproductively because of a conflict of interests between managers and shareholders. The decision to retain or overinvest cash is often driven by managers' compensation schemes or job concerns rather than a desire to maximize firm value (Jensen, 1986).

While retaining excess cash is costly, it can also enhance firm value for at least two reasons. First, it insulates firms from cash flow variability. Baum et al. (2003) posit that cash reserves can be viewed as "options" that are exercisable in adverse economic conditions. Bates et al.

(2018) find that the value of corporate cash holdings has increased significantly in recent decades, which is predominantly driven by the investment opportunity set and cash-flow volatility, as well as secular trends in product market competition, credit market risk, and within-firm diversification. Second, external financing, such as borrowing or issuing stocks, may involve significant costs in terms of underwriting and legal fees. Due to information asymmetries (Myers and Majluf, 1984) and agency problems (Jensen, 1986), external financing can sometimes become unavailable or excessively expensive (Cunha and Pollet, 2020). In such circumstances, firms with substantial cash reserves can avoid these costs and pursue optimal investment opportunities. Duchin et al., (2010) find that excess cash may in fact benefit firms in times of dislocationin markets for external finance.

We argue that the value-enhancing role of excess cash should be more evident in transition economies such as China. As Allen et al. (2005) note, a strong legal system is absent in China, and the financial institutions are dysfunctional. The banking system fails to channel individual savings effectively into firms with potential investment opportunities (Malkiel, 2007). Meanwhile, China's economic growth and scale of urbanization promise substantial new markets and investment opportunities for Chinese firms. It is likely that the capital supply falls short of the investment demand.

The CSRC's strict regulations on IPO application make firms selective in reporting the projects in which they would like to invest, in order to avoid rejection. Firms therefore lack funds to finance other viable projects with positive NPVs to advance shareholder value. Thus, excess IPO funds are expected to improve firms' financial performance by mitigating their financial constraints. The above discussion leads to the following hypothesis:

H1. *Excess IPO funds are positively associated with firms' post-IPO operating performance.*

We argue that firms are more cautious in selecting projects to report to the CSRC in the IPO application when the perceived rejection rate is higher. A smaller number of carefully selected projects can increase the chance of approval. Different provinces and lead underwriters have different average rejection rates for IPO applications. Firms therefore use the rate in their home province or for their lead underwriter as reference values. Firms headquartered in a province, or using a lead underwriter, with a lower pass rate are more likely to conceal the extent of their desired funding and thus face more financial constraints during the post-IPO years. We predict that the value-enhancing effect of excess IPO funds posited in H1 is more prominent for firms with a perceived higher rejected rate, as indicated by the average IPO rejection rate in their home province or the rejection rate of their lead underwriters.

Political connections bring favorable legal conditions and financing channels (Allen et al., 2005; Allen et al., 2009). Likewise, firms with bank ownership also benefit from such connection in the form of information flow (Hoshi et al., 1991) or related lending (Lu et al., 2012). We therefore predict the evidence of H1 to be more prominent among firms without political or banking connections. We propose the second and third hypotheses as follows:

H2. *The evidence of H1 is more pronounced in firms whose home province or lead underwriter has a lower pass rate.*

H3. *The evidence of H1 is more pronounced in firms with weaker political connections and weaker bank connections.*

4 Research design

4.1. Data and sample

The CSRC promulgated the *Measures for the Administration of Initial Public Offering and Listing of Stocks* on 17 May 2006, requiring firms to report the proposed amounts and usage of funds in IPO applications. This regulation enables us to gauge firms' excess IPO funds. We choose a sample of Chinese IPOs from 2006 to 2012. In order to implement a difference-in-differences test, we include observations three years prior to and after IPOs.

The funds raised in IPOs are hand-collected from IPO prospectuses and annual reports. The planned IPO fundraising is obtained from the *Application of IPO Funding* section of the company's prospectus, and the actual IPO fundraising is collected from the *IPO Funding* section of the annual report in the IPO year. From IPO prospectuses, we also identify whether the CEO or chair is politically connected. The performance and ownership data, together with accounting and finance data, are collected from the China Stock Market and Accounting Research (CSMAR) database. We exclude financial firms and observations with unidentified IPO status. Our final sample for regression analyses is 6,670 firm-year observations for 1,115 unique firms.

4.2. Model

To examine the impact of excess IPO funds on post-IPO operating performance, we employ a "difference-in-differences (DID)"[2] model, following prior research on post-IPO performance

[2] We construct a firm-year panel dataset and use a dummy variable (POST) to partition the sample into two periods. For each firm, the years before the IPO represent the pre-treatment period, and those after the IPO represent the post-treatment period. Firms that raised excess funds at IPO represent the treatment group, and those without excess IPO funds represent the control group. For any firm, this indicator excess funds remains unchanged during the regression period. The DID model can control the impact of pre IPO performance.

