

**CROSS COUNTRY ANALYSIS AND INTERNATIONAL CAPITAL
MARKETS**

by

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A dissertation submitted to the
Graduate School-Newark
Rutgers, The State University of New Jersey
in partial fulfillment of requirements

For the degree of

Doctor of Philosophy
Graduate Program in Management
Written under the direction of

Professor Bharat Sarath
and approved by

Newark, New Jersey

May, 2018

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ABSTRACT OF THE DISSERTATION

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My dissertation comprises of two essays: 1) IPO underpricing, evidence from international listing in US market and 2) The impact of auditing and voluntary information verification on default rate: evidence from small private business.

The first essay compares patterns of initial public offering (IPO) underpricing and trading across United States and Chinese firms going public in the US market. The IPO process is complex and involves diverse economic issues such as the quality of publicly available information and the role of intermediaries. Information asymmetry and uncertainty regarding the market demand for the IPO affect the offer price as well as the number of shares offered to the public. The relationship between the offer price and the aftermarket price (end-of-first-day price), commonly referred to as "IPO underpricing," involves the interaction of all these economic factors. The first goal of my study is to examine the differential effects of information asymmetry and uncertainty of demand on IPO underpricing across Chinese and US firms. I find that there are significant differences in the estimation of demand as well as the level of underpricing across US and Chinese IPOs. I also examine whether intermediaries try to offer better terms to Chinese firms in order to increase their market share of Chinese business. I find no results to support this

hypothesis, that is, the explicit costs of conducting an IPO does not differ across Chinese and US firms. I conclude that the underwriters are more interested in building a market for their Chinese products to US investors by underpricing the issue and making it more attractive.

The second essay examines whether audited financial information can improve the efficiency of small business financing as effectively as it helps capital allocations to public firms. Using an exclusive dataset from a private bank in China, I find that audited financial statements, customer loyalty and local knowledge of the business are significantly correlated with bank loan repayment by small businesses in China. A closer examination leads to less expected results that Chinese audits do not generate any new information but act rather as a screening mechanism with regard to clients. In addition, larger groups seem to be less effective at helping each other suggesting that a free rider problem becomes a significant issue in groups consisting of five members.

ACKNOWLEDGEMENTS

I am grateful to all of those with whom I have had the pleasure to work during this and other related projects. Each of the members of my dissertation committee has provided me extensive personal and professional guidance and taught me a great deal about both research and life in general. This dissertation would not have been possible without the help of you. I would especially like to thank Dr. Bharat Sarath, the chairman of my committee. As my teacher and mentor, you have taught me how to be a curious and serious researcher. I am very grateful for your continuous trust, support and patience. I also want to thank Dr. Bikki Jaggi. Your academic spirits will always inspire me. I would like to thank Dr. Min Cao. You gave me valuable advice on research, teaching and life. Talking and working with you is such a pleasure. And Dr. Paul Miranti, you gave me a lot of support, which I truly appreciate. I am also grateful for the insightful guidance from Dr. Kishore Tandon. Your help is vital in my research from financial research perspective. Finally, I want to give special thanks to Dr. Jianming Ye. Thank you for introducing me to this program and all the generous support you have made.

Nobody has been more important to me in the pursuit of this project than the members of my family. I would like to thank my parents, whose love and guidance are with me in whatever I pursue. My colleagues and friends, your love and care encourage me every day. Thank you.

TABLE OF CONTENTS

Essay I: IPO underpricing, evidence from international listing in US market.....	- 1 -
1. Introduction	- 1 -
1.1 The IPO process	- 1 -
1.2 Why are IPOs underpriced	- 5 -
1.3 Foreign countries IPOs in the United States and ADRs	- 7 -
2. Research Questions and hypotheses	- 10 -
2.1 Comparison of underpricing patterns of US and Chinese IPOs	- 10 -
2.1.1 IPO underpricing	- 10 -
2.1.2 The likelihood of underpricing.....	- 13 -
2.1.3 Hi- tech IPOs	- 14 -
2.1.4 Venture-capital (VC),Private Equity(PE) backed IPO and underpricing .-	15 -
2.1.5 Lock-up period, public investor protection and IPO underpricing...-	17 -
2.1.6 Partial adjustment and IPO underpricing	- 21 -
2.2 Capital raised-matched sample	- 22 -
2.3 Ordinary Least Squares regression analysis.....	- 23 -
3. Sample and tests.....	- 24 -
3.1 Sample selection.....	- 24 -
3.2 Variables design and definition	- 25 -
3.3 Summary statistics	- 28 -
4. Results.....	- 31 -
4.1 Tests on average IPO underpricing comparison.....	- 31 -
4.2 Tests on likelihood of underpricing and overpricing.....	- 32 -
4.3 Tests on Hi-tech, VC, and best effort commitment related IPOs underpricing	- 33 -
4.4 Tests on lock up period and IPO underpricing	- 34 -
4.5 Tests on partial adjustment and IPO underpricing.....	- 36 -
4.6 Tests with matching sample	- 37 -

4.7 Tests on OLS regression	- 37 -
5. Discussion, Conclusions and Extensions.....	- 38 -
5.1 Applications and Extensions.....	- 41 -
5.2 Conclusion.....	- 42 -
Appendix I.....	- 43 -
Tables	- 47 -
References	- 66 -
Essay II: The impact of auditing and voluntary information verification on default rate: evidence from small private business.....	- 70 -
1. Introduction	- 70 -
2. Background	- 75 -
2.1 Financial reporting and auditing environment in China	- 76 -
2.2 Commercial Banking for Small Businesses in China.....	- 78 -
2.3 Relationship lending in small-micro business	- 80 -
2.4 Group lending with small-micro business.....	- 81 -
3. Literature review and research hypotheses.....	- 82 -
3.1 Auditing.....	- 84 -
3.2 Loyalty	- 87 -
3.3 Group size.....	- 88 -
3.4 Control variables	- 90 -
4 Results.....	- 92 -
4.1 Sample	- 92 -
4.2 Descriptive statistics.....	- 95 -
4.3 Tests of hypotheses	- 98 -
5 Limitations, Extensions and Conclusions	- 99 -
5.1 Extension	- 100 -
5.2 Conclusions.....	- 100 -
Appendix - Variable definitions.....	- 103 -
Tables	- 105 -
References	- 119 -

LIST OF TABLES

Table 1. 1: Sample selection	- 47 -
Table 1. 2: Summary of underpricing	- 48 -
Table 1. 3: Likelihood of underpricing/overpricing	- 50 -
Table 1. 4: Underpricing of Hi- tech, VC backed and best effort contract commitment IPOs	- 52 -
Table 1. 5: Underpricing with Lockup period.....	-55 -
Table 1. 6: Underpricing with partial adjustment.....	- 58 -
Table 1. 7: Industry-issue size-matched sample summary statistics	- 60 -
Table 1. 8: OLS regression	- 63 -
Table 2. 1: Sample selection	- 105 -
Table 2. 2: Distribution of firms by industry and area	- 106 -
Table 2. 3: Descriptive statistics	- 109 -
Table 2. 4: Group lending sample	- 111 -
Table 2. 5: Contingency tables	- 112 -
Table 2. 6: Pearson Correlations.....	- 114 -
Table 2. 7: Determinates on small business default rate	- 116 -

LIST OF FIGURES

Figure 1. 1: Securities Insurance Process.....	- 44 -
Figure 1. 2: Percentage of IPO Underpricing for US and Chinese IPOs	- 46 -

Essay I: IPO underpricing, evidence from international listing in US market

1. Introduction

An initial public offering (IPO) refers to the first time a firm issues its shares in a stock exchange for public trade. There is usually a premium on the closing price compared to the offered price on issuing day, which is called underpricing. This study focuses on the underpricing of the US and Chinese IPOs in the US market. After running the sample, which covers 2557 IPOs in the United States market, I find that Chinese IPOs have a much higher mean value and larger standard deviation on IPO underpricing as compared to the US and other foreign countries' IPOs. This phenomenon has been previously noted by researchers, but has not yet been studied thoroughly. This study aims to answer two questions: a) What is the difference on IPO underpricing between domestic firms and Chinese firms? and b) What factors are associated with the difference?

[Insert Figure 1.1 here]

1.1 The IPO process

The main motivation for an IPO is to raise capital from the public in exchange for shareholding. In this process, the issuing firm, auditor, the attorney, and the underwriter (arguably the most relevant party) work together to prepare legal files for the U.S. Securities, Exchange Commission (SEC) and the exchange market that it

is listed under. The total amount raised from the public is called gross proceeds, and the entire compensation that intermediaries receive from the issuer is called the gross spread, which includes the insurer fee, legal expenses, and research expenses.

The whole process can take 25 weeks (see Figure 1.1). The first phase takes one to three weeks for pitching and mandates, including investment bank pitch services, selecting managers, managing a team and legal counsel, and preliminary assessment. The second phase takes four to five weeks for preparation of materials. During this period, the revolving parties hold an organization meeting, conduct due diligence, prepare a draft of the registration statement (prospectus), and file a registration statement with the SEC. The third phase, marketing, requires four to six weeks to prepare roadshow presentations and documents, revise and respond to SEC comments, print and distribute a preliminary prospectus, and to provide in-house presentations to underwriters. The fourth phase, which takes four to eight weeks, is to allow underwriters and managers to perform core city and international city roadshows, and finalize registration documents. The fifth and last phase before the IPO is pricing, including final due diligence, pricing of the offering, and the first trade. Once the offering is complete and trading commences, the end-of-first-trading day price will typically be different from the offer price. This study focuses on the difference between the offer price and the closing price at the end of the first day's trading across US domestic IPOs and Chinese IPOs in the US market.

The issuer and underwriter often decide the IPO price jointly. As the most important part of an IPO, the underwriter usually signs a contract with the issuing

firm as its agent. The three most commonly used types of commitments include firm commitment, best efforts, and all-or-none. The first option is most popular. The process entails the SEC approving the registration of a firm-commitment IPO. For the case of firm-commitment, an investment bank purchases the securities from the issuer and then sells it to the public. Approval requirements are often done for qualified enterprises or in cases where the investment bank can guarantee they will obtain interest, thus, prompting them to resell whatever they acquire from the issuer. Concerning the best-effort offering, the bank only commits to selling a given range of shares. Given the risks that are involved in best effort deals, it is only the speculative security-oriented firms that sell the stocks of new and unseasoned enterprises (Dunbar 1998; Russell L. Forkey). In this study, the sample size of best effort commitment is small, as only 25 out of 2557 (0.98%) IPOs chose this method. Although the IPO underpricing using best effort is much higher than other contracts, due to the small sample size, there is insufficient evidence that best effort IPOs have higher first-day returns compared to other commitments.

Another factor that may impact offering price decision is the method of price building. There are two popular methods that underwriters often use: traditional book building and the Dutch auction. Most IPOs of recent have preferred the former method. Book building allows underwriters the freedom to choose valuation models and the desired issue price. However, initially agreed rates are subject to change as the backers meet the potential investors and consider their financial offer based on the number of shares that they want to purchase and at what price. The process is prone to a downward bias because investment banks have to consider maximizing

their underwriting fee as well as the maintenance of a good relationship with potential investors with whom they do repeated business. On the other hand, Dutch auctions have the selling enterprise consult with the banks for a possible valuation range before giving the information to the shareholders, who then place their bids, thus leading to the determination of an investor-friendly value. The issuing organization will then consider going public if it believes that it can raise sufficient proceeds. The Dutch auction method has advantages both for the offering firm and for investors and could potentially replace the book building method in the future.

The supply side of the IPO, that is the number of shares offered and the offer price may not gauge the demand side properly leading either to shortage or excess in the aftermarket. The key underlying factor is that at the time of the initial offering, investors lack information that allows them to value the firm with confidence while the offering firm is uncertain about the market demand for their equity. This leads to a two-sided information asymmetry problem and both sides can contribute to differences between the offer price and the equilibrium market price at the end of the first day trading. On the investor side, there is a typical adverse selection market. Where investors “underbid” at the initial offer creating the potential for an initial positive return on the first day of trade, normally referred to as “IPO underpricing.” From the side of the offering firm, lack of information about market demand makes them dependent on intermediaries like investment banks whose interests may not be fully aligned with the firm offering securities. While the underpricing of IPO’s has been widely studied, the complexity of the underlying economics resulted in findings that are sometimes conflicting and inconclusive. My goal is to examine this

issue by exploiting differences in the informational features of Chinese and US IPO's that take place on US exchanges. This is motivated by many other studies that have examined the asymmetric information problem from either the side of the market or from the side of the issuer but typically not from both sides.

1.2 Why are IPOs underpriced

One classic study, Baron (1982), demonstrates a positive demand for investment banking advising and distribution services when the market demand side is not known to the offering firm. In this framework, underpricing arises because of rent extraction by the investment bank. Beatty and Ritter (1986) demonstrated the existence of a monotone association between the uncertainties of investors on IPO value and anticipated underpricing of the IPO. They also stated that investment bankers create an underpricing equilibrium as a compensation mechanism through the purchase of a significant capital stake that they later sell at higher prices. However, Beatty and Ritter (1986) also argue that investment banks who underprice too little or too much could lose potential investors or IPO clients and find themselves unprofitable in the future.

Another study by Carter and Manaster (1990) on returns from IPO of shares reveals that capital from better-informed investors requires high returns. The authors argue that the level of informed activity is shown by the reputation of the marketing underwriter. The study also reveals that reputable backers are associated with low risk IPOs. Accordingly, the low risk reduces the incentive to look for market information, and therefore, decreases the number of informed investors.

Therefore, Carter and Manaster (1990) contend that reputable underwriters are associated with IPOs with low returns.

Boeh and Dunbar (2016) also studied the effects of pipeline deals in registrations of IPO and how underwriting levels affect the price of IPO. By looking into the IPO from 2002 to 2013, they discover that an IPO book runner's pipeline has a significant influence on price decisions. The presented evidence in this study is in agreement with the theories of agency and market power that state that underwriters employ growing pipelines to push for high IPO first-day returns.

The IPO model by Yung Chris, Çolak Gönül, and Wang Wei (2008) explains the reason for increased underpricing during waves (i.e. the "hot market" phenomenon). This explanation is relevant to the study of Chinese IPO's as there might be a demand for these stocks even though the market as a whole is not undergoing increased demand for IPO's. Typically, the rise in business activities during boom increases the demand for IPO's that has high growth potential increasing the degree of underpricing. Adverse selection is described as pro-cyclical since many marginal firms seek funding during a boom and the dispersion in unobservable quality becomes more extreme. Other issues consistent with this pattern include the greater cross-sectional return variance and a higher incidence of delisting for hot-market IPOs. In general, the fact that the adverse selection problem is worse in hot markets acts to lower the offer price while the greater demand drives up the aftermarket price resulting in higher levels of underpricing.

1.3 Foreign countries IPOs in the United States and ADRs

US markets, as the largest capital markets in the world, attract many global issuers and investors. Foreign firms choose US markets instead of their home country's markets because the US market is mature and well-developed, which can provide a higher level of funds, and also because of the difficulty with going public in their country of origin due to an unfavorable economic environments and strict regulations.

Chinese firms are typical examples of foreign firms that choose the US market, as approximately half of the foreign firms listed in the US market are from China (66.2% in the sample from 2002 to 2016). The primary reason that these companies do not choose the Shanghai and Shenzhen exchanges is the relatively strict criteria and the limited numbers allowed by China Securities Regulatory Commission (CSRC) to go IPO. CSRC enact strict regulation primarily due to the fact that the Chinese stock market is still developing with a large number of unsophisticated investors. For example, in US markets, more than 70% of investors are institutional or corporate, whereas in China, only 20% of investors are institutional or corporate, and more than 80% of investors are individuals who are typically less educated and do not have access to reliable information with which to make trading decisions.

Individual investors are relatively vulnerable because of this lack of information and experience. To protect the public individual investor's interests, the China Securities Regulatory Commission (CSRC) has created strict listing requirements. For example, from the perspective of profitability, the Shanghai

exchange requires a public firm to have a net profit of more than thirty million RMB (renminbi) in the first three years. It also requires a firm to have a net cash flow from operations over fifty million from the past three years or three hundred million RMB (renminbi) from operating income; and the ratio of intangible assets to net property must be lower than 20%. Also, there must not be any false records in financial statements from the past three years. The Shenzhen exchange requires public firms to meet at least one of the following three standards: First, the ratio of the pre-tax profit to the real share capital of the final annual settlement has to be more than 10% in the past three years. Second, the pre-tax profit of the last three years must be above ten million rmb. Third, the equity profit margin is no less than 5%. Since these requirements are difficult for a growing firm to meet, they must search abroad for an alternative exchange to raise funds.

When a Chinese firm enters the US market, following SEC's instruction, they are more likely to issue American Depositary Receipts (ADR) or American Depositary Shares (ADS). The depository bank is the leading issuer of ADR. Under the issuance by the depository bank, ADR represents the US dollar and available instruments that are held by the depository institution. Often the currency represents the possession of the foreign companies' common shares. With the ADR arrangement, US investors can easily hold an equity stake (indirectly) in non-US firms. Exchanges and settlement are handled in the US exchange, and legal issues of investing in foreign countries are avoided through the use of ADR's.

In the US, an entity known as the Depositary Trust Firm (DTC) is charged with the task of dealing with ADR issues, including issuing, clearing, and settling the ADRs after which the dividends are paid in US dollars. Also, non-US firms can easily enter U.S. markets due to ADR's flexibility and inclusiveness.

There are three types of ADRs. Level I instruments require a firm to fill an F- 6 registration statement while considering the waiver aspect of the law 12g3-2(b) according to SEC reporting provisions. ADR issued under Level I are more like SEO's than IPO's. In addition, Level I ADRs are strictly traded on OTC markets rather than the US stock exchange. Lastly, Level 1 ADR's do not raise new capital. For these reasons, it is not acceptable to include Level 1 ADR's along with IPO's.

On the other hand, the Level II ADR program is highly comprehensive since it is required to adhere to the SEC's legal procedures and reporting standards. Besides filing an F- 6 registration, the platform compiles with SEC Form 20-F alongside other regulations, such as annual report submission in accordance with US GAAP or IFRS, and subject to the regulations formulated in the Sarbanes-Oxley Act. Level III ADR's are similar to Level II for the fact that the issuer raises capital under a Level III ADR. In addition, firms raising capital under a Level III ADR file a form F-1 with the SEC exactly like an IPO.

Since there is no home-country security backing for a Level III ADR, and the regulatory requirement is the same as an IPO, a foreign firm Level III ADR is similar to any other IPO in the US market. Therefore, we include Level III ADR's in our IPO sample.

2. Research Questions and hypotheses

In this section I briefly describe the hypotheses that attempt to compare IPO underpricing of US and Chinese firms in the US market. I then propose some firm level characteristics that can be used to explain the differences. All the hypotheses are motivated by considerations of how various economic factors have differential effects on information asymmetry problems across Chinese and US firms or on demand uncertainty for these securities.

2.1 Comparison of underpricing patterns of US and Chinese IPOs

2.1.1 IPO underpricing

As I discussed previously, asymmetric information is the most fundamental element of stock price, and the disparity of information and knowledge about a firm builds the gap of bid-ask spread. Therefore a positive or negative return on public share is generated and this return can lead to underpricing of IPOs on their first trading day. There are many articles which study the reasons for, consequences of and changes related to IPO underpricing. Schaub (2003) demonstrates that the early and aftermarket returns of ADRs traded on the NYSE were compared and the US markets overprice ADRs in the short and long term. This underpricing is more severe for the seasoned equity offering (SEO) and developing countries.

Legal systems also have an impact on foreign firms' IPO underpricing in the US market. Diro Ejara, Ghosh (2004) present comparative analyses of the pricing and aftermarket performance of IPOs by ADRs and a matching sample of US firms over

the 1990–2001 period. Offered by large, well-known multinationals, ADR IPOs go through a detailed scrutiny, and incur significant costs, during the pre-IPO period to recast financial statements in conformity with SEC rules and the US GAAP. This mitigates the information asymmetry between the IPO firm and investors. They categorize the ADR issuing country as developed or emerging, and their sample includes several cases of privatization of state owned corporations. The analyses indicate that: i. ADR IPOs are significantly less underpriced than comparable US IPOs; ii. IPOs from developed countries are more underpriced; and iii. Privatization IPOs are less underpriced than non-privatizations. The lower underpricing of ADR IPOs persists even after differential IPO attributes, the traditional proxies for information asymmetry and the unique characteristics associated with ADR IPOs, are accounted for. Boulton et al. (2010) argue that it is well established that a link exists between a country's legal system and the size, liquidity, and value of its capital markets. They study how differences in country-level governance affect the underpricing of initial public offerings (IPOs). Examining 4462 IPOs across 29 countries from 2000 to 2004, they find the surprising result that underpricing is higher in countries with corporate governance that strengthens the position of investors relative to insiders. They conjecture that when countries give outsiders more influence, IPO issuers underprice more to generate excess demand for the offer, which in turn leads to greater ownership dispersion and reduces outsiders' incentives to monitor the behavior of corporate insiders. Consistent with this control motivation for underpricing, they find that underpricing has a negative association with post-IPO outside blockholdings and a positive association with

private control benefits. Blockholders are often able to influence the company with the concentration of voting rights that are awarded with their holdings. In addition, firms whose insiders are entrenched either by majority ownership or by dual-class structures do not underprice more in countries with better governance. In these firms the ownership structure protects managers from outside influence, eliminating the incentive to increase outside ownership dispersion through underpricing. Engelen, van Essen (2010) using a large firm-level dataset of 2920 IPOs from 21 countries examine the impact of country-level institutional characteristics on the underpricing of IPOs. Through hierarchical linear modeling they are able to control for firm-specific and issue-specific characteristics and test whether country-specific institutional characteristics add explanatory power to explain the level of underpricing. Their results show that about 10% of the variation in the level of underpricing is between countries. The quality of a country's legal framework, as measured by its level of investor protection, the overall quality of its legal system and its level of legal enforcement, reduces the level of underpricing significantly.

Culture, geography and language offer alternative perspectives that can impact information asymmetry, hence providing some additional explanations for IPO underpricing. Cai and Zhu (2015) examine the impact of cultural distance on the underpricing of IPOs issued by foreign firms in the United States. Using a sample of 503 foreign IPOs from 27 countries for the 1980–2012 period, they find that greater cultural differences between U.S. investors and foreign domiciled issuers increase the underpricing of foreign IPOs. Their findings are robust after controlling for a

country's legal environment, financial development, and corporate tax rates. They also find that the presence of prior public equity issues in the home market moderates the positive impact of cultural distance due to the increased transparency and visibility of foreign firms among U.S. investors. Their results suggest that cultural differences influence IPO underpricing through an information asymmetry channel and that visibility reduces information asymmetry between foreign issuers and U.S. investors, which, in turn, mitigates the positive impact of cultural distance on the underpricing cost.

Motivated by these earlier studies, I argue that due to the geographical distance from the United States to China, the differences in legal systems, visibility of business, access to information and understanding of SEC and other files, the essential information asymmetry is much greater for Chinese firms. Therefore, the underpricing of initial public offerings in the United States and Chinese firms should also have some differences. Accordingly, the first null hypothesis on IPO underpricing is as follows:

H1: The first day underpricing of US domestic and Chinese IPOs are the same.

2.1.2 The likelihood of underpricing

The definition of underpricing is the proportion of difference on the first trading day closing price subtracts initial offering price on the offering price. If this value of is positive, it means that either the offer price has been set too low with an intentional discount (supply side), or the market's willingness to purchase this

share is higher than issuers' expectation (demand side). If the value of underpricing is negative, it means that this IPO is overpriced, which means either the offer price has been set too high with a premium, or the market's willingness to purchase this share is lower than expected. My study aims to find out that whether the patterns of IPO underpricing and overpricing of domestic and Chinese firms are the same, or in other words, whether investment bankers have a greater probability of overestimating the demand for Chinese IPO's.

H2: The likelihood of IPO underpricing is the same for US domestic and Chinese firms.

2.1.3 Hi- tech IPOs

After the dot-com bubble from 1997 to 2001, Hi-tech IPOs continue to attract more public attention. For instance, Facebook's IPO in 2012 was the biggest in technology and one of the biggest in internet history, with a peak market capitalization of over \$104 billion. However, the Hi-tech firms have the characteristics of high growth rate, low stability, high risk and low profit at the starting phase. These factors mean they have a very unfavorable characteristic to meet the strict regulation requirement in China. In particular, Hi-tech firms can rarely meet the requests on profitability required by the Shanghai and Shenzhen exchanges. As a result, many hi-tech firms from China come to the US for an initial public offering. The market attention and reaction to a hi-tech firm from China might be different from domestic firms. Previous research has included a hi-tech

dummy as a common control variable and their results show that underpricing is greater for Hi-tech firms (Loughran, Ritter 2004;Diro Ejara, Ghosh 2004). In my study, I will test whether the hi-tech related IPOs from the US and China are viewed differently either in terms of the inherent risk or in terms of their growth prospects. While the first will typically drive up underpricing, the second will drive down underpricing.

H3: Hi-technology related IPOs have the same underpricing for both US domestic IPOs and Chinese IPOs.

2.1.4 Venture-capital (VC),Private Equity(PE) backed IPO and underpricing

Going public, raising capital from the public investor, and achieving long run development are the ultimate goals for a firm. However, a firm is not working alone towards the goal of going public. Before they have the resources to reach out for public funds, private equity (PE) is their best chance to obtain money to build up the business. Rather than commercial bank loans, venture-capital (VC) is the most accessible source of funding for an entrepreneur. VC and PE not only provide capital to businesses, they also bring other resources such as reputation, industry knowledge, external monitoring and general expertise in going public. Helping a firm to go public and cash out during the IPO is the classic game venture-capital plays in the capital market. Moreover, as the insider behind the issuer, the venture-capitalist usually has discretion on communication with the investment banker. The venture capitalist's incentives are conflicting. On the one hand they want the offer

price to be as high as possible to maximize their profit but they are also in a hurry to cash out and want to make sure the offer does not fail and this incentivizes them to take a lower offer price. Not surprisingly, the empirical relationship between the presence of a VC and the level of underpricing is also mixed. Some articles argue that venture-capital can provide monitoring to support firms, and that better monitoring is associated with lower underpricing (Barry et al. 1990). On the contrary, Lee and Wahal (2004) argue that VC-backed IPOs are significantly more underpriced than non-VC backed IPOs. The success of an IPO ensures the future flow of capital into VC funds and this benefit offsets the cost of underpricing. Liu and Ritter (2011) put forth the analyst lust theory of underpricing. They argue that VCs are willing to use underpricing to pay the lead underwriter for all-star analyst coverage that is bundled with IPO underwriting. They show that VC-backed IPOs are more underpriced when the lead underwriter provides all-star analyst coverage.

Bradley et al. (2015) indicate that before the IPO bubble burst, the first day return for IPOs backed by top VC firms was double that of non-top VC IPOs. Top VC IPOs were also twice as likely to receive all-star analyst coverage and suffered twice the number of negative returns upon lockup expiration. They argue that this was not a coincidence. Underwriters benefited from underpricing vis-à-vis allocation strategies whereas VCs gain from information momentum which allows them to cash-out at higher prices at lockup expiration. Loughran and Ritter (2004) also provide evidence showing that with bookbuilding, underwriters have discretion over the allocation of hot IPOs. Some shares went to “friends and family” of the issuing firm, as Ljungqvist and Wilhelm (2003) show. But some shares also went to

the executives of issuing firms and their venture capitalists through personal brokerage accounts (Siconolfi, 1997).

The underlying theory and evidence are still mixed on the relationship between the degree of underpricing and the involvement of venture-capital or private equity in an IPO. This leaves an interesting question as to whether the venture-capital backed IPO has the same level of underpricing for domestic and Chinese firms.

H4: VC backed IPOs have the same level of underpricing on both US domestic IPOs and Chinese IPOs.

2.1.5 Lock-up period, public investor protection and IPO underpricing

Lockup agreements prohibit firm insiders—including employees, their friends and family, and venture capitalists—from selling their shares for a set period of time. The terms of lockup agreements may vary, but most prevent insiders from selling their shares for 180 days. Lockups may also limit the number of shares that can be sold over a designated period of time. U.S. securities laws require a firm using a lockup to disclose the terms in its registration documents, including its prospectus. (SEC.gov | Initial Public Offerings: Lockup Agreements 2011)

Generally, a lockup period is a condition of exercising an employee stock option. Depending on the firm, the IPO lock-up period typically lasts between 90–180 days before these shareholders are allowed the right, but not the obligation, to

exercise the option. Lockups are designed to prevent insiders from liquidating assets too quickly after a firm goes public thus helping to mitigate potential adverse selection problems. When employees and pre-IPO investors initially get their shares or options, they sign a contract with the firm that typically prohibits trades for the first 90–180 days after a future IPO. When the firm is ready to go public, the underwriting bank then reaffirms the existing agreements in new contracts. This helps to ensure the market will not disproportionately increase the supply, which drives prices downward. While lockups used to be simple—usually lasting 180 days for everyone—they have become increasingly complex.

Usually employees and early investors want shorter lockups (so they can cash out sooner) while the underwriting banks want longer ones (to keep insiders from flooding the market and sinking the share price). The firm is often somewhere in the middle—wanting to keep employees and investors happy but not wanting it to look like insiders don't have faith in it. (Wikipedia 2017a)

Many articles find a positive correlation between lock up expiration and abnormal returns, especially when venture-capital is involved. Bradley et al. (2001) find that lockup expirations are, on average, associated with significant and negative abnormal returns, but the losses are concentrated in firms with venture capital backing. For the venture-capital-backed group, the largest losses occur for hi-tech firms and firms with the greatest post-IPO stock price increases, the largest relative trading volume in the period surrounding expiration, and the highest quality underwriters. Field and Hanka (2001) find a permanent 40 percent increase in

average trading volume, and a statistically prominent three-day abnormal return of -1.5 percent when lockups expire. The abnormal return and volume are much larger when the firm is financed by venture capital, and they find that venture capitalists sell more aggressively than executives and other shareholders. Ertimur et al. (2014) examine the effect of large shareholders' ex ante selling incentives on firms' voluntary disclosure choices in the setting of IPO lockup expirations. They find evidence that managers delay disclosures of bad news, not for their own benefit, but to enable influential pre-IPO shareholders to sell their shares at more favorable prices. Delays are more pronounced when aggregate selling incentives are greater, when uncertainty is high, and when venture capitalists, influential investors with strong selling incentives, own more shares. Simultaneously, managers' disclosure decisions reflect litigation concerns; no significant delays occur when litigation risk is high or when managers trade themselves.