(Sun and Tong, 2003; Fan et al., 2007; Petersen, 2009):[3]

$$ROS_{i,t} = \alpha + \beta_1 Excess_{i,t} + \beta_2 Post + \beta_3 Post * Excess_{i,t} + \beta_4 Controls_{i,t} + \varepsilon_{i,t} \quad (1)$$

where *i* stands for the firm and *t* for the year. The dependent variable of operating performance is measured by return on sales (*ROS*), calculated as the ratio of net income to sales. We do not use return on assets (*ROA*) or return on equity (*ROE*) because the assets of the firms increase dramatically after the IPOs, imposing a downward bias on performance measures based on equity or assets (Sun and Tong, 2003; Fan et al., 2007). *Post* is an indicator variable that equals one for observations in the post-IPO period, and zero otherwise. *Excess* measures the excess funds from an IPO, calculated as the difference between the raised and planned funds scaled by the planned funds. H1 predicts the coefficient of *Post*Excess* to be significantly positive.

Following prior research (e.g. Fan et al., 2007), we include additional variables. These variables include firm size (*SIZE*), measured as the natural logarithm of operating revenue; leverage (*LEV*), measured as the ratio of total debt to operating revenue; liquidity (*LIQ*), calculated as the ratio of fixed assets to operating revenue; and listing age (*LAGE*), measured as the time from the year in which the firm was listed to the current year. Finally, we incorporate year and industry dummy variables. All continuous variables are winsorized at the 1st and 99th percentiles to mitigate the effects of outliers.

Hypothesis H2 predicts the positive effect of excess IPO funds on firms' post-IPO operating performance to be more pronounced in firms whose province or lead underwriter has a lower

[3] The standard errors based on heteroskedasticity-corrected errors clustered by firm and year are used to mitigate the heteroskedasticity problem and autocorrelation problem (Petersen, 2009).

IPO pass rate. We respectively use dummy variable *Pass_province* and *Pass_underwriter* to measure the pass rate of IPO candidates' province and lead underwriter. *Pass_province* is a dummy variable that equals one if the pass rate of the candidates' home province is less than 100 percent in the year before IPO, and zero otherwise. *Pass_underwriter* is a dummy variable that equals one if the pass rate of the candidates' lead underwriter is less than 100 percent in the year before IPO, and zero otherwise. To examine H2, we replicate our tests based on the subsamples portioned by *Pass_underwriter* or *Pass_underwriter.*

Hypothesis H3 predicts that the positive effect of excess IPO funds on firms' post-IPO operating performance is more pronounced in firms with weaker political connections or lower bank ownership. Following the literature (Fan et al., 2007; Chen et al., 2010; Cull et al., 2015), firms' political connection is measured on both shareholder and manager levels: (1) *GOE* is a dummy variable that equals one if the firm's ultimate owner is the government; (2) *PC* is a dummy variable that equals one if its CEO or chair currently serves or formerly served as an official in either the central or local government, or the military.[4] According to prior research (Lu et al., 2012), firms' bank ownership is measured by *HBS*, a dummy variable that is equal to one if the firm holds more than 5% ownership of a bank, and zero otherwise. To examine H3, we replicate the tests based on the subsamples portioned by *GOE*, *PC* or *HBS*.

For robustness checks, we also use other measures of financing constraints, namely the size-age index (Hadlock and Pierce, 2010) and whether the firms are listed in the main board, which faces fewer financial constraints. Based on the nature of our setting, we use the data prior to

[4] Following Fan et al. (2007), the political tie of CEOs' and chairs' information is obtained from the *Profile of Directors and Senior Managers* section of prospectuses. The profile typically contains CEOs' or chairs' name, age, gender, education, professional background and employment history. For those whose bio is unavailable from the profile, we complemented this information by internet search.

IPOs to mitigate the effect of the IPO on these measures. Some financing constraints are not applicable. The Kaplan-Zingales (1997) index is not available prior to IPOs because there is no stock price; bond ratings (Duchin et al., 2010; Garcia-Appendini and Montoriol-Garriga, 2013) are not available because firms rarely issue bonds prior to IPOs.

4.3. Endogeneity

Since excess IPO funds are not randomly allocated to firms, it is possible that they are endogenous to firms' operating conditions. To control for unobservable time-invariant firm characteristics, we apply fixed effects. Nonetheless, if time-variant omitted variables influence both excess fundraising and post-IPO performance, the results could be biased.