There are also researches that support the signaling effect of lockup period and IPO underpricing. Aggarwal et al. (2002) develop a model in which managers strategically underprice IPOs to maximize personal wealth from selling shares at lockup expiration. First-day underpricing generates information momentum by attracting attention to the stock and thereby shifting the demand curve for the stock outwards. This allows managers to sell shares at the lockup expiration at prices higher than they would otherwise obtain. They test the model on a sample of IPOs in the 1990s and find that higher ownership by managers is positively correlated with first day underpricing, underpricing is positively correlated with research coverage, and research coverage is positively correlated with stock returns and insider selling

at the lockup expiration. Brav and Gompers (2003) test three potential explanations for the existence of IPO lockups: lockups serve as (i) a signal of firm quality, (ii) a commitment device to alleviate moral hazard problems, or (iii) a mechanism for underwriters to extract additional compensation from the issuing firm. Their results support the commitment hypothesis. Insiders of firms that are associated with greater potential for moral hazard lockup their shares for a longer period of time. Insiders of firms that have experienced larger excess returns, or are backed by venture capitalists, or go public with high-quality underwriters are more likely to be released from the lockup restrictions.

The argument is that the longer the lock up term, the stronger the protection it offers to public outsiders and the higher uncertainty it creates for the insiders. Uninformed investors are more willing to trade in the immediate post-IPO period when there is a lock-up period since there is a lower probability that they are interacting with an informed insider. Therefore, IPO underpricing should be lower for those firms with a longer lock up period. At the same time, the complexity of lock up period may also reveal some further information about the firm. The standard lock up period, based on SEC guidance, is 180 days. If a firm has a non-standard lock up policy, for instance, periods of 90, 180, 270 days for different classes of insiders, this provides a signal to the market which might affect both the offer price and the after-market price. The effect of this signal may differ across US domestic IPOs and Chinese IPOs, so my (null) hypothesis on lock up period is:

H5: Domestic and Chinese firms have the same IPO underpricing given each type of lock-up period (standard or non-standard).

2.1.6 Partial adjustment and IPO underpricing

Hanley (1993) documents that the relation of the final offer price to the range of anticipated offer prices disclosed in the preliminary prospectus is a good predictor of initial returns. Issues that have final offer prices which exceed the limits of the offer range have greater underpricing than all other initial public offering, and are also more likely to increase the number of shares issued. These results are consistent with the pricing and allocation schedule proposed by Benveniste and Spindt (1989), in which shares in an offering are rationed and prices only partially adjust to new information.

Loughran and Ritter (2004) put forth that an alternative approach to evaluating the demand for IPOs is the partial adjustment phenomenon documented in Hanley (1993). She suggests that underwriters fail to adjust the offer price of an IPO high enough when they encounter unexpectedly strong demand for an issue on road shows. As a result, in her study, “above the file range” offers experience two times the underpricing of a typical (within the file range) IPO. Following Hanley (1993), Panel B of Table VI reports the underpricing associated with offers that occur above or below the preliminary file range. An upward revision occurs when the offer price of the IPO exceeds the midpoint of the preliminary file range (expected price). A downward revision occurs when the offer price of the IPO is

equal to or less than the expected price. Forty-four percent of foreign US IPOs experience upward price revisions, roughly the same percentage as domestic US IPOs. Notably, upwardly revised foreign IPOs experience an average underpricing of 18.4% compared to 38.2% for the asset size-matched domestic IPOs. Regardless of the control sample examined, underpricing is significantly lower for upwardly revised foreign IPOs. In terms of downward revisions, both foreign and domestic IPOs experience similar, albeit lower, underpricing. The results are again suggestive that the underpricing of foreign IPOs is less sensitive to variations in demand than domestic IPOs.

H6: The impact of partial adjustments on IPO underpricing is the same for US domestic and Chinese firms.

2.2 Capital raised-matched sample

Given the large difference in sample size between US IPOs and Chinese IPOs, I create a subsample of US IPO's matched to Chinese IPO's with regard to the issuer's industry and issue proceeds (capital raised) size. This industry-size-matched sample also allows me to further detect the factors that can influence the Chinese IPOs higher underpricing. For each Chinese IPO, I have at least one US domestic IPO that matches exactly on the industry (two-digit SIC codes) and has a nearest capital raised size (total proceeds in US market) with this Chinese IPO. For completeness, I include the results for the full sample of domestic US IPOs in the ensuing analyses.

2.3 Ordinary Least Squares regression analysis.

Following prior research studying IPO underpricing (Baron 1982; Barry et al. 1990; Beatty, Ritter 1986; Benveniste, Spindt 1989; Bradley, Jordan 2002; Carter, Manaster 1990; Engelen, van Essen 2010; Hanley 1993; Lee, Wahal 2004; Ljungqvist et al. 2006; Ljungqvist, Wilhelm 2003; Loughran, McDonald 2013; Loughran, Ritter 2004; Loughran et al. 1994; Ritter 2011, 2015; Ritter, Welch 2002; Rock 1986; Schaub 2003; Tian et al. 2016; Yung Chris, Çolak Gönül, Wang Wei 2008; Zheng, Li 2008), I use a total of twelve explanatory variables: an offer price, an issue size, a proportion of gross spread to total issues size, a hi-tech stock dummy, a venture capital dummy, a private equity dummy, a standard lock up dummy (set equal to one if company has 180 days lock up period, and zero otherwise), a partial adjustment dummy (set equal to one if company has adjust the offer price upwards from the filing price range, and zero otherwise), the logarithm of assets, the logarithm of (1 + age), share overhang (the ratio of retained shares to issued shares), and a Carter Manaster top-tier underwriter dummy (set equal to one if the lead underwriter has a rank of 8 or more, and zero otherwise). The issue size, assets and sales are measured in millions of dollars. The OLS regression is:

$$\begin{aligned} Underpricing_i = & a_0 + a_1(Offer\ Price)_i + a_2(Issue\ Size)_i + a_3(GrossSpread\ %)_i + \\ & a_4(Hi-Tech\ Dummy)_i + a_5(VC\ Dummy)_i + a_6(PE\ Dummy)_i \\ & + a_7(Standard\ Lock-up\ Dummy)_i + a_8(Partial\ Adjustment)_i + a_9[ln(total\ assets)_i] \\ & + a_{10}ln(1+age)_i + a_{11}(Overhang\ or\ insider\ holding)_i \\ & + a_{12}(top-tier\ manager\ dummy)_i + e_i \end{aligned}$$

3. Sample and tests

3.1 Sample selection

I construct the sample by identifying all IPOs in the US between January 1st, 2002 and December 31, 2016 that appear in the Thomson Financial Securities Data Firm (SDC) Platinum database. I choose the period after Sarbanes–Oxley Act (SOX) which was enacted on July 30, 2002. SOX was enacted to improve the audited financial statements issued by public firms, and consequently, to reduce the information asymmetry between insiders and outsiders. As the information environment changed after SOX, I restrict the sample almost entirely to the post-SOX period. I use all the IPO's listed on the three major exchanges in the United States, NYSE, NASDAQ, and AMEX. I include only domestic firms that filed registrations statements on form S-1 and foreign firms that filed registrations statements on form F-1 with the SEC. The forms S-1 and F-1 require the same disclosures. From SDC, I obtain the issuer, ticker, SIC code, industry, nation, IPO file and issue date, the IPO offer price, the first available closing price after the first trading day, the total proceeds in this market, the percentage of gross spread of principal amount in this market, the listed exchange, primary shares, type of security, total issued shares, the lock up days, whether it was listed prior or not, whether it is a hi-tech firm or not, whether it is venture backed or not, whether it is private equity backed or not, and whether it uses best effort commitment or not. Table 1.1 demonstrates my sample selection process. In agreement with what prior research has noted, I manually check for mistakes and exclude duplicate observations and ticker symbol in SDC database (45 IPOs are excluded). I try to

replace the missing value with the earliest closing price within seven days subsequent to the issue date (i.e. the second day, third day, or first week closing price) in SDC. Observations where I cannot find closing price within seven days and/or offer price are excluded (224 IPOs are excluded). The final sample from SDC has 2557 observations, although in some of the tables, I am missing up to 1.8% of the sample because of incomplete information. Among the 2557 IPOs, 2213 IPOs are from the United States, 137 IPOs are from China and 207 IPOs are from other foreign countries.

[Insert Table 1.1 here]

3.2 Variables design and definition

The main variables of interest in testing my hypotheses are: IPO underpricing, hi-tech index, venture-capital or private equity backed index, lock up agreement and price partial adjustment. The definitions and sources of these variables are discussed below in detail. Appendix B describes how I identify the variables of interest.

- 1) IPO underpricing: I follow the most well accepted definition on underpricing. IPO underpricing is the percentage return from the offer price to the first closing price, based on Thomson Financial Securities Data Firm (SDC) Platinum and DataStream

databases. Or IPO underpricing = $(1\text{st day closing price} - \text{offering price}) / \text{offering price} * 100\%$. The earliest closing price within one week subsequent to the IPO issue date in SDC is used when a first-day price is not available. IPO issue date and offer price are obtained from SDC. A positive number for IPO underpricing indicates that IPO is underpriced and a negative number indicates that IPO is overpriced.

- 2) Hi-Tech dummy: Dummy variable equal to 1 if the issuer's primary business is high tech industry involved. 0 otherwise.
Issuer SDC High Tech Industry (Description): Description of the high tech industry in which the issuer is involved as its primary line of business (if applicable).
- 3) VC backed dummy: Venture-capital backed IPO issue flag is Equal to 1 where the issuer was venture-backed at the time of the initial public offering. 0 otherwise.
- 4) PE backed dummy: Private equity backed IPO issue flag is Equal to 1 where the issuer was private equity backed at the time of the initial public offering. 0 otherwise.
- 5) Standard lock up and Lock-up days: The number of days shares are in lockup in SDC database is defined as the minimum number of days that shares must be held before lockup agreements and/or restricted periods expire, allowing the possible sale of securities in the open market. This number varies from every

insider for each issuer. In other words, one issuer may have several lock up agreements. For example: Ticker: CCCR has lock up agreement to insiders as 90, 90, 90, and 150 days; Ticker: PRS has lock up agreement to insiders as 90, 180, 180, 180 days; Ticker: FEHL has lock up agreement to insiders as 180, 270, and 360 days. This format of numeric information makes it difficult to calculate the mean or median value for lock up days. Therefore I design a variable named standard lock. The standard lock up dummy variable indicates whether the issuer has a standard lock up agreement that lock the securities for 180 days from insider to public market. If the issuer only has 180 days lock up agreement for each insider, I define it as a standard lock. If the issuer has lock up agreement with different level, I define it as non-standard lock. In my mode, the Standard lock is equal to 1 if the issuer has and only has lock up agreement on 180 days. 0 otherwise.

- 6) Partial adjustment, Price as expected and Above: Partial adjustment or called Price to file range is the indicator generated by the SDC variable ABOVEBELOW. Above/Below Filing Price Description is the flag that compares offer price with the latest filing price i.e., A-Above range, B-Below range, NA-Not applicable, W-Within range. In my sample, I define the price to file range equal to 0 if the offer price is within the file price

range; equal to 1 if the offer price is below the file price range; equal to 2 if the offer price is above the file price range; missing if the ABOVEBELOW is not applicable.

- 7) ABOVE is equal to one if the partial adjustment is upwards above the filing range.
- 8) Top-Tier Underwriter Dummy: The selection of top-tier investment underwriters is following Jay Ritter's underwriter ranks data. I choose the underwriters that rated 9.1 point in Ritter's system and generate dummy variables equals one if the issuer choose one of the following top tier underwriters: Citi Salomon Smith, Credit Suisse First Boston, Deutsche Alex Brown, Deutsche Bank, Donaldson, Lufkin & Jenrette Goldman Sachs, JP Morgan, JP Morgan Chase, Lazard, Lehman, Merrill Lynch, Morgan Stanley, Morgan Stanley DW, Nomura, Salomon Bros and Salomon Smith, and equal to zero otherwise.

3.3 Summary statistics

Table 1.2 Panel A summarizes the mean and median value of IPO underpricing, and the number of IPOs for each group in my sample period of 2002–2016. US domestic has the largest number of IPOs in my sample with 2213 IPOs, following other foreign country issues 207 IPOs in US market, 171 IPOs are common shares and 36 are ADRs. The Chinese firm in US markets sector has 137 IPOs, among them 26 IPOs are common shares and 111 IPOs are ADRs during 2002 to 2016 period.

Chinese IPOs have more ADRs as compared to other foreign countries. However there is no large difference in underpricing between all foreign common shares and ADRs. This result provides further evidence that type III ADRs which have no home country security backing are essentially IPO's for economic purposes.

[Insert Table 1.2 here]

Comparing the mean value of underpricing of US domestic and Chinese IPOs, it is obvious that Chinese IPOs are more underpriced than US IPOs, the mean value of underpricing being 22.51% and 10.50% respectively. Other foreign country ADRs have the lowest mean value of IPO underpricing which equals to 8.04%, lower than other foreign countries' common shares which have a mean value 9.17%. Chinese common share IPOs have the highest mean value of IPO underpricing which equal to 27.49%, slightly higher than Chinese ADRs underpricing at 21.35%. Meanwhile, US domestic IPOs have an average first day return at 10.50%. These results are consistent with prior studies. It is notable that Chinese IPOs have much larger standard deviation as 0.465, almost double the US domestic and other foreign countries' standard deviation (0.24 and 0.229). This large variance shows a picture that Chinese IPOs have higher internal diversity on first day return. In other words, the issue price discount or the market attention on Chinese IPOs is very different from each other. Figure 2 shows a clearer view of Chinese IPO underpricing versus

US domestic IPO underpricing, that Chinese IPOs are less centered and have fatter tails on both sides. The performance of Chinese IPOs is less clustered.

[Insert Figure 1.2 here]

Table 1.2 Panel B presents the summary of interested variables by groups. The mean value of offer price for Chinese IPO is \$12.23, which is \$3.18 lower than US domestics and \$2.79 lower than other foreign countries. However, Chinese IPOs have the largest capital raised in US markets, 14.77 million higher than US domestic IPOs and 47.6 million higher than other foreign country IPOs on average. The gross spread as % of principal amount indicates proportion of total manager's fees the issuer paid to lead underwriters during the IPO process, including management fee, underwriting fee, and selling concession. This variable has significant influence on underwriters' motivation for price building. If the gross spread varies from US domestic IPOs and Chinese IPOs, it shows that the underwriters treat these firms differently. However, in our sample, there is no significant difference in underwriter fees involved. Indeed those Chinese firms pay higher to underwriters than US domestic firms and other countries' firms (0.6% and 0.56% higher respectively). However the matching sample analysis reveals that there is no significant difference in underwriter fees across US domestic and Chinese IPOs. Likewise, the mean value for top-tier underwriter does not show a significant difference between all three groups. The Chinese firms are generally smaller than US and other foreign firms, but

have longer histories before coming to the US market. Compared to US domestic and other foreign countries, Chinese firms are more likely to issue hi-Tech related and venture-capital backed IPOs. But there is no significant difference on lock-up agreement and offer price partial adjustment. Notably, Chinese IPOs have the highest ABOVE file range which indicates that compared to US IPOs and other foreign IPOs, Chinese firms have higher offer price upper adjustment before initial public offering.

4. Results

In this subsection, I test my null hypotheses: the average first day underpricing (Hypothesis 1), the likelihood of underpricing (Hypothesis 2), the hi-tech involved IPOs (Hypothesis 3), the VC/PE backed IPOs (Hypothesis 4), the lock-up agreement (Hypothesis 5), the partial adjustment (Hypothesis 6), the issue size-matched sample and the OLS analysis.

4.1 Tests on average IPO underpricing comparison

As displayed in Table 1.2 Panel A, the mean value of IPO underpricing for US domestic and Chinese firms are 10.5% and 22.51% respectively. The nearly doubled underpricing indicates that the Chinese firms have much higher discounts on offering price, or the market is more likely to gamble on Chinese firms. From the Table 1.2 Panel B, the mean value of issue price on Chinese IPOs has lower offerings as compared to US domestic IPOs. These results imply a support assumption that to

attract US investors, Chinese firms work with underwriters to offer a discount to public.