We use an instrumental variable approach to address the concern. Following Pagan and Sossounov (2003), we determine whether a year is defined as a bull (2006, 2007 and 2009) or bear market (2008, 2010, 2011 and 2012) and set a dummy variable *Bull*, which equals one if the listing years are during bull markets, and zero otherwise. In China, it usually takes about two years for a firm to list in a stock exchange, which results in the unpredictability of market conditions at the time of listing. *Bull* is a plausible instrumental variable. It satisfies the relevance condition because the issuer price is higher in bull market and so excess IPO fundraising is more likely to occur. *Bull* satisfies the exclusion restriction in that it is unlikely to be affected by firm characteristics. In China's stock market, where retail investors dominate, the bull market is less correlated with macroeconomic conditions (Li et al., 2017; Deng et al., 2018). Therefore, *Bull* is not likely to influence firms' post-IPO performance except through the channel of excess IPO funds.

In addition, we use a propensity score matching (PSM) approach to mitigate the concern of

functional form misspecification (Shipman et al., 2016). We define firms with excess IPO funds as the treatment group, and those without excess IPO funds as the control group. We match each sample in the treatment group with a counterpart from the control group with similar firm characteristics that may affect the incidence of excess funds in IPOs, including firm size (*SIZE*), leverage (*LEV*), liquidity (*LIQ*) and the average operating performance before IPO (*Pre-IPO_ROS*). The propensity scores are estimated based on caliper distance with a maximum of one percent.

5 Empirical findings

5.1. Univariate test

Table 1 presents the sample distribution and descriptive statistics of the main variables used in our analyses for the full sample and two subsamples, defined by whether or not a firm raised excess funds. Excess fundraising is prevalent in the sample period. Consistent with prior research (e.g. Sun and Tong, 2003; Fan et al, 2007), the mean and median ROS decline following an IPO. In both the pre- and post-IPO periods, the ROS is significantly higher among firms that raised excess funds.

[Insert Table 1]

5.2. Regression tests for H1

Table 2 reports the regression results from testing the effect of excess IPO funds on post-IPO performance.[5] In columns (1) to (3), the operating performance is measured using net income divided by sales (*ROS*). The result in column (1) shows that excess funds lead to a

[5] We make three partitions of the data: 1. ROS and Excess both positive; 2. ROS positive, Excess negative; 3. ROS and Excess are pooled. We find that the positive impact of excess funds on post-IPO operating performance exists in partitions 1 and 3.

significant improvement in post-IPO operating performance, supporting H1. The results are robust to alternative proxies for excess IPO funds, as shown in columns (2) to (3).[6]

To mitigate the concern of reverse causality, we use the change in ROS as the dependent variable, which is measured as the difference between the three-year average ROS in the pre-IPO period and that in the post-IPO period. Column (4) presents the results, showing that excess IPO funds are associated with performance improvement. In columns (5) to (7), we use the logarithm of net income, *ln(Earnings)*, the logarithm of net income before interest revenue, *ln(Earnings - Interest revenue)*, and net income before interest revenue divided by sales, *(Earnings - Interest revenue)/Sales* as alternative measures of operating performance. The results render further support to H1. In untabulated tests, we document consistent results after controlling IPO underpricing or earnings management. When we use the estimation window of one or two years prior to and after IPOs, the results remain quantitatively unchanged.

[Insert Table 2]

In 2010, there appeared a new regulation titled *Guidelines for Further Deepening IPO Reform*. Under the new regulation, the shares allocated to institutional investors in IPOs are positively determined by their offered price in the inquiry process. Meanwhile, the disclosure requirement was increased, making it easier for investors to differentiate the quality of IPO firms. Since high-quality IPO firms may have suffered fewer financial constraints prior to IPOs, we predict that the impact of excess funds on their performance is less pronounced. We thus

[6] *Excess_D* is a dummy variable taking the value of one for a firm with excess IPO funding, and zero otherwise. *Excess2* is measured as actual IPO funding minus planned IPO funding divided by actual IPO funding. In untabulated tests, we find that the results are also robust to *Excess3*, measured as actual IPO funding minus planned IPO funding divided by total assets of one year before IPO, and *Excess4*, measured as actual IPO funding minus planned IPO funding divided by sales revenue of one year before IPO.

explore whether the regulatory change in 2010 reduced the impact of excess IPO funds on firms' performance. Table 3 presents the results. Column (1) and column (2) show that the positive influence of excess funds on post-IPO performance is confined to years before the regulatory change. A further equality test shows that the coefficients on *Post*×*Excess* differ significantly between the IPO firms before and after the regulatory change. Furthermore, a DID test in column (3) shows that the regulatory change in 2010 reduces the impact of excess IPO funds on firms' performance.