4.2 Tests on likelihood of underpricing and overpricing

Table 1.3 displays the likelihood of IPOs to be underpriced or overpriced. For all the underpriced US domestic IPOs, the mean and median value of underpricing are 18.5% and 11%; for all the overpriced US domestic IPOs, the mean and median value of underpricing are negative -6.17% and -4%, respectively. For all the underpriced Chinese IPOs, the mean and median value of underpricing are 38.34% and 25%; for all the overpriced Chinese IPOs, the mean and median value of underpricing are negative, -9.15% and -7%, respectively. Here the positive underpricing value indicates that either issue price is discounted, or the market will pay premium for the new issue due to high demands and interests. On the contrary, the negative value of underpricing or negative first day return indicates a premium on issuing price, or the low demand and interest from public investors. Table 1.3 also shows the likelihood of IPOs being underpriced or overpriced. Including the zero first day return, the probability of US domestic IPOs to be underpriced is 63.71%, and for Chinese IPOs' is 65.69%. There is no notable difference in the likelihood to be underpriced for these two groups of IPOs. The following Table 1.3 Panel B employs the Chi-square analysis and shows the level of χ^2 is greater than 0.1. Therefore, there is no significant difference in the likelihood to be underpriced for US domestic IPOs and Chinese IPOs.

[Insert Table 1.3 here]

4.3 Tests on Hi-tech, VC, and best effort commitment related IPOs underpricing

Table 4 summarizes the mean value of IPO underpricing for different groups in sample when hi-tech, VC, and best effort commitment involved. For US domestic and Chinese IPOs, Table 4 Panel A displays the IPOs for which core business is hi-tech related have higher underpricing than other industries. For other foreign IPOs, this effect reverses. The difference in hi-tech involvement and no hi-tech related business on US domestic IPOs is 8.7%, higher than this difference in Chinese IPO groups which is 3.4%. The difference in Chinese and US domestic underpricing is much higher when the IPOs are not related with hi-tech business, which equals to 12.9%, while the difference in the hi-tech related IPOs equals to 7.7%. The hi-tech involved business, in some way, mitigates the gap in US domestic and Chinese IPOs' first day return.

[Insert Table 1.4 here]

Table 1.4 Panel B displays the IPO underpricing when venture-capital is behind the stocks that first traded in US exchanges. For all three groups, US domestic, Chinese and other foreign countries' IPO, the VC backed issues all have higher

underpricing or first day return. The US domestic firms seems to be impacted the most from VC backing, with the highest difference on underpricing at 11.8%. Following are other foreign countries' firms; the difference on first day return is 8.1%. And Chinese firms seem to have the least impact from venture-capital backing with a difference of only 3.8% between the VC backed and non-backed IPOs. From the table, the difference in Chinese and US domestic underpricing is much higher when the IPOs are not backed by venture-capital, which equals 13.2%, while the difference in the VC backed IPOs equals 5.3%. Just like Hi-tech businesses, venture capital also has a different influence on US domestic and Chinese IPOs' first day return.

Since majority of the issuers choose firm commitment contact with underwriters, the sample size for best efforts offer is very small, only 23 cases for US domestic firms and 2 cases for Chinese IPOs. Due to the sample size, the statistics is not quite meaningful. However from the table 1.4 Panel C, it can tell that the best efforts IPOs have much higher underpricing for US domestic firms and have lower level of negative relationship for Chinese firms.

4.4 Tests on lock up period and IPO underpricing

Table 1.5 shows the IPO underpricing for each group under different lock up agreements. Lock up terms reveals how strong the firm's agreement to protect the uninformed public investors is. Table 1.5 Panel A provides an overview, ignoring some omitted observations. For all three groups, more than 80% of the issuers

choose the standard 180 days lock up term following SEC's guidance. The first day returns for different terms are not drastically different, only 2.5% for US domestic issuers, 1.1% for Chinese issuers and 3.4% for other foreign issuers. The difference in the underpricing of Chinese issuers with the other two groups across the type of lock up terms is showing similarities. Under the standard setting, Chinese IPOs are 11.6% more underpriced than US domestics'. Under the non-standard setting, this difference is 13.1%. The pattern remains the same for Chinese and other foreign issuers, for which the differences are 13% and 15.4%.

[Insert Table 1.5 here]

Table 1.5 Panel B provides a more detailed picture of lock up terms. Given the average of each group, the analysis shows that US domestic IPOs have the highest underpricing when applying for standard lock up terms; Chinese IPOs have the highest underpricing when applying for relatively longer lock up terms for which no term for any insiders is shorter than 180 days; Other foreign IPOs have the highest underpricing when applying for shorter lock up terms or relatively weaker public investor protection. The length of lock up terms release is a signal of how strong the insiders are. These possible insiders include executives, shareholders and underwriters. Normally the insiders prefer a shorter lock up term to get faster cash out, and typically, a longer lock up term can protect the uninformed outsiders better. Therefore, a longer lock up term can reveal the level of responsibility of the issuer to

the public. The result from this table is rather confusing and worth a further investigation and discussions

4.5 Tests on partial adjustment and IPO underpricing

Table 1.6 displays that an alternative approach to evaluating the demand for IPOs is the partial adjustment phenomenon documented in Hanley (1993). She suggests that underwriters fail to adjust the offer price of an IPO high enough when they encounter unexpectedly strong demand for an issue on the road show. As a result, in her study, “above the file range” offers experience two times the underpricing of a typical (within the file range) IPO. Following her study and Loughran and Ritter's work (2004), Table 1.6 reports the underpricing associated with offers that occur above or below the preliminary file range. An upward revision occurs when the offer price of the IPO exceeds the midpoint of the preliminary file range (expected price). A downward revision occurs when the offer price of the IPO is less than the expected price. 27.94% of Chinese IPOs experience upward price revisions, roughly two times that of domestic US IPOs and other foreign IPOs. Other foreign firms make the most downward revisions, at about 32% higher than US domestics and Chinese IPOs. Notably, upwardly revised Chinese IPOs experience an average underpricing of 50.6% compared to 35.6% for the domestic IPOs. In terms of downward revisions, domestic, Chinese and other foreign IPOs experience similar lower underpricing. These results provide evidence that suggests that underwriters who work with Chinese issuers are less likely to adjust the offer price to a proper

level as compared to US firms. And the market has an abnormally high demand on Chinese IPOs beyond underwriters' price prediction ability.

[Insert Table 1.6 here]

4.6 Tests with matching sample

Table 1.7 demonstrates the results for an issue-size-matching sample from US domestic IPOs with similar capital raised to Chinese IPOs. Due to the identical issue size, there is likely more than one domestic that firm matches with Chinese firms. The final matching sample has 137 Chinese IPOs and 186 similar issue size domestic IPOs. The t-test indicates that even for the similar size IPOs, Chinese firms still have significantly higher underpricing compare to US domestic firms. The issue price is also significantly lower than US firms. However the gross spread or the total compensation pay to the underwriter is similar between the two groups. This variable reveals the broker fee paid to the underwriter and hence discloses that the efforts underwriters make for a US and a Chinese IPO is generally the same. The result of underpricing for the above filing range is consistent with Table 1.6. It suggests that with the same level of compensation and effort, the underwriter still fails to adjust issue price for Chinese IPOs.

[Insert Table 1.7 here]

4.7 Tests on OLS regression

Table 1.8 presents the results for the Ordinary Least Squares regression analysis. Underpricing is the dependent variable. For US domestic IPOs, offer price, gross spread, venture-capital backing, private equity back, and partial adjustment have positively significant correlation with first day return. For Chinese IPOs, the offer price, gross spread, and partial adjustment have positively significant correlation with first day return. Interestingly, private equity backing has a negatively significant correlation with first day return; right in the opposite direction of the US domestic sample. The results for other foreign countries are ambiguous, and may be impacted by the complexity of country construction. Only venture-capital backing has significantly positive correlation with first day return. Panel B demonstrates the OLS regression results on an industry-issue size matched sample.

[Insert Table 1.8 here]

5. Discussion, Conclusions and Extensions.

This study conducts an exhaustive analysis of all firms that have issued their shares to the public for the first time in US markets over the period 2002–2016. In particular we focus on Chinese firms that have conducted an IPO in the US market rather than in Chinese markets. I examine many of the most important

characteristics associated with IPOs to see how they might differ across US and Chinese firms. I also include other foreign firms that conducted IPOs in the US market rather than their home countries to see if they are closer to US IPOs or Chinese IPOs.

The main empirical findings are that the contractual arrangements associated with Chinese IPOs and other foreign IPOs are very similar to those for US firms. However, there are significant differences in market reactions. In particular, first-day returns are much higher for Chinese firms than for US firms. A matched pair design where Chinese firms are matched with US firms on both size and industry confirms that Chinese firms are underpriced more than US firms. On the contrary, other foreign firms display a slightly lower level of underpricing than US firms.

I then look more closely at various parameters that might affect underpricing to see if any of these contribute directly to the differences in market reactions. The first is a check of the likelihood of overpricing — that is to see if there is any competitive pressure across underwriters to capture market share by offering overly favorable terms to the issuer. Despite the fact that the first-day discounts are larger for Chinese firms, I do not find any difference in the probability of overpricing. I infer that as with other features like lock-out clauses or fees, underwriters behave in a similar fashion with both US and foreign IPOs and the differences that are showing up are due to differences on the market side that are not fully understood by the underwriting firms.

The main evidence that I offer to support this claim has do with adjustments in the initial filing range. Registrations statements include an initial assessment of the offer range with an estimated minimum and maximum offer price. While the typical offer price falls within this filing range, there are many instances where the price falls outside the filing range. In general, if the filing range is too high, that is, the interest in the offer is overestimated or falls away after the roadshows and the offer price has to be reduced below the initial filing range, the underpricing is also low. That is, even after a downward adjustment, first day returns are lower than average. In contrast, if the offer price is adjusted above the filing range, the first day returns tend to be much higher than average. This has been interpreted as a partial adjustment to demand if it has been initially underestimated. In other words, if the market demand was incorrectly estimated at the time of initial filing of a range, the subsequent adjustment only corrects partially for this problem.

I find that adjustments to the filing range are significantly associated with the larger underpricing of Chinese IPOs. The higher underpricing for Chinese IPOs is mostly due to those where the filing range was increased. While the underwriters increased the offer price in response to greater than estimated demand, and they failed to raise it adequately for both US and Chinese IPOs the under adjustment is significantly greater for Chinese IPOs. My end conclusion is that while underwriters try to treat US and foreign IPOs on the same footing, they tend to make larger errors regarding the market demand for Chinese IPOs.

As noted earlier, I repeat all these findings in a matched sample of Chinese and US IPOs. The results are qualitatively similar in the matched sample suggesting that while some well-known causes of underpricing such as in industries like Hi-Tech might partially explain the greater underpricing of Chinese IPOs there is a strong residual effect from the fact that underwriters cannot estimate the demand as accurately for Chinese IPOs as for US IPOs.

5.1 Applications and Extensions

The main application of my findings is that asymmetric information about demand is a much more severe problem for Chinese firms and other foreign firms relative to US firms. This could be due either to the fact that there is greater inherent uncertainty with regard to the prospects of Chinese firms and underwriters are more concerned about the riskiness involved, or it could be that the clientele for Chinese IPOs are less well-known to investment bankers leading to difficulties in setting the initial filing range. An implication of my findings is that perhaps, underwriters should charge higher fees for Chinese IPOs and do a more diligent job at determining the filing range so that the offer price is not raised outside this range.

The sample of Chinese IPOs in the US, even including ADR's, is quite small, and expanding the observations, perhaps by including Chinese IPOs in Europe is one possibility. However, this may not lead to many more observations. A more direct possibility is to examine trading data to see why it is harder to predict the demand for Chinese IPO's. It is natural to ask whether this inherent uncertainty is driven by volatile liquidity in the aftermarket. Analyzing the trading volume both on

information days and on non-information days may provide useful insights on the market for Chinese and other foreign IPOs.

Another point is the analysis of prices and volume at the end of the lock-out period. Some studies have argued that the true aftermarket price is manifested only after the insiders are allowed to trade freely. For this reason, it will be interesting to examine whether the price patterns of Chinese and US IPOs are significantly different around the end of the lock-out period. In particular, it will be interesting to see if there are any differences in insider sales at the end of the lock out period and how this links up with the trading in the pre-lockout period.

5.2 Conclusion

This study examines all IPOs in the US market and compares Chinese and other foreign IPOs with US IPOs. I find that market-making by investment banks is quite homogenous across these groups but the relationship between the offer price and aftermarket prices is very different across the groups. In particular, I find that Chinese IPOs are more profitable for investors than US IPOs in a short window following the IPO. These excess returns may simply reflect higher risk but they could also reflect a failure of underwriters to accurately measure the demand for Chinese IPOs.

Appendix I

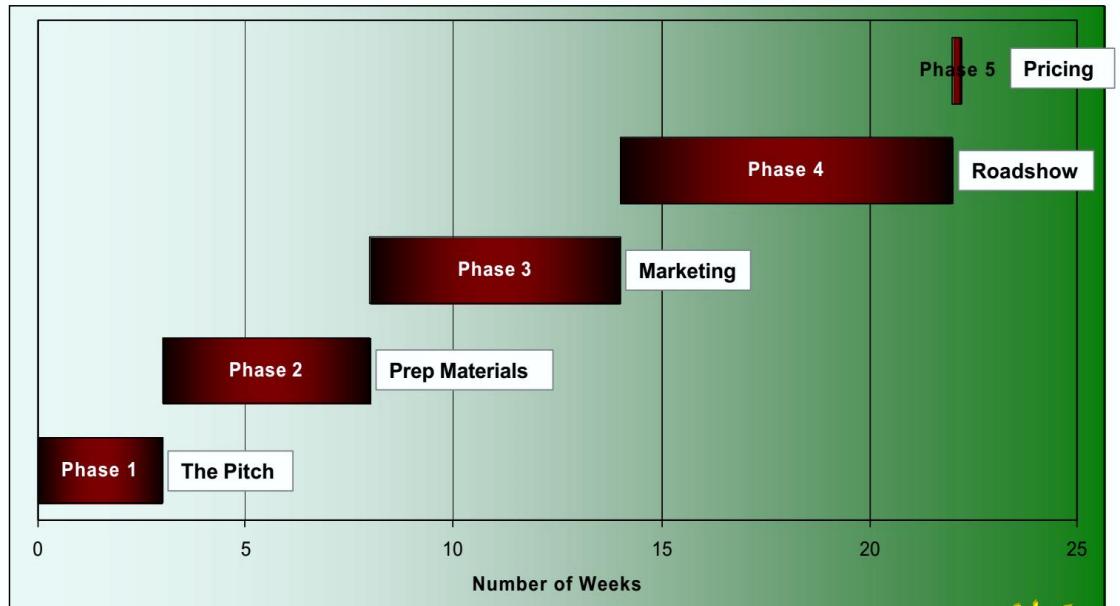
A: Type of ADRs (Bank 2017)

Type of ADR	Description	SEC Filing required	Capital Raising
Un-sponsored	ADRs traded on the US OTC market, using existing shares. No contractual relationship with firm. Up to four depositary banks can establish	Form F-6 (filed by depositary bank), 12g3-2(b) exemption	No
Sponsored Level I	ADRs traded on the US OTC market, using existing shares. Firm forms contractual relationship with single depositary bank	Form F-6 (filed by depositary bank and firm), 12g3-2(b) exemption	No
Sponsored Level II	ADRs listed on a recognized US exchange (NYSE or NASDAQ), using existing shares	Form F-6, Form 20-F	No
Sponsored Level III	ADRs initially placed with US investors and listed on a recognized US exchange (NYSE or NASDAQ)	Form F-6, Form 20-F, Form F-1	Yes