[Insert Table 3]

5.3 2SLS and PSM

Table 4 Panel A presents 2SLS regression results based on the instrumental variable *Bull*. The result in column (1) suggests that excess IPO fundraising is more likely to occur in a bull market. We interact the instruments with *POST* and use the variable to instrument for the interaction term of *Excess* and *POST*. The results show that excess IPO funds are significantly positive, confirming the effectiveness of excess funds in improving post-IPO (industry-adjusted) operating performance. Panel B documents consistent results based on firm fixed effects to control for time-invariant firm characteristics.

The PSM results are presented in Panel C. Column (4) reports the results of predicting the incidence of excess IPO fundraising. Firms that exceed their funding targets in IPOs usually have lower leverage ratios, more fixed assets and higher pre-IPO operating performance. The matching process reduces our sample to 1,242 observations. The online appendix shows that the matching covariates are statistically indifferent between firms in the treatment group and their counterparts from the control group. Column (5) shows that excess IPO funds have a

positive effect on post-IPO operating performance.

[Insert Table 4]

5.4. Regression tests for H2 and H3

A key argument underpinning H1 is that firms facing greater financing obstacles are more likely to utilize excess cash to enhance firm performance. To test H2, we perform regression analyses based on subsamples partitioned by IPO rejection rates. The results are reported in Table 5.[7] In columns (1) and (2), the average rejection rate of the IPO candidates' home province is used to partition the sample. Consistent with our prediction, the positive effects of excess funds on post-IPO performance are more pronounced for firms from provinces with lower approval rates. Columns (3) and (4) show that the positive effects of excess cash on post-IPO performance are more significant for firms whose lead underwriter has a lower average approval rate. These results are consistent with the notion that IPO candidates are more selective in reporting proposed investment projects with a higher perceived risk of rejection, which hinders firms from reporting all the projects that they would like to invest in, and results in financial constraints.

[Insert Table 5]

To test H3, we perform regression analyses based on subsamples partitioned by political connection or bank ownership. The results are reported in Table 6. Panels A and B show that the effectiveness of excess funds on post-IPO performance is concentrated in firms without political connections. A further equality test shows that the coefficients on *Post*×*Excess* are significantly different between politically connected firms and unconnected firms. Panel C

[7] Some firms are dropped because there were no IPOs in their provinces or their lead underwriters in the previous year.

shows that the positive effects of excess IPO funds are concentrated in firms with bank ownership of less than 5%. These results support H3.

For robustness checks, we use size-age index (*SA*) and whether the firms are listed in the main board (*Main_board*) as alternative measures for financial constraints, and we partition the sample in the same manner. Panels D to E document that the positive effects of excess IPO funds are more pronounced in firms with a high *SA index* and firms not listed in the main board. These results confirm that firms with excess funds perform better because they have mitigated financial constraints.

[Insert Table 6]

5.5. Additional analyses

To explore direct evidence of how excess funds mitigate the financial constraints of IPO firms, we examine the sensitivity of investment to cash flow (Hoshi et al., 1991) with the following regression model:

$$INV_{i,t} = \alpha + \beta_1 Excess_{i,t-1} + \beta_2 CF_{i,t-1} + \beta_3 \Delta Sales_{i,t-1} + \beta_4 Excess_{i,t-1} * CF_{i,t-1} + \Sigma \beta_i Controls_{i,t-1} + \varepsilon_{i,t} \quad (2)$$

where *INV* is capital expenditure divided by total assets in year t, *CF* is cash flow divided by total assets in year t-1, and *ΔSale* captures growth opportunities, measured as sales in year t-1 minus sales in year t-2 all divided by sales in year t-2. The model is estimated based on subsamples prior to and after IPOs. Results are reported in the online appendix.[8] We find that firms still face financial constraints after IPO, as indicated by significantly positive β_2, and

[8] We drop the data one year before IPO, because the investment year is the IPO year.

that excess funds mitigate financial constraints after IPO, as indicated by significantly negative β_4.

We then explore the implication of excess IPO funds on cost of debt and R&D investment. The results are reported in the online appendix. The results show that excess funds reduce the net interest expenses or the net interest expenses divided by debt. The funds also increase the R&D expenses and R&D expenses relative to sales. We also do not find an effect of excess IPO funds on tunneling, which rules out the possibility that managers transfer the funds out of firms for their private benefit.

6 Conclusions

How excess funds affect firm performance is a topical question in the financial economics literature. Two views commonly contribute to the controversy. The free cash flow hypothesis posits that large cash holdings serve the private interests of managers, while the costly external financing hypothesis holds that substantial cash reserves can reduce the costs of external financing and therefore serve shareholders' interests. In this study, we examine this question by exploring the setting of Chinese capital markets with limited supply for IPOs and prevalent financial constraints.

Our results show that firms with excess IPO funds tend to have operating performance that is greater than firms without excess funds. In addition, this effect is moderated among firms with less severe financial constraints. In further analysis, we find that during post-IPO years firms still face financial constraints in China's underdeveloped financial markets. Excess IPO funds can alleviate financial constraints, and thus help firms to take growth opportunities. The

overall evidence confirms Myers and Majluf's (1984) view that firms may use cash reserves effectively by funding value-increasing investment opportunities when external financing is costly.

The results have important policy implications. As long as the integrity of the IPO application is ensured, the CSRC should allow firms to report all the projects that they would like to pursue and the full amount of required funding, leaving it to investors to assess the viability of the proposed projects.

Our evidence from China is informative to emerging economies around the world that have underdeveloped financial markets. In these countries, firms often face severe financing constraints, and access to finance is valuable to firm investment and performance. We call for future research to uncover other channels, beyond excess IPO funds, that can enhance firm investment/performance in these countries.

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Table 1: Sample Distribution and Descriptive Statistics

Panel A presents the distribution of excess funds from IPOs by year and industry. Panel B presents the descriptive statistics of main variables. Panel C presents the means and medians of firm performance. *ROS* is net income divided by sales revenue. Excess is measured as actual IPO funding minus planned IPO funding divided by planned IPO funding. *Excess_D* is a dummy variable taking the value of 1 for a firm with excess IPO funding, and 0 otherwise. *Excess2* is measured as actual IPO funding minus planned IPO funding divided by actual IPO funding. POST is a dummy variable that equals 1 if the year is after the IPO year, and otherwise 0. *LEV* is total debt divided by operating revenue. *SIZE* is the natural logarithm of operating revenue. *LIQ* is fixed assets divided by operating revenue. *LAGE* is the number of years since the firm was listed.

Panel A: Sample distribution by year

	IPOs			Firm-year observations		
	Total number	Mean of excess	Median of excess	Total number	Mean of excess	Median of excess
2003				60	-0.002	0.002
2004				172	0.051	0.031
2005				243	0.051	0.032
2006	61	-0.005	0.007	335	0.328	0.141
2007	112	0.082	0.068	680	0.380	0.477
2008	76	0.054	0.039	962	0.411	0.511
2009	97	1.027	1.007	1054	0.427	0.512
2010	339	0.596	0.631	943	0.470	0.548
2011	277	0.487	0.545	867	0.506	0.567
2012	153	0.360	0.430	771	0.510	0.572
2013				430	0.442	0.503
2014				153	0.360	0.430
Total	1,115	0.404	0.488	6670	0.405	0.490

Panel B: Descriptive Statistics					
	Mean	SD	p25	p50	p75
ROS	0.131	0.119	0.060	0.114	0.183
Excess	0.404	0.310	0.230	0.488	0.639
Excess_D	0.890	0.310	1.000	1.000	1.000
Excess2	0.335	0.313	0.161	0.417	0.571
LEV	0.555	0.477	0.273	0.430	0.680
SIZE	20.506	1.194	19.672	20.332	21.120
LIQ	0.384	0.389	0.144	0.279	0.485
LAGE	1.000	0.817	0.000	1.000	2.000

Panel C: Performance between firms with and without excess funds					
	Full sample	Firms without excess funds	Firms with excess funds	Difference	T value/Z value
Mean					
Pre-IPO (Periods from T-3 to T-1)	0.154	0.120	0.158	-0.038***	-6.8483
Post-IPO (Periods from T0 to T+2)	0.131	0.092	0.135	-0.043***	-6.5079
				-0.005	
Median					
Pre-IPO (Periods from T-3 to T-1)	0.131	0.096	0.134	-0.039***	-8.247
Post-IPO (Periods from T0 to T+2)	0.114	0.072	0.119	-0.047***	-9.214
				-0.008	

Table 2 Excess IPO Funds and Operating Performance

This table presents the estimation results for the effect of excess IPO funding on financial performance. *Excess* is measured as actual IPO funding minus planned IPO funding divided by planned IPO funding. *Excess_D* is a dummy variable taking the value of 1 for a firm with excess IPO funding, and 0 otherwise. *Excess2* is measured as actual IPO funding minus planned IPO funding divided by actual IPO funding. *POST* is a dummy variable that equals 1 if the year is after the IPO year, and 0 otherwise. *LEV* is total debt divided by operating revenue. *SIZE* is the natural logarithm of operating revenue. *LIQ* is fixed assets divided by operating revenue. *LAGE* is the number of years since the firm was listed. The numbers reported in parentheses are t-statistics based on heteroskedasticity-corrected errors clustered by firm and year. ***, ** and * indicate significant differences at the 1%, 5% and 10% levels respectively.