Figure 1. 1: Securities Insurance Process

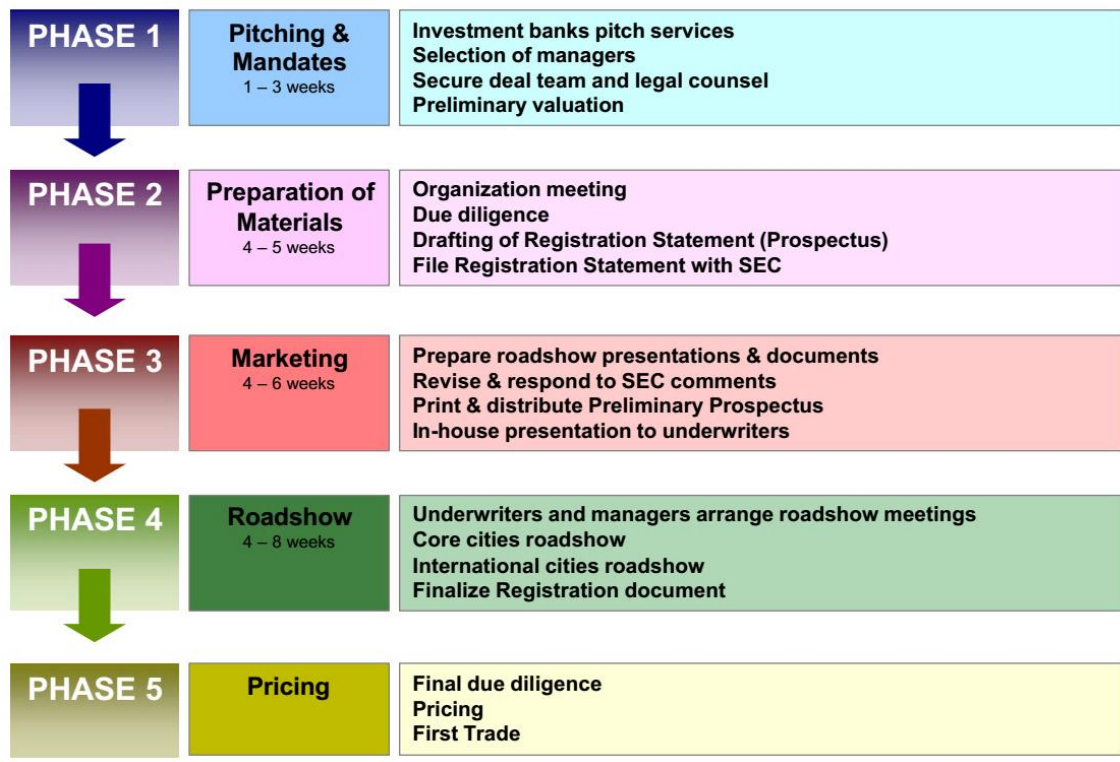
a.

SECURITIES ISSUANCE PROCESS



b.

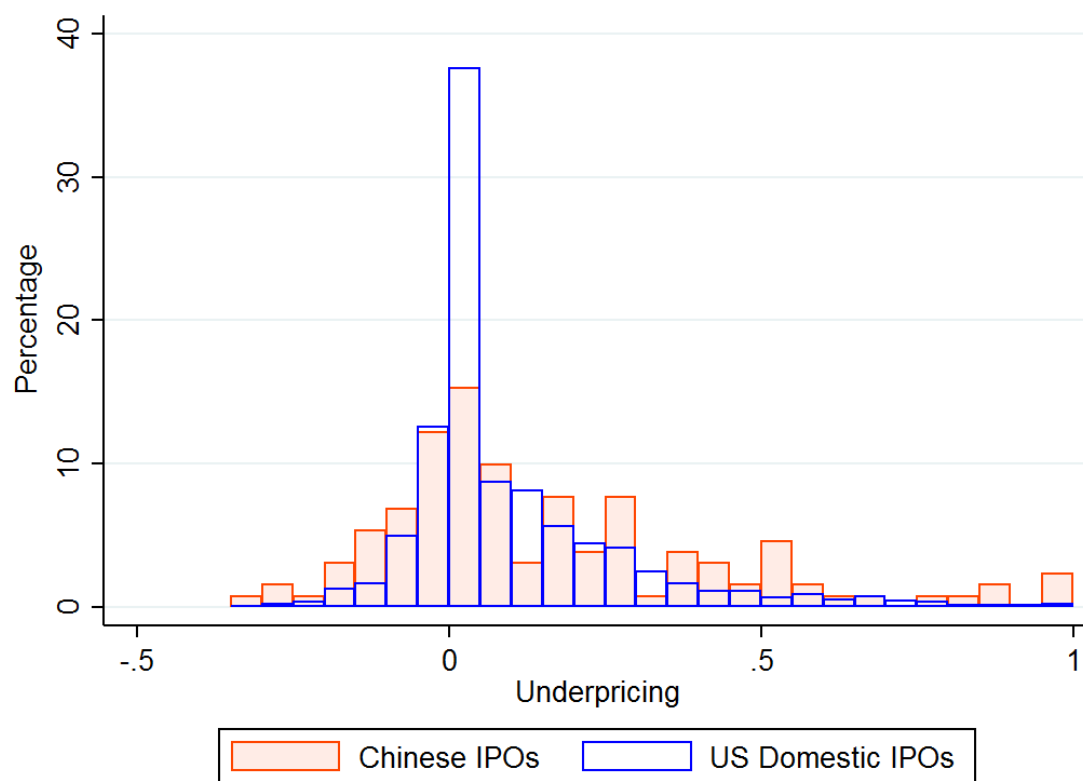
SECURITIES ISSUANCE PROCESS



IPO Process & Timetable - Wall Street Training (Hamilton Lin)

http://www.wallst-training.com/resources/WST_IPO_Process_and_Timetable.pdf

Figure 1. 2: Percentage of IPO Underpricing for US and Chinese IPOs



Bar width: 5

Tables

Table 1. 1: Sample selection

Table 1.1 demonstrates my sample selection process. As same as prior researcher noticed, I manually check the mistake and exclude the duplication observation and ticker symbol in SDC database (45 IPOs are excluded). I try to replace the missing value with the earliest closing price within seven days subsequent to the issue date (i.e. the second day, third day, or first week closing price) in SDC. For the observations cannot find closing price within seven days. I exclude the missing values of closing price and/or offer price (224 IPOs are excluded). The final sample from SDC has 2557 observations, although in some of the tables I am missing up to 1.8% of the sample because of incomplete information. Among the 2557 IPOs, 2213 IPOs are from the United States, 137 IPOs are from China and 207 IPOs are from other foreign countries.

			<u>US</u>	<u>Chinese</u>	<u>Others</u>	
			Common Shares	Common Shares	ADRs	ADRs
Initial data size (Three major exchanges, 2002-2016)		2826				
Subtract	Duplicate Observations	(5)				
	Duplicate Ticker	(40)				
	(SDC error or CRSP change, manually correct)					
	Missing IPO closing price from SDC	(224)				
Final Sample		2557	2213	26	111	36

Table 1. 2: Summary of underpricing

Table 1.2 Panel A summarizes the mean and median value of IPO underpricing, and the number of IPOs for each group in my sample period of 2002–2016. U.S. domestic has the largest number of IPOs in my sample with 2213 IPOs, following other foreign country issues 207 IPOs in US market, 171 IPOs are common shares and 36 are ADRs. The Chinese firm in US markets has 137 IPOs, among them 26 IPOs are common shares and 111 IPOs are ADRs during 2002 to 2016 period. Chinese IPOs have more ADRs compare to other foreign countries'. However there is no large difference on underpricing between all foreign common shares and ADRs. This result provides further evidence that ADRs in my sample are generally type III ADRs which have no home country security back and have the same level of information asymmetric with common shares.

Panel A:

		<u>Underpricing</u>					
		N	Mean	Median	Std. Dev.	Min	Max
All		2557	11.02%	2.00%	0.258	-91.18%	353.85%
US		2213	10.50%	2.00%	0.240	-91.18%	350.00%
China	All Chinese IPO	137	22.51%	8.00%	0.465	-33.00%	353.85%
	Common Shares	26	27.49%	0.00%	0.466	-29.17%	153.75%
	ADR	111	21.35%	9.00%	0.466	-33.00%	353.85%
Others	All Others IPO	207	8.97%	2.00%	0.229	-34.88%	121.54%
	Common Shares	171	9.17%	1.00%	0.228	-27.50%	117.14%
	ADR	36	8.04%	5.00%	0.236	-34.88%	121.54%

Panel B:

	All IPOs		US IPOs		Chinese IPOs		Others IPOs	
	Mean	Median	Mean	Median	Mean	Median	Mean	Median
Number of obs.	2,557		2213		137		207	
Underpricing	11.02%	2.00%	10.50%	2.00%	22.51%	8.00%	8.97%	2.00%
Offer Price	15.39	15.00	15.41	15.00	12.23	11.00	15.02	14.00
Proceeds in mil	257.88	120.00	255.01	122.10	269.78	96.00	222.18	131.45
Gross Spread as %	6.31%	7.00%	6.25%	7.00%	6.85%	7.00%	6.30%	7.00%
ln(total assets)	5.04	5.00	5.06	5.08	4.46	4.45	5.27	5.33
ln(1+age)	2.28	2.30	2.22	2.20	3.11	2.30	2.22	2.48
Shares Inside Holding (%)	67.10%	74.06%	66.01%	73.10%	83.03%	91.41%	68.18%	74.86%
Hi-Tech Dummy	0.38	0.00	0.35	0.00	0.58	1.00	0.44	0.00
VC Dummy	0.32	0.00	0.30	0.00	0.60	1.00	0.32	0.00
PE Dummy	0.23	0.00	0.23	0.00	0.10	0.00	0.22	0.00
Standard Lock Dummy	0.90	1.00	0.90	1.00	0.89	1.00	0.89	1.00
ABOVE file range Dummy	0.15	0.00	0.14	0.00	0.24	0.00	0.13	0.00
Top-Tier Underwriter Dummy	0.72	1.00	0.71	1.00	0.74	1.00	0.77	1.00

Table 1. 3: Likelihood of underpricing/overpricing

Table 1.3 displays the likelihood that IPOs go to underpriced or overpriced. For all the underpriced US domestic IPOs, the mean and median value of underpricing are 18.5% and 11%; for all the overpriced US domestic IPOs, the mean and median value of underpricing are negative, -6.17% and -4%, respectively. For all the underpriced Chinese IPOs, the mean and median value of underpricing are 38.34% and 25%; for all the overpriced Chinese IPOs, the mean and median value of underpricing are negative, -9.15% and -7%, respectively. Here the positive underpricing value indicates that either issue price is discounted, or the market will pay premium for the new issue due to high demands and interests. On the contrary, the negative value of underpricing or negative first day return indicates a premium on issuing price, or the low demand and interests from the public investors. Table 1.3 also shows the likelihood of IPOs to be underpriced or overpriced. Including the zero first day return, the probability of US domestic IPOs to go underpriced is 63.71%, the Chinese IPOs is 65.69%. There is no notable difference on the chance to go underprice for these two groups of IPOs. The following Table 1.3 Panel B employ the Chi-square analysis and shows the level of chi2 is greater than 0.1. Therefore, there is no significant difference on the likelihood to go underpriced for US domestic IPOs and Chinese IPOs.

Panel A:

	Likelihood to be Underpriced	[+] / underpriced			[-] / overpriced			0	Total Obs
		<u>N</u>	<u>Mean</u>	<u>Median</u>	<u>N</u>	<u>Mean</u>	<u>Median</u>	<u>N</u>	<u>N</u>
All	63.59%	1626	19.61%	12.00%	564	-6.55%	-4.00%	367	2557
US	63.71%	1410	18.50%	11.00%	460	-6.17%	-4.00%	343	2213
China	65.69%	90	38.34%	25.00%	40	-9.15%	-7.00%	7	137
Others	60.87%	126	18.65%	11.00%	64	-7.70%	-5.00%	17	207

Panel B: Chi Square test

Observed Values		US	CN	
	UP	1410	90	1500
	OP	460	40	500
		1870	130	
Estimate Values		US	CN	
	UP	1402.50	97.50	1519
	OP	467.50	32.50	501
		1892	128	2020
Chi ²	0.116	>0.1		(No significantly difference

Table 1. 4: Underpricing of Hi- tech, VC backed and best effort contract commitment IPOs

Table 1.4 summarizes the mean value of IPO underpricing for different groups in sample when Hi-tech, VC, and best effort commitment are involved. For US domestic and Chinese IPOs, Table 1.4 Panel A displays the IPOs which have core business that is Hi-tech related, have higher underpricing than other industries. For other foreign IPOs, this effect reverses. The difference in Hi-tech involvement and no Hi-tech related business on US domestic IPOs is 8.7%, higher than this difference in Chinese IPO groups, which is 3.4%. The difference in Chinese and US domestic underpricing is much higher when the IPOs are not related with Hi-tech business, which equals to 12.9%, while the difference on the Hi-tech related IPOs equals to 7.7%. The Hi-tech involved business, in some way, mitigates the gap in US domestic and Chinese IPOs' first day return.

Table 1.4 Panel B displays the IPO underpricing when venture-capital is backed behind the stocks that first traded in US exchanges. For all three groups, US domestic, Chinese and other foreign countries' IPO, the VC backed issues all have higher underpricing or first day return. The US domestic firms seem to benefit most from the VC backing, which have the highest difference on underpricing at 11.8%. Following is other foreign countries' firms; the difference on first day return is 8.1%. And Chinese firms seems have the least benefit or impact from the venture-capital backing with the difference on first day return being only 3.8% between the VC backed and non-backed IPOs. Telling from the table, the difference on Chinese and US domestic underpricing is much higher when the IPOs are not backed by venture-capital, which equals to 13.2%, while the difference on the VC backed IPOs equals to 5.3%. Just like Hi-tech involved business, the venture capital can also, in some way, have some influence reducing the difference on US domestic and Chinese IPOs' first day return.

Panel A:

	Hi-Tech Industry		Non Hi-Tech		Difference on Underpricing
	N	Mean	N	Mean	
All IPO	968	16.10%	1589	7.90%	8.20%
US IPO	790	16.10%	1423	7.40%	8.70%
China IPO	87	23.80%	50	20.30%	3.40%
Others IPO	91	8.90%	116	9.00%	-0.10%

Panel B:

	VC Backed		Non VC Backed		Difference on Underpricing
	N	Mean	N	Mean	
All IPO	822	18.90%	1722	7.20%	11.70%
US IPO	670	18.60%	1538	6.80%	11.80%
Chinese IPO	86	23.90%	48	20.00%	3.80%
Others IPO	63	15.00%	136	6.90%	8.10%

Panel C:

	Best Efforts		Other Techniques		Difference on Underpricing
	N	Mean	N	Mean	
All IPO	25	39.40%	2531	10.70%	28.70%
US IPO	23	41.70%	2190	10.20%	31.60%
Chinese IPO	2	12.80%	135	22.70%	-9.80%
Others IPO	0	-	207	9.00%	-9.00%

Table 1. 5: Underpricing with Lockup period

Table 1.5 shows the IPO underpricing for each group under different lock up agreements. Lock up terms reveals how strong the firms' agreement to protect the uninformed public investors is. Table 1.5 Panel A provides an overview, ignoring some omitted observations. For all three groups, more than 80% of the issuers choose the standard 180 days lock up term following SEC's guidance. The first day returns for different terms are not quite different, only 2.5% for US domestic issuers, 1.1% for Chinese issuers and 3.4% for other foreign issuers. The difference on underpricing for Chinese issuers with the other two groups across the type of lock up terms is showing similarities. Under the standard setting, Chinese IPOs are 11.6% higher than US domestics. Under the non-standard setting, this difference is 13.1%. The same pattern remains the same for Chinese and other foreign issuers, for which the differences are 13% and 15.4%.

Table 1.5 Panel B provides a more detailed picture on lock up terms. Given the average of each group, the analysis shows that US domestic IPOs have the highest underpricing when applying standard lock up terms; Chinese IPOs have the highest underpricing when applying relatively longer lock up terms for which no term for any insiders is shorter than 180 days; Other foreign IPOs have the highest underpricing when applying shorter lock up terms or relatively weaker public investor protection. The length of lock up terms release is a signal for how strong the insiders are. These possible insiders include executive, shareholder and underwriters. Normally the insiders prefer a shorter lock up term to get faster cash out and a longer lock up term can protect the non-informed outsiders better. Therefore, a longer lock up term can reveal the level of responsibility of the issuer to the public. The result from this table is rather confusing and worth further investigation and discussion.

Panel A:

		Standard	Non-Standard	Difference
		180 days	Other terms	on underpricing
All IPO	Mean	11.50%	8.70%	2.80%
	N	2106	451	
	%	82.36%	17.64%	
US IPO	Mean	11.00%	8.40%	2.50%
	N	1814	399	
	%	81.97%	18.03%	
Chinese IPO	Mean	22.60%	21.50%	1.10%
	N	121	16	
	%	88.32%	11.68%	
Others IPO	Mean	9.60%	6.10%	3.40%
	N	171	36	
	%	82.61%	17.39%	

Panel B:

		Weaker	Standard	Stronger	Complex	No protection	Average of
		<180 days	180 days	>180 days	Mixed terms	No lock up terms	Total obs
Lock up term indicator		1	0	2	3	missing days	
All IPOs	Mean	11.40%	11.50%	9.40%	7.60%	6.80%	11.00%
	N	112	2109	104	12	220	2557
	%	4.38%	82.48%	4.07%	0.47%	8.60%	
US IPOs	Mean	10.20%	11.00%	8.70%	7.90%	7.20%	10.80%
	N	94	1817	87	10	205	2213
	%	4.25%	82.11%	3.93%	0.45%	9.26%	
Chinese IPOs	Mean	17.50%	22.60%	29.20%	-	0.00%	22.70%
	N	8	121	7	0	1	137
	%	5.84%	88.32%	5.11%	0.00%	0.73%	
Others IPOs	Mean	18.60%	9.60%	1.70%	6.30%	0.40%	9.60%
	N	10	171	10	2	14	207
	%	4.83%	82.61%	4.83%	0.97%	6.76%	

Table 1. 6: Underpricing with partial adjustment

Table 1.6 displays that an alternative approach to evaluating the demand for IPOs is the partial adjustment phenomenon documented in Hanley (1993). She suggests that underwriters fail to adjust the offer price of an IPO high enough when they encounter unexpectedly strong demand for an issue on the road show. As a result, her study, “above the file range” offers experience two times the underpricing of a typical (within the file range) IPO. Following her study and Loughran and Ritter's work (2004), Table 1.6 reports the underpricing associated with offers that occur above or below the preliminary file range. An upward revision occurs when the offer price of the IPO exceeds the midpoint of the preliminary file range (expected price). A downward revision occurs when the offer price of the IPO is less than the expected price. 27.94% of Chinese IPOs experience upward price revisions, roughly two times that of domestic US IPOs and other foreign IPOs. Other foreign firms make the most downward revision at about 32% higher than US domestic and Chinese IPOs. Notably, upwardly revised Chinese IPOs experience average underpricing of 50.6% compared to 35.6% for the domestic IPOs. Underpricing is significantly higher for upwardly revised IPOs. In terms of downward revisions, domestic, Chinese and other foreign IPOs experience similar lower underpricing. These results provide evidence which suggests that underwriters who work with Chinese issuers are less likely to adjust the offer price to the proper level as compared to US firms. And the market has abnormally high demand on Chinese IPOs beyond underwriters’ price prediction ability.

		Below filing range	Within filing range	Above filing range	Total Obs
Price to filing range indicator		1	0	2	
All IPO	Mean	2.70%	7.70%	36.40%	11.00%
	N	483	1653	376	2512
	%	19.23%	65.80%	14.97%	
US IPO	Mean	2.60%	7.30%	35.60%	10.40%
	N	409	1460	312	2181
	%	18.75%	66.94%	14.31%	
Chinese IPO	Mean	5.80%	12.70%	50.60%	22.60%
	N	13	85	38	136
	%	9.56%	62.50%	27.94%	
Others IPO	Mean	2.60%	9.10%	26.10%	9.40%
	N	61	108	26	195
	%	31.28%	55.38%	13.33%	

Table 1. 7: Industry-issue size-matched sample summary statistics

Table 1.7 demonstrates the results for an issue-size-matching sample from US domestic IPOs with similar capital raised to Chinese IPOs. Due to the identical issue size, there is likely more than one domestic firm which matches with Chinese firms. The final matching sample has 137 Chinese IPOs and 186 similar issue size domestic IPOs. The t-test indicates that even for the similar size IPOs, Chinese firms still have significantly higher underpricing as compared to US domestic firms. The issue price is also significantly lower than US firms. However the gross spread or the total compensation pay to the underwriter is similar between the two groups. This variable reveals the broker fee paid to the underwriter, and hence discloses that the effort the underwriter makes for a US and a Chinese IPO is generally the same. The result of underpricing for the above filing range is consistent with Table 1.6. It suggests that with the same level of compensation and effort, the underwriter still fails to adjust issue price for Chinese IPOs.

	Chinese IPOs	Capital Raised -Matched US Domestic IPOs	Chinese and matched IPOs
Number of observations	137	186	323
Underpricing Mean	22.51%	15.15%	18.27%
t-statistic(compare to Chinese IPOs)		0.088*	0.338
Underpricing Std.Dev.	0.46	0.22	0.35
Offer Price	12.23	13.76	13.04
t-statistic		0.021**	0.179
Proceeds in mil	269.78	214.38	239.96
t-statistic		0.717	0.841
Gross Spread as %	6.85%	6.68%	6.76%
t-statistic		0.122	0.349
ln(total assets)	4.46	4.64	4.56
ln(1+age)	3.11	2.29	2.66
Shares Inside Holding	83.03%	71.46%	76.35%
Hi-Tech	0.58	0.59	0.58
VC	0.60	0.46	0.53
PE	0.10	0.22	0.16
Standard Lock	0.89	0.89	0.89
Expected Price	0.64	0.56	0.59

ABOVE File Range	0.25	0.20	0.22
Underpricing for Above range	50.59%	34.73%	42.46%
Top-Tier Underwriter	0.74	0.69	0.71
Likelihood to go underpriced	65.69%	67.74%	66.72%

Table 1. 8: OLS regression

Table 1.8 presents the results for Ordinary Least Squares regression analysis. Underpricing is the dependent variable. For US domestic IPOs, offer price, gross spread, venture-capital backing, private equity backing, and partial adjustment are significantly positively correlated with first day return. For Chinese IPOs, the offer price, gross spread, and partial adjustment are significantly positively correlated with first day return. Interestingly, private equity backing is negatively correlated with first day return; right in the opposite direction of the US domestic sample. The results for other foreign countries are ambiguous, and may be impacted by the complexity of county construction. Only venture-capital backing has significantly positive correlation with first day return. Panel B demonstrates the OLS regression results on the industry-issue size matched sample.

Panel A: OLS regression on full sample

	All IPOs		US IPOs		Chinese IPOs		Others IPOs	
	Coefficient	t-value	Coefficient	t-value	Coefficient	t-value	Coefficient	t-value
Number of obs.	1,954		1664		132		178	
Offer Price	0.004***	4.070	0.005***	4.670	0.015	1.540	-0.001	-0.150
Proceeds in mil	0.000	0.220	0.000	-0.420	0.000	0.330	0.000	0.980
Gross Spread as %	1.180**	2.150	1.150*	1.640	10.326*	1.910	0.115	0.130
ln(total assets)	-0.011***	-3.190	-0.009**	-2.500	-0.008	-0.240	-0.027**	-2.370
Shares Inside Holding(%)	0.177***	6.270	0.138***	4.750	0.212	1.060	0.236***	2.860
Hi-Tech Dummy	-0.012	-0.890	-0.003	-0.240	-0.012	-0.130	-0.098**	-2.140
VC Dummy	0.052***	3.340	0.066***	4.290	-0.174	-1.390	0.083	1.600
PE Dummy	0.011	0.750	0.024*	1.700	-0.327*	-1.840	0.013	0.270
Standard Lock Dummy	-0.015	-0.850	-0.007	-0.390	-0.001	-0.010	-0.017	-0.300
ABOVE file range Dummy	0.251***	17.070	0.242***	16.790	0.364***	3.840	0.161***	2.930
Top-Tier Underwriter Dummy	0.012	0.920	0.011	0.860	0.011	0.100	0.059	1.170
Intercept	-0.134**	-2.790	-0.142**	-2.510	-0.769*	-1.680	0.027	0.230
Adjust R ²	0.221		0.252		0.146		0.103	

Panel B: OLS regression on industry-issue size matched sample

	Chinese IPOs		Matched US IPOs		Chinese and Matched US IPOs	
	Coefficient	t-value	Coefficient	t-value	Coefficient	t-value
Number of obs.	132		172		304	
Offer Price	0.015	1.540	0.009**	2.250	0.010**	2.190
Proceeds in mil	0.000	0.330	0.000	-1.040	0.000	0.150
Gross Spread as %	10.326*	1.910	0.659	0.300	5.363**	2.090
ln(total assets)	-0.008	-0.240	-0.004	-0.340	-0.005	-0.400
Shares Inside Holding(%)	0.212	1.060	0.219**	2.110	0.244**	2.350
Hi-Tech Dummy	-0.012	-0.130	0.029	0.810	0.011	0.250
VC Dummy	-0.174	-1.390	0.028	0.660	-0.051	-0.950
PE Dummy	-0.327*	-1.840	-0.039	-0.850	-0.109*	-1.730
Standard Lock Dummy	-0.001	-0.010	-0.003	-0.050	-0.037	-0.520
ABOVE file range Dummy	0.364***	3.840	0.175***S	3.860	0.273***	5.460
Top-Tier Underwriter Dummy	0.011	0.100	-0.030	-0.680	-0.015	-0.280
Intercept	-0.769*	-1.680	-0.177	-1.010	-0.452**	-2.190
Adjust R ²	0.146		0.247		0.178	

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Essay II: The impact of auditing and voluntary information verification on default rate: evidence from small private business

1. Introduction

Conventional wisdom asserts that public companies should release comprehensive information because this leads to more efficient capital allocation by the market. Investors in public companies face an information asymmetry problem and react in suboptimal ways if disclosure is inadequate and fails to reduce information asymmetry across capital providers and users. Among all channels of communication, audited financial statements play the most important role and independent assurance is considered a requisite for high quality financial statements. Higher audit quality should therefore work as “greater assurance that the financial statements faithfully reflect the firm’s underlying economics, conditioned on its financial reporting system and innate characteristics (DeFond, Zhang 2014).” For public companies in many countries, a professional third party has to provide assessment and affirmation to make sure a company’s financial information meets the required standards on relevance, faithfulness, comparability, verifiability, timeliness and understandability. This system is no doubt a trustworthy information filter to public investors which can help to reduce the information asymmetry across capital user and provider.

However, the assurance quality varies in that some systems do not have a mandatory auditing requirement. For instance, the privately held companies are not

subject to SEC or other financial institutions' supervision and they are not responsible for public investors who are highly dependent on audited financial statements to obtain information. On the contrary, private firms are only responsible for their particular capital provider: family and friends (insider finance), venture capital, commercial banks or other private lenders. Among them, a commercial bank is the most important capital provider. Due to the opaque information quality of many small businesses, verifying information and monitoring capital usage remains a difficult problem for commercial banks particularly in "new" economies like China. While there is much prior research on the relation of audit quality and cost of capital in publicly traded firms, my study aims to the effect of audited financial statement on small business commercial bank loans. Moreover, I also examine whether other non-financial mechanisms that mitigate information asymmetry can moderate the risk of default for those small business which provide no audited report.

The data examined in this paper covers a large proportion of loans made by a private Chinese bank to small businesses. There is considerable information on the characteristics of individual borrowers as well as their businesses. In addition, there is considerable variance in the use of audited financial statements. However, audits in China correspond to reviews in the US where the auditor simply checks the information submitted by the client for numerical errors and no attempt is made to critically examine whether the information reflects the underlying properties of the business. For this reason, it is unclear whether auditing will have any effect on default rates.

For both audited and unaudited statements, I examine whether previous involvement between the bank and the business owner, or the fact that the owner was born in the same town as where the business is located, has an effect on default rates. These factors may mitigate potential adverse selection or moral hazard problems with regard to borrowers. For these reasons I expect that both these variables will lower the default rate on loans.

The third research question concerns the use of group lending schemes where each borrower agrees to help the others in the group in case of financial difficulties. The use of such groups has become a standard theme for many micro-lenders, the best-known example being the Grameen Bank in Bangladesh. The founder of the Grameen Bank, Mr. Muhammad Yunus, was awarded the Nobel Peace Prize in 2006. The advantages of group lending are that it provides both joint liability risk sharing and local monitoring of each borrower by the other members of the group. Indeed, it is this second feature, that potential moral hazard is curbed by mutual monitoring, that is often believed to be the main advantage of group lending schemes. However, there is another well-known problem, free-riding, which is associated with group lending. Some members of the group may refuse to pay their share when other defaults, guessing that some other non-defaulting member may be willing to pay double share of the default to avoid compromising their position with the bank. For this reason, it is interesting to examine how the default rate varies with group size.

I found that the presence of an audited financial statement significantly affects the probability of default. In view of the fact that auditing in China is very superficial,

it is difficult to imagine why there is such a positive outcome due to auditing. A closer examination of the data shows that most of the borrowers who get their statements audited are older and larger in size. I therefore conjecture that the lower bankruptcy rate is more a signaling mechanism rather than a monitoring mechanism. In other words, audited statements are associated with a higher “type” of borrower, resulting in better outcomes for the loan.

Customer loyalty to the bank, that is, a longer relationship with the bank, also reduces the default rate with or without audits. Indeed, I find that loyalty acts as a substitute for auditing since customers with a long association rarely provide audited statements. I explain this result in a straightforward way in that a longer association gives the bank a better understanding of the customer and the likelihood of repayment of the loan. More interestingly, I also find that when the borrower was born in the same town as the business and the lending bank, there is also a reduction in the default rate. This may be interpreted either as arising from lower asymmetric information, or in the case of group borrowers, closer bonding with the other borrowers.

The analysis of group lending shows significantly higher default rates for groups of five than for groups of four or three. Unfortunately, the total sample of group lending is not large enough to robustly confirm this result. However, it is suggestive that the free rider problem is already present in groups of five. This finding may have two possible explanations though both are linked to the free rider problem. The first is the traditional one, that in a group of five, there are incentives

to not pay the fair share in the hope that the cost of default is higher for some other member of the group who will then pay a doubled share. An alternative is that the default may be blamed on some other member of the group who refused to contribute towards helping with loan repayment.

There are relatively few studies that provide insights into the role of an external audit in private debt pricing in a voluntary audit environment, (Kim et al. 2011b) and this study provides some information on this gap in the literature. In particular, this study shows that in a voluntary audit regime, the separation obtained by the fact that “better” types seek voluntary audits (Ronneen 1996) is confirmed in our study. In general, it is difficult to separate the effects from audit quality from the effects of the types that seek an audit. This is somewhat mitigated in our setting where the informational role of the audit is negligible and the effects of the types of borrowers who seek audits is emphasized.