	ROS			ROS change	Ln(Earnings)	Ln(Earnings –Interest revenue)	(Earnings – Interest revenue)/Sales
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Excess	0.030***			0.015**	0.221***	0.214***	0.034***
	(2.98)			(2.41)	(2.85)	(2.78)	(3.69)
Excess*POST	0.017**				0.295***	0.301***	0.019**
	(2.02)				(4.19)	(4.43)	(2.47)
Excess_D		0.009					
		(1.41)					
Excess_D *POST		0.009*					
		(1.90)					
Excess2			0.035***				
			(3.64)				
Excess2 *POST			0.016**				
			(1.99)				
POST	-0.011	-0.014	-0.010		-0.162*	-0.168*	-0.014
	(-0.88)	(-1.10)	(-0.72)		(-1.83)	(-1.93)	(-1.17)
LEV	-0.012	-0.013	-0.011	-0.013	0.022	0.024	0.001
	(-0.75)	(-0.80)	(-0.74)	(-1.40)	(0.46)	(0.50)	(0.16)
SIZE	-0.031***	-0.032***	-0.031***	0.004**	0.735***	0.728***	-0.031***
	(-12.55)	(-12.82)	(-12.76)	(2.42)	(44.59)	(45.38)	(-13.41)
LIQ	0.021*	0.018	0.021*	-0.016	0.221***	0.218***	0.033***
	(1.66)	(1.41)	(1.68)	(-1.20)	(4.25)	(4.17)	(4.06)
LAGE	-0.003	-0.005	-0.003		-0.013	-0.012	0.000
	(-0.59)	(-1.06)	(-0.54)		(-0.32)	(-0.30)	(0.07)
Constant	0.748***	0.791***	0.753***	-0.114***	2.708***	3.024***	0.714***
	(13.81)	(14.34)	(14.16)	(-3.39)	(6.68)	(8.64)	(13.26)
Industry fixed effect	Y	Y	Y	Y	Y	Y	Y
Year fixed effect	Y	Y	Y	Y	Y	Y	Y
N	6,670	6,670	6,670	1,105	6,590	6,384	6,412
Adj.R^2	0.256	0.249	0.259	0.071	0.677	0.673	0.308

Table 3 The Regulatory Change in 2010

This table presents the regression results for the effects of regulatory change on the IPO funding-performance relation. The dependent variable is return on sales (*ROS*). *Excess* is measured as actual IPO funding minus planned IPO funding divided by planned IPO funding. *POST* is a dummy variable that equals 1 if the year is after the IPO year, and 0 otherwise. *Regulation* is a dummy variable that equals 1 if the listing year of the firm is after the regulatory change in 2010, and 0 otherwise. The control variables are defined in Table 2. The numbers reported in parentheses are t-statistics based on heteroskedasticity-corrected errors clustered by firm and year. ***, ** and * indicate significant differences at the 1%, 5% and 10% levels respectively.

	Listing in 2006-2009	Listing in 2010-2012	Listing in 2006-2012
	(1)	(2)	(3)
Excess	0.0245**	0.036**	0.031*
	(2.52)	(2.56)	(1.82)
Excess*POST	0.0298***	0.006	0.019***
	(3.57)	(1.34)	(3.03)
P-value for equality test	[0.017]		
POST	-0.0100	-0.013	-0.013
	(-0.98)	(-0.89)	(-1.12)
Excess*POST*Regulation			-0.058**
			(-2.28)
Regulation			-0.033*
			(-1.73)
POST*Regulation			0.009
			(0.78)
Excess*Regulation			0.008
			(0.34)
LEV	0.0098	-0.040***	-0.012
	(1.20)	(-2.60)	(-0.75)
SIZE	-0.0195***	-0.033***	-0.030***
	(-6.03)	(-8.60)	(-12.70)
LIQ	0.0270**	0.044***	0.024*
	(2.19)	(3.93)	(1.86)
LAGE	-0.0011	-0.013	-0.011
	(-0.15)	(-1.17)	(-1.42)
Constant	0.467***	0.834***	0.677***
	(6.50)	(11.35)	(12.23)
Industry fixed effect	Y	Y	Y
Year fixed effect	Y	Y	Y
N	2,047	4,623	6,670
Adj.R^2	0.403	0.284	0.268

Table 4 Instrumental Variables and PSM

This table presents the robust results for the effect of excess IPO funding on operating performance. In columns (1) to (2), the two-staged regression results are presented. The fixed effect is shown in column (3). *Excess* is measured as actual IPO funding minus planned IPO funding divided by planned IPO funding. *POST* is a dummy variable that equals 1 if the year is after the IPO year, and 0 otherwise. In columns (4) and (5), the PSM approach is presented, where *Excess* is replaced by *Excess_D*. *Bull* is a dummy variable that equals 1 if the listing years are during bull markets, and 0 otherwise. *Pre-IPO_ROS* is the average net income on sales before IPO. The control variables are defined in Table 2. The numbers reported in parentheses are t-statistics based on heteroskedasticity-corrected errors clustered by firm and year. ***, ** and * indicate significant differences at the 1%, 5% and 10% levels respectively.

	Panel A: 2SLS regression		Panel B: Firm fixed effect	Panel C: PSM approach	
	Excess	ROS	ROS	Excess_D	ROS
	(1)	(2)	(3)	(4)	(5)
Predict Excess (Excess)		-0.361*			0.009
		(-1.86)			(0.66)
Predict Excess (Excess) *POST		0.070**	0.010**		0.028***
		(2.42)	(2.49)		(4.14)
POST		-0.053***	-0.007***		0.001
		(-3.38)	(-2.67)		(0.43)
Bull	0.375***				
	(11.06)				
LEV	-0.088***	-0.028*	-0.003*	-0.828**	-0.001
	(-3.91)	(-1.82)	(-1.80)	(-2.32)	(-0.04)
SIZE	-0.040***	-0.049***	0.013***	-0.096	-0.017***
	(-4.72)	(-4.83)	(5.92)	(-0.92)	(-4.21)
LIQ	-0.096***	-0.012	-0.041***	-0.877**	0.050***
	(-3.24)	(-0.54)	(-11.72)	(-2.23)	(2.68)
LAGE		-0.019**	-0.008***		-0.009***
		(-2.17)	(-8.07)		(-2.75)
Pre-IPO_ROS				6.012***	
				(3.32)	
Constant	1.036***	1.386***	-0.119***	4.338*	0.382***
	(5.73)	(4.12)	(-2.62)	(1.73)	(4.35)
Firm fixed effect	N	N	Y	N	N
Industry fixed effect	Y	Y	N	Y	Y
Year fixed effect	Y	Y	Y	Y	Y
N	1,115	6,670	6,670	1,115	1,242
Adj.R^2/Pseudo R^2	0.504	0.250	0.822	0.278	0.297

Table 5 The Pass Rate of IPO Application

This table presents the regression results for the effects of pass rate on the IPO funding-performance relation. The dependent variable is return on sales (*ROS*). *Excess* is measured as actual IPO funding minus planned IPO funding divided by planned IPO funding. *POST* is a dummy variable that equals 1 if the year is after the IPO year, and 0 otherwise. *Pass_province* is a dummy variable that equals 1 if the pass rate of IPO candidates' province is less than 100 percent in the year before IPO, and 0 otherwise. *Pass_underwriter* is a dummy variable that equals 1 if the pass rate of IPO candidates' lead underwriter is less than 100 percent in the year before IPO, and 0 otherwise. The control variables are defined in Table 2. The numbers reported in parentheses are t-statistics based on heteroskedasticity-corrected errors clustered by firm and year. ***, ** and * indicate significant differences at the 1%, 5% and 10% levels respectively.

	The pass rate of firms' province		The pass rate of firms' lead underwriter	
	Pass_province=1	Pass_province=0	Pass_underwriter=1	Pass_underwriter=0
	(1)	(2)	(3)	(4)
Excess	0.023*	0.036***	0.020**	0.041***
	(1.73)	(3.11)	(2.01)	(3.30)
Excess*POST	0.024**	0.012	0.034***	0.003
	(2.56)	(1.21)	(3.90)	(0.22)
P-value for equality test	[0.088]		[0.002]	
POST	-0.012	-0.014	-0.020*	-0.003
	(-0.78)	(-1.32)	(-1.82)	(-0.29)
LEV	-0.010	-0.021**	-0.006	-0.009
	(-0.51)	(-2.21)	(-0.64)	(-1.02)
SIZE	-0.034***	-0.031***	-0.032***	-0.026***
	(-10.97)	(-7.53)	(-9.76)	(-9.80)
LIQ	0.020	0.021	0.024**	0.023**
	(1.46)	(1.13)	(2.31)	(2.02)
LAGE	-0.004	-0.000	0.000	-0.003
	(-0.54)	(-0.00)	(0.07)	(-0.63)
Constant	0.698***	0.750***	0.751***	0.612***
	(11.33)	(8.50)	(9.72)	(10.28)
Industry fixed effect	Y	Y	Y	Y
Year fixed effect	Y	Y	Y	Y
N	3,514	3,035	3,933	2,634
Adj.R^2	0.308	0.242	0.335	0.319