The positive effects of customer interaction history conform to prior studies on the topic and has a straightforward explanation related to greater information. However, there is usually a lack of documentation of individual characteristics such as whether the borrower is approaching a bank in his/her hometown. While the results are not particularly surprising, they do show that the customer data is reliable and does not contain much noise.

The results on group lending, or solidarity lending as it is alternatively known, are perhaps the most interesting, but the scope is limited by the size of the sample. Popular wisdom (Solidarity Lending, Wikipedia) suggests that a group of five

members is most efficient in protecting against default. Instead, my findings suggest that groups of three or four may be better at balancing the tension between the favorable effects of risk-sharing and the unfavorable effects of free riding at least in the context of this data sample.

The rest of the paper is organized as follows. The next section provides the institutional background to auditing and commercial lending to small businesses in China. The hypotheses are developed in Section 3 while the tests and results are provided in Section 4. Section 5 provides the conclusions as well as the limitations and potential extensions of my study.

2. Background

I focus on micro firms in China and examine different assurance mechanisms for mitigating information asymmetry: (i) independent assurance through voluntary auditing; (ii) information collected by banks on customers that have a prior relationship with the bank and (iii) private monitoring through group lending. An audited financial statement is a voluntary choice because like in the United States, auditing is not a mandatory requirement for private firms. The majority of capital used in a private firm is mostly likely to be personal or family savings or credit card and commercial bank loans. It is not necessary to present an audited financial statement to capital providers.

Most studies focus on the audited financial statement's usefulness prior to a commercial bank loan. Our research, on the contrary, focuses on the bank loan repayment performance after the loan closing. Using a sample of Chinese small

businesses, I investigate whether audited financial statements can reduce information asymmetry between the lender and borrower, and therefore help to reveal the true value of a small business.

2.1 Financial reporting and auditing environment in China

In the United States, Generally Accepted Accounting Principles (GAAP) are the standard framework of guidelines for financial accounting used in any given jurisdiction. International Financial Reporting Standards (IFRS) is a single set of accounting standards, developed and maintained by the International Accounting Standards Board (IASB) with the intention of those standards being capable of being applied on a globally consistent basis, thus providing investors and other users of financial statements with the ability to compare the financial performance of publicly listed companies on a like-for-like basis with their international peers. IFRS Standards are now mandated for use by more than 100 countries, including the European Union and by more than two-thirds of the G20 Countries. As a leading developing country in G20, China has been improving its accounting standard consistently. Chinese accounting standards (CAS) are the accounting rules used in mainland China. CAS is unique because they originated during a socialist period in which the state was the sole owner of industry. Therefore, unlike western accounting standards, they were less a tool of profit and loss, and more an inventory of assets available to a company. This system of accounting was widely considered to be unsuitable for managing corporations in a market economy. In 2006, the Chinese government introduced a revised accounting law. This was the fruit of considerable discussion and protracted debate, involving the Ministry of Finance,

members of the IASB and representatives of some Chinese firms. The old Chinese Accounting Standards (CAS) was largely replaced by the International Financial Reporting Standards (IFRS) to bring China more in line with the rest of the world. The similarity between the new CAS and the IFRS is almost 90–95%. This set of standards is an implement for all listed enterprises in the Chinese market. For smaller enterprises including private holding companies, the ministry of finance issued the Accounting Standards for Small Enterprises (ASSE) in 2011. These standards provide detailed regulatory guidance to smaller enterprises to standardize their internal accounting processes. However, despite the official regulation on small business from the Chinese government, the nature of small private business leads to a structure that has some level of internal accounting but lack of external auditing. In this case, all small business' auditing reports are voluntary.

The audit quality in China for small business is ambiguous. Big four audit firms cooperate with Chinese audit firms and the resulting quality is acceptable. However, there are few audit firms which are willing to provide auditing services to private firms. After interviewing some small business owners and the bank that provides us small business data I found the “audit” in China for a small business to be more like a “review” in the US. The audit firms only check the form of the numbers but do not independently verify the accuracy of the content. As an example, the average charge for an audit report for small business is only 2000 RMB (about \$320 USD). Meanwhile a review in the US costs about \$3000 and an audit report costs about

\$15,000. I can make an assumption that the audit quality for a small business is much lower than for a public firm based on these figures and fees.

The integrality and complexity of financial statements for a small business are not like a public company that has massive numbers to process. Third party auditing is completely a voluntary choice made by the business owner. Hiring a bookkeeping expert, for relatively larger private firms or those lacking of hands, it may be a reasonable action to keep daily business on track. It is rare, however, that a small business hires an auditor to assess its financial numbers. It is purely an extra expense to them, but given sufficient motivation, for instance a growing business requiring a large amount of money, an audited financial statement may show good credibility to others and may increase the possibility of getting a loan or helping to obtain a lower interest rate.

2.2 Commercial Banking for Small Businesses in China

The lending environment for small business in China is very different than the US's. For micro businesses all over the world, commercial banking is the most reachable way for them to obtain funds. However, the number of commercial banks in China is very limited compared to the US. As of 2015, there were only 137 banks across the country of China, including 5 centrally controlled banks, 12 joint-equity banks and 120 city commercial banks. Both the number and dispersion of the branches are not as good as in the U.S. The less competitive environment allows the banks provide relatively simpler products to small business clients. Also, due to the

small number of bank branches, a small business faces greater challenges to find a bank and win the bank loan.

The Chinese government publishes several supporting legal documents to help small-micro businesses' growth, such as the 'Implementation suggestions for further development of small and micro business from State Council' in 2009, and the "Implementation suggestions for financing support to small and micro business from State Council' in 2013. Although these regulations show a great support from the central government, there is no direct fund guaranteed from the authority. The commercial banks have higher discretion since the regulation is relaxed, but is still under very strict supervision on deciding bank loan interest rates. On the other hand, it is not efficient for Chinese commercial banks to control the small loan risk through interest rate. Another issue is that it is very difficult to retrieve losses through legal systems. The law protects the money lender who suffers from losses, however since the small-micro loan amount is generally very small, the effort and fees involved with recovering the losses is always higher than the default amount itself. This makes the banks have to develop their own system to screen the clients before lending and keep closer monitoring after lending to prevent default and make profit.

One method the commercial banks use is so called "hard information," that is solid financial numbers, like financial statements, tax reports or third party guarantee reports. The financial statements are not usual for small-micro businesses because they are in lack of regulatory guidance and financial expertise

within their companies. However, the businesses do have bookkeeping to keep track of daily operations. In this case, some businesses are willing to hire an auditor to review their financial records.

2.3 Relationship lending in small-micro business

If the financial statement of a borrower has not been audited, more important may be the “soft” information obtained through ongoing banking relationships (Petersen, Rajan 1994; Berger, Udell 1995; Petersen 2004). This information, such as a loan officer’s knowledge of the potential borrower’s ability, character, and trustworthiness, is “soft” in the sense that it is hard to quantify and communicate to others, and may not be verifiable by outsiders. If the accuracy of information regarding a potential borrower increases the longer the relationship between the parties exists, and thereby reduces information asymmetries, past dealings with a borrower may provide superior information for assessing credit worthiness (Diamond 1991; Petersen, Rajan 1994). Despite the potential informational advantages from ongoing banking relationships, their theoretical influence on lending decisions is unclear. Boot and Thakor (1994) show that interest rates decline as the savings from the bank’s improved knowledge of the borrower is passed on to the borrower. In contrast, Greenbaum et al. (1989) and (Sharpe 1990) predict that interest rates increase with relationship length as the bank’s improved knowledge may have an influence on the formation of the relationship. The conflicting theoretical predictions are mirrored in the mixed empirical evidence on the impact of relationship duration on interest rates (Ongena, Smith 2001; Petersen, Rajan 1994; Berger, Udell 1995; Bharath et al. 2011). In China, interest rates are

centrally fixed and the literature cited here is only indirectly related to our hypothesis. I use the idea that a prior relationship allows the bank to select lenders more carefully reducing default rate rather than adjusting the interest rates.

2.4 Group lending with small-micro business

The concept of group lending is derived from Nobel peace prize winner Dr. Muhammad Yunus's practice of solidarity lending. It is a lending practice where small groups borrow collectively and group members encourage one another to repay. It is an important building block of microfinance (Wikipedia 2017b). In our sample, group lending refers to borrowing money from commercial banks as small groups rather than individuals. If the borrower is too small or not qualified to borrow as an entity, the bank will ask them to form a lending group along with other borrowers. The members in one lending group usually have some correlations: such as the owners being located in same area or knowing each other socially, or the businesses working together as upstream and downstream firms in the same product lines etc. This scheme does have inherent risks due to the possible collusion the business owners may form due to their close bonds. However only with this bond is it possible to establish the repayment contract with one's credit. The group size is usually between 2 to 5 members. The bank will give the borrowing group a loan and ask the group members to guarantee that if one member defaults, others will pay off the amount owed by the defaulting member. The key mechanism of group lending is this mutual monitoring and guarantee. The most common case for small business defaults is embezzlement when the bank loan is supposed to be used for daily operation and is used instead for a risky investment. Not surprisingly, these

investments often fail leading to default. In this case, group lending is a very strong restriction on the usage of the bank loan. The members have strong motivations to keep an eye on each other to monitor where the money is used, and keep track on each other's businesses' performance. Therefore, group lending is an efficient monitoring mechanism when the bank doesn't have enough resources to closely monitor every borrower.

Besides the peer enforcement, there are several mechanisms with which group lending can help to reduce the default rate: peer screen and peer monitoring. Allowing members to mutually choose other members is an efficient peer screen process that can be a substitution for credit score. There is no mature credit report system in China as far, so it is important to choose clients carefully using other assurance information. The banks either prefer individual loyal clients which have cooperation histories with them, or group lenders that are good enough to be qualified to be chosen by other borrowers. Therefore, joint liability is an alternative form of credit reports; hence the group lending strategy is an alternative form of collateral.

3. Literature review and research hypotheses

Information asymmetries between firm managers and lenders generally result in insiders having better information on the firm's past and future economic performance and, consequently, on firm default risk (Sengupta 1998; Bharath et al. 2008). Information asymmetries tend to be greater in small, private businesses,

which often have little institutional history and are not required to publicly disclose company-specific information (Butler et al. 2007). As a result, these businesses tend to be more informationally opaque than larger, publicly-listed firms, increasing information risk and potentially influencing lending decisions. To minimize these information asymmetries, lenders use multiple “information cues” to evaluate applicants' ability to repay loans. These information cues can take various forms, ranging from data on past financial performance and credit history to information on management's character, credibility, and quality acquired through personal knowledge of the potential borrower, observations of the firm's operations, systems, and employees, and costly signals of credit worthiness (such as the hiring of an external auditor) sent by the applicant (Fulmer 1991-1992; Shailer 1999; Danos et al. 1989). Although these various information cues differ in form from soft to hard, and in granularity from simple dichotomous signals regarding the use or non-use of a management or accounting practice to more granular credit scores and financial results, studies indicate that lenders combine and trade off these disparate cues when making lending decisions (Danos et al. 1989; Moulton 2007) .

Berger and Udell (2006) argue that financial institutions use three primary methods to obtain relevant information cues and compensate for information asymmetries in small business lending decisions: accounting-based lending, credit scoring, and relationship lending. In China, credit scores are not generally available. Instead I consider a third possibility that comes from micro-finance — the use of group lending. As noted earlier, group lending in China derives from the practice of

solidarity lending developed in Bangladesh and India. I will examine each of these issues in order.

3.1 Auditing

Most theories on auditing are based on the mandatory regime for publicly traded firms and on issues of differential quality and the association of audit quality with audit fees or with investor reactions. Many studies investigate whether audited financial statements can reduce firms' cost of debt, and the evidence is inconclusive. However, these studies also generally fail to find an association between auditor use or quality and firms' cost of debt (Houghton 1983; McKinley et al. 1985; Pany, Smith 1982). Based on this interest, other papers have studied the effect of auditing on private firms where the choice is voluntary.

The theoretical underpinning of the shift from voluntary audits to mandatory audits (or vice-versa) is provided in Ronnen (1996). That paper argues that high type firms would choose auditors under a voluntary regime. Blackwell et al. (1998) find auditor use associated with lower interest rates in 212 revolving credit agreements from six U.S. banks. (Kim et al. 2011a), using a panel sample of 9,168 privately held Korean firm years, find lower interest rate spreads for audited firms and even lower spreads for firms with Big 4 auditors. Further, exploiting the panel nature of their data, they find that firms that change from being not audited to audited have significant reductions in their cost of debt. Using a large proprietary database of privately held U.S. firms, Minnis (2011) provides evidence consistent with auditing reducing firms' cost of debt after controlling for firms' endogenous

audit choice. In contrast, companies that dispense with being audited suffer downgrades to their ratings because avoiding an audit sends a negative signal and removes its assurance value. In contrast, Allee and Yohn (2009) , using a sample of 1,481 U.S. small businesses, find no association between audit association and cost of debt.

Cassar et al. (2015) examine whether more sophisticated accounting methods (in the form of accrual accounting) interact with other information sources to reduce information asymmetries between small business borrowers and lenders, thereby lowering borrowers' probability of loan denial and cost of debt. They find that higher third party credit scores, but not the use of accrual accounting, decrease the likelihood of loan denial. Lennox and Pittman (2011) exploited a natural experiment in which voluntary audits replace mandatory audits for U.K. private companies. They analyze whether imposing audits suppresses valuable information about the types of companies that would voluntarily choose to be audited (as in (Ronnen 1996)). They control for the assurance benefits of auditing to isolate the role signaling plays by focusing on companies that are audited under both regimes. These companies experience no change in audit assurance, although they can now reveal for the first time their desire to be audited. They find that these companies attract upgrades to their credit ratings because they send a positive signal by submitting to an audit when this is no longer legally required.

Chinese audits of private businesses are low-cost and, by implication, low quality. However, this does not mean that the auditing for small business is

completely useless. A small business which is capable and willing to prepare a readable financial report and hire an auditor to review it sends a positive signal on its financial condition. The ability to interact with an auditor may convey that the firm has more sophisticated book-keeping technology and therefore has a higher chance of being given a loan (Cassar et al. 2015) In summary, my setting is one where there is little assurance value to auditing and signaling theory provides the underlying economic factor for classifying audited firms as higher quality and less likely to default. This leads to my first hypothesis (in null form).

H1: Audit in China has no effect on small business default rate.

Accounting reports are not the only information cue lenders can use to evaluate the financial condition and riskiness of potential borrowers. Credit scores are now readily available for many small businesses. These scores, which can be purchased from credit rating agencies such as Dun & Bradstreet and Experian in the US, incorporate a broad set of information on past credit history, business demographics, and other public information on financial history. Kallberg and Udell (2003) find that information in Dun & Bradstreet credit scores (particularly credit payment history) exhibits significant incremental ability to predict small business failure, over and above accounting information. Such hard data is not available in China and instead, I examine a “soft” data source.

3.2 Loyalty

The discussion thus far has focused on the influence of “hard” information on lending decisions. While the hard information in accounting reports and credit scores may be important factors in small business lending decisions, even more important may be the “soft” information obtained through ongoing banking relationships (Berger, Udell 1995; Petersen, Rajan 1994; Petersen 2004). This information, such as a loan officer's knowledge of the potential borrower's ability, character, and trustworthiness, is “soft” in the sense that it is hard to quantify and communicate to others, and may not be verifiable by outsiders. If the accuracy of information regarding a potential borrower increases the longer the relationship between the parties exists, and thereby reduces information asymmetries, past dealings with a borrower may provide superior information for assessing credit worthiness (Diamond, 1991; Petersen and Rajan, 1994).