Table 6 Financing Constraints and the Effects of Excess IPO Funds

This table presents the results for the effects of financing constraints on the IPO funding-performance relation. The dependent variable is return on sales (*ROS*). *Excess* is measured as actual IPO funding minus planned IPO funding divided by planned IPO funding. *POST* is a dummy variable that equals 1 if the year is after the IPO year, and 0 otherwise. *GOE* is a dummy variable that equals 1 if the ultimate controlling shareholder is a government agency or government-controlled SOE, and 0 otherwise. *PC* is a dummy variable equal to 1 if the firm's CEO or chair has served as a government official or in the military, and 0 otherwise. *HBS* is a dummy variable equal to 1 if the firm holds more than 5% bank ownership, and 0 otherwise. *SA* is a dummy variable that equals 1 if *SA index* is higher than the median *SA index* of all firms before IPO, and 0 otherwise. Following Hadlock and Pierce (2010), *SA index* is calculated as: (-0.737* Size) + (0.043* Size^2) − (0.040*Age), where size is the log of book assets, and age is the log of the sum of the number of years since the firm was incorporated and 1. *Main_board* is a dummy variable that equals 1 if the firms are listed on the main board, and 0 otherwise. The control variables follow Table 2. The numbers reported in parentheses are t-statistics based on heteroskedasticity-corrected errors clustered by firm and year. ***, ** and * indicate significant differences at the 1%, 5% and 10% levels respectively.

	Panel A: Ownership		Panel B: Personal political connections		Panel C: Holding bank shares		Panel D: Size-age index		Panel E: Listing board	
	GOE=1	GOE=0	PC=1	PC=0	HBS=1	HBS=0	SA=0	SA=1	Main_board=1	Main_board=0
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Excess	0.020	0.029**	0.050***	0.028**	0.043	0.029***	0.038***	0.002	0.017	0.028**
	(0.76)	(2.51)	(3.36)	(2.50)	(0.79)	(2.81)	(2.70)	(0.16)	(0.89)	(2.43)
Excess*POST	0.000	0.023***	-0.008	0.030**	-0.027	0.018**	-0.008	0.052***	-0.027*	0.033***
	(0.01)	(2.68)	(-0.67)	(2.53)	(-0.83)	(2.03)	(-0.30)	(4.80)	(-1.68)	(3.86)
P-value for equality test	[0.060]		[0.000]		[0.091]		[0.001]		[0.000]	
POST	-0.002	-0.014	0.019*	-0.025	-0.002	-0.012	-0.042***	0.000	-0.004	-0.018
	(.)	(-1.03)	(1.65)	(-1.62)	(-0.13)	(-0.93)	(-2.70)	(0.03)	(-1.09)	(-1.39)
LEV	-0.063**	-0.006	-0.040*	-0.006	-0.026	-0.012	-0.058***	-0.007	-0.016	-0.012
	(-2.25)	(-0.46)	(-1.84)	(-0.44)	(-1.20)	(-0.76)	(-5.80)	(-0.39)	(-0.55)	(-0.76)
SIZE	-0.020***	-0.038***	-0.024***	-0.033***	-0.018**	-0.032***	-0.073***	-0.026***	-0.010	-0.045***
	(-3.56)	(-11.95)	(-8.91)	(-10.50)	(-2.52)	(-11.86)	(-13.17)	(-7.57)	(-1.50)	(-14.16)
LIQ	0.039	0.015	0.038***	0.017	0.029	0.020	0.019	0.018	0.042	0.003
	(1.00)	(1.29)	(2.73)	(1.23)	(0.81)	(1.56)	(1.30)	(1.26)	(1.53)	(0.19)
LAGE	-0.015***	-0.002	-0.013**	-0.000	-0.007	-0.003	0.008	-0.012**	-0.007	0.000
	(-2.70)	(-0.32)	(-2.49)	(-0.05)	(-1.09)	(-0.53)	(1.33)	(-2.21)	(-1.55)	(0.06)
Intercept	0.556***	0.867***	0.605***	0.762***	0.590***	0.733***	1.607***	0.557***	0.204	1.005***
	(4.40)	(12.55)	(9.42)	(11.14)	(3.55)	(12.37)	(14.46)	(7.64)	(1.21)	(14.74)
Industry fixed effect	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Year fixed effect	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
N	808	5,862	1,642	5,028	217	6,453	3,332	3,338	681	5,989
Adj.R^2	0.264	0.290	0.253	0.264	0.492	0.258	0.362	0.228	0.337	0.282