I assess the influence of loyalty on repayment performance using the variable Relationship, which equals the number of days the firm had conducted business with X bank at the time of the commercial loan approval. Following prior studies (Cassar et al. 2015; Minnis 2011), I assume that information asymmetries are lower and the intentions to maintain a good relationship with X bank are higher when the firm has conducted business with a bank for a relatively longer period of time. This leads to our next hypothesis (in alternative form).

H2: A longer history with a bank has a negative correlation with default rate.

Hypotheses 1 and 2 were based on the notion of asymmetric information arising from adverse selection where the key problem of the lender is to differentiate between good and bad quality applicants for loans. The next issue is to deal with irresponsible behavior after the loan has been issued, that is, a moral hazard problem.

3.3 Group size

The primary moral hazard problem is that borrowers may misuse the funds they have obtained for risky ventures or for ones that yield private utility but do not generate sufficient returns. This problem is particularly acute in the micro-finance area where solidarity or group lending has been proposed as a solution. In particular, the main debate centers on optimal group size with a maintained assumption that group lending is better than individual lending. But are larger groups always better than smaller ones? The evidence is mixed.

Ahlin (2015) explores group size in joint liability lending, primarily in the adverse selection framework with local borrower information. Ahlin finds that raising group size accomplishes nothing if there is no local borrower information. The result highlights a complementarity between group size and social capital. Taking ex ante and ex post moral hazard into account in the model, Ahlin finds that if information deteriorates sufficiently with group size, an intermediate group size does better than either extreme, or in their words, “simulations suggest that most of the efficiency gains from larger groups are realized in group sizes below ten, and

that outreach and efficiency can increase dramatically when a moderate group size threshold is crossed.”

Ahlin and Waters (2016) develop a model of group borrowing that incorporates partial group liability, where the focus is on an optimal contractual allocation of the defaulted loan across members of the group. The model illustrates a trade-off of group liability lending: while higher levels of group liability increase within group risk-sharing, if liability is too high, borrowers may rush to default ahead of others. The model predicts the existence of an optimal partial liability that maximizes transfers between group members while avoiding strategic default. Structural estimation using repayment data suggests that while a partial liability below full liability may reduce default rates, the incidence of strategic default is rare.

However, large groups may introduce a free-riding problem and make group lending less attractive. Che (2002) studies an incentive rationale for the use of group lending as a method for financing liquidity-constrained entrepreneurs. The joint liability feature associated with group lending lowers the liquidity risk of default but creates a free-riding problem. In the static setting, the free-riding problem dominates the liquidity risk effect under a plausible condition, thus making group lending unattractive. When the projects are repeated infinite times, however, the joint liability feature provides the group members with a credible means of exercising peer sanction, which can make group lending attractive, relative to individual lending.

Interestingly, some recent papers find that group lending cannot fulfill its objective to reduce default rate by peer repayment. Giné and Karlan (2014) find no evidence that group lending can significantly reduce default rate in an experimental framework. Group liability in microcredit purports to improve repayment rates through peer screening, monitoring and enforcement. However, it may create excessive pressure, and discourage reliable clients from borrowing.

Quidt et al. (2016) contrasts individual liability lending with and without groups to joint liability lending motivated by an apparent shift away from the use of joint liability by microfinance institutions, combined with recent evidence that a) converting joint liability groups to individual liability groups did not affect repayment rates, and b) an intervention that increased social capital in individual liability borrowing groups led to improved repayment performance. I summarize this argument in the next hypothesis in alternative form.

H3: The larger the group size, the lower the default rate.

3.4 Control variables

Several variables are used to control for other potential determinants of loan default. Firm age is one of the most important variables impacting the true value of small business. According to the survey from Small Business Administration, the chances of small business survival increases dramatically within even the first year they are established. As a result, the longer a small business exists, the lower the risk that it goes bankrupt, therefore, the lower the possibility that it goes default on

a commercial bank loan. The firm age in our sample is defined as the year of a small business setting up to the time it applied for the bank loan. The mean and median numbers of year in our sample are 8.8 and 8 years respectively.

I also control for other variables in firm characteristics level: firm size as log of total assets; the size of employee population. Since small businesses are generally operated and controlled by their founders (aka owners) and it is the business owner who borrows money from the bank as an entity, I control some business ownership characteristics such as owners' age, owners' gender, marriage conditions, total number of shareholders in the business, total shares the owner controls and whether the owner is an actual beneficial owner.

Another important variable I introduce in our model is home business. Home business is defined as dummy variable which equals one if the business owners' birth city is the same city she/he runs business. This variable indicates whether the bank is able to obtain more information through the business owner's local social relationship and reputation.

There are several financial variables I would like to take into control but due to the limitation of data availability, they are not working properly in our model. Rather, I simply list them here: the list assets, liability ratio, debt ratio, new equity, business growth, ROA, net profit margin, cash flow margin and assets turnover. The full list of variables can be found in Appendix A.

4 Results

4.1 Sample

The data in this study is provided by X bank, a bank to be owned by a non-government fund in China. As the first bank puts forward the term 'small micro financing' in China, X bank has developed their major strategy of targeting to small micro business since 2008. It has more than 3.5 million small business clients all over China and takes up more than 20% of market share in the small micro business financing area. To evaluate the quality and potential risk of a small business borrower, X bank requests their clients to present a series of financial credentials including property and share certifications, business license, qualification to operate, contract history with and brief information on cooperators, tax and bank statement reports, and the owners' credit report if applicable. Moreover, a small business considered to be in qualified condition should be able to prepare at least three years' financial statements prior to borrowing which, consists of a balance sheet, income statement and cash flow statement.

To support this study, X bank grants us confidential access to randomly select small businesses' data from their national micro-finance database. I collect the fundamental and financial data of 286 small businesses from year 2008 to 2013. Each firm has at least three years' of financial statements consisting of balance sheets, income statements and cash flow statements. In addition to this financial information, I also collect other relevant variables including commercial loan amount, interest rate, maturity duration, firm age, firm size, home business information, history with bank, group size for group lending and commercial loan

default performance. Using this information, I generate two dummy variables in our test: home business dummy and bank loan default dummy.

[Insert Table 2.1 here]

The raw data is randomly selected from X bank's national small business client pool with financial statements. It consists of 928 firm-year observations which each firm providing three to five years' of financial statements prior to borrowing from the bank. Since our study only concentrates on after loan performance, I take only the average number of their financial data in our final sample. As the result, I have 291 firm observations before treatment. Table 2.1 details the selection process. I eliminate observations in which any of the crucial financial numbers equal zero in order to avoid small businesses that provide invalid financial statements or have manual mistakes. I also remove two observations that are missing group member information. As the result, our final sample contains 286 unique small business observations of businesses that have voluntarily used financial statements to apply for a commercial bank loan.

[Insert Table 2.2 here]

As outlined in Table 2.2 and Table 2.3, the final sample covers 286 firm observations from 24 areas and 11 industries. Among them, 59 are regular customers and 227 are group lending borrowers (Table 2.4). The overall default rate is 19.58% (56 firms default). All the small firms have at least three years of financial statements prior to borrowing, and 35 of the financial statements have been audited. 141 firms are running by local business owner, 193 firms have cooperation relationships with banks before borrowing and 60 of them have relatively longer histories than the average, 215 days.. Table 2.2 displays the distribution of our sample by industry and province. Panel A shows a trend that small business clusters in manufacturing, and in wholesale and retail trade industries, are at 55.95% and 35.31% respectively, with the default rates in these two industries being 21.88% and 18.81%. Another notable industry is culture, sports and entertainment, which has two variables and both firms default in our sample. Panel B also displays the industry cluster by showing that most of the provinces with higher weight in our sample are famous for manufacturing and sales trade.

Although X bank is a nationwide bank and the dataset covers small business samples randomly, due to the limitation of market share, our research is not a comprehensive and representative national study. Also, since a financial statement is not a mandatory requirement to borrow from X bank, as a result, the small businesses in our sample have relatively higher transparency. Therefore, the sample in this study on average is likely larger in size, having better operating performance

and is more stable than the average of the entire population of small business in China.

4.2 Descriptive statistics

Table 2.3 displays the descriptive statistics for the full sample and for the audited sample. I have 35 firms with audited reports over 286 firms in the whole sample. The average default rate for the full sample and audited sample are 0.2 and 0.06 respectively. The audited sample has a much lower default rate, less home business (0.34 compared to 0.49 in full sample), a longer history with the bank (263 days compared to 216 days in full sample), is slightly smaller in group size (2.86 members compared to 3.03 members in full sample), is generally larger in size (InTA is 8.34 compared to 7.79 in full sample), has more employees (122 employees compared to 69 employees in full sample), a longer survival time (firm age is 9.43 years compare to 8.8 years in full sample), a larger liability ratio (0.42 compare to 0.35 in full sample), much lower financial stress (debt ratio is 0.08 compare to 2.4 in full sample), and lower ROA (0.14 compare to 0.2 in full sample).

[Insert Table 2.3 here]

Table 2.4 demonstrates a closer look at the individual and group lending by group size. I have 59 individual borrowers, 20.34% of them who provided the bank with an audited financial statement; 62.71% of the owners are local people, higher

than group lenders; and the average history with the bank is longer than group lenders at 260 days. And none of the individual borrowers in our sample default in their term. For the two, three, four and five-members groups, I have one, forty, twenty, and five groups respectively. 7.5% of three-member groups, 11.25% of four-member groups and 20% of five-member groups have audited reports, and less than half of the group lenders are local. Interestingly, history with banks drops dramatically when the group sizes rise. The three-member groups have almost the same loyalty level as individual borrowers, and the four-member groups only have half of the history of bank cooperation before they apply for a loan. The five-member groups have the shortest history with banks, as they spend an average of merely two months before they ask the bank for a loan. As for the default rate, individual borrowers perform very well and none of them go bankrupt in our sample. The only two-member group is not default. 22% and 25% of the three and four-member groups default for their group lending. And the five-member group has the highest default rate, which reaches 44%. However due to the small sample of five-member groups, it is difficult to conclude that the five-members are suffering from the worst free-riding problem. But the trend in this table did provide some evidence that larger the group size, the more likely the downside of free-riding will overwrite the upside of risk-sharing on joint liability in group lending.

[Insert Table 2.4 here]

The contingency tables in Table 2.5 study our hypotheses. Panel A shows that audited firms have 5.71% of default rate while non-audited firms have 21.91% of default rate, this difference is significant in t-tests and Pearson Chi square tests. Panel B also verifies the significant differences in home business and non-home business. The difference on default rate is not as large as an audited sample, but is still significant in the t-test and Pearson Chi square test. In Panel C I separate loyalty level into two stages: shorter history with bank and longer history. I use the mean value of history with bank as the breakpoint, which is 216 days. Any one below this number is counted as having a shorter history, and any one above this number has a longer history with bank. I also have some omitted observations in the missing history subsample. The longer history subsample has the lowest default rate which is 5%, less than the loyalty group which has 21.05% of observations default for the bank loan. This difference is significant in the Pearson chi square test. Table 2.5 introduces the simple and classic two by two models to test the hypotheses and shows that audited financial statement, home business and history with bank do make a difference on the ability to control bank loan repayment risk.

[Insert Table 2.5 here]

Table 2.6 provides Pearson correlations between variables impacting the default of commercial loans. The default indicator has a significantly negative correlation with loan maturity duration, audited financial statement, loyalty with

bank, and firm age, and also has a significantly positive correlation with the amount of group lending. Audit indicator is significantly positively correlated with total assets of small business. And loyalty is significantly negatively correlated with group size.

[Insert Table 2.6 here]

4.3 Tests of hypotheses

The main results show in Table 2.7. Models 1 to 4 show logit regression results that take an individual variable of interest into the model one by one. Model 1 shows a negative significant correlation between audited financial statement and default rate. Model 2 displays a weak but significant negative correlation between loyalties with default rate. Model 3 reveals a significant positive relationship between group size and default rate. And Model 4 shows a significant negative correlation between home business and default. Hence auditing, history and home business have a negative impact on default rate. In other words, the businesses that were audited have longer cooperative histories with banks, and the businesses run by local owners are less likely to go into default. On the contrary, larger groups are more when compared to smaller groups.

[Insert Table 2.7 here]

Models 5 to 7 check the robustness of auditing's native correlation with default rate after introducing other risk control variables. And the result is straightforward that auditing holds a significantly negative correlation with default rate in all tests. Due to the availability of the data I do not have some of the control variables in our logit regression models but firm age has a negative correlation with bankruptcy in most of the tests. This indicates that when a business survives long enough, it is less likely to go into default when borrowing from the bank.

5 Limitations, Extensions and Conclusions

The dataset is very rich but not sufficiently large. For this reason, I have to state our conclusions, particularly with regard to group lending, with some caution. The second major issue is that interest rates are not flexible in China. For this reason, the rate of default may be driven by the fact that interest rates may not reflect the risk of the business, distorting the results. Also, the private debt market in China is quite recent and relatively undeveloped, with relatively little competition across banks. In general, this may lead to some inefficiencies in the borrowing and lending process with actual outcomes being unreflective of the underlying economics. Overall, the univariate results and correlations strongly support our hypothesis but more sophisticated tests suffer from missing data issues leading to a reduction in the sample and loss of power. Therefore, though the results generally support the

economic hypotheses developed in this paper, I was not able to perform the type of robustness tests that I would ideally have preferred to conduct on the data.

5.1 Extension

The most obvious extension is to get more data to conduct tests on subsamples to back up the results. An alternative is to try and get demographics about US borrowers that would allow cross national hypothesis testing. Although there is a large amount of data on small business loans and defaults in the US, confidentiality concerns stop banks from turning over data, even with names removed, to researchers. Commercial private banking is still at a very early stage in China and will expand considerably over the next decade. Foreign banks do not yet operate in the small business sector of the Chinese economy and may find inflexibility with regard to interest rates a major problem. While it is too early to predict how Chinese small businesses will develop in the future or whether China will move towards banking structures that are common in developed countries, this study provides one starting point for tracking this development. In particular, in the absence of credit scores and reliable tax data, small businesses may have to rely more on auditors than similar businesses in the US.

5.2 Conclusions

This study examines small business lending in China and the influence of different economic factors on the default rates of small businesses. In the US, lending to small businesses and sole proprietors is based on W-2 information and Credit Scores. In addition, US banks have flexibility in offering different levels of

interest based on the risk of the customer. In China, reliable credit scores are not available and interest rates are set by central banks. Taken together, the decision on whether to lend is the most critical decision and the information base for this decision is different from the US.

Audits in China are voluntary and they are not expensive. Auditors simply arrange the information in a clean format rather than verify whether the information supplied is accurate. For these reasons, audits may not be expected to have much of an effect on default rates. However, I find that the default rate for customers who voluntarily undergo an audit is much lower than average. Based on analyzing the people who chose to undergo audits, I find that they are typically older and better educated suggesting that it is these associated factors rather than the audit that drives lower default rates.

I also find that customer loyalty (history with the bank) has a significantly negative correlation with small business default rate. Longer relationships reduce the rate of default suggesting that relational information allows managers to make better lending decisions. Loans to local borrowers who were born in the town where the business is situated default less frequently in univariate tests, but this negative correlation disappears when introducing other factors such as auditing or length of association with the bank.

An interesting development from the world of microfinance is solidarity loans, that is lending to small groups of borrowers who are responsible for each other's loans and are expected to provide efficient monitoring because of this cross-

responsibility. Typically, such group loans are extended to riskier borrowers who may not meet the lending threshold on an individual level. I find that the default rate is higher for groups as a whole because they are generally riskier than average, but that the failure to keep with the contract to support each other is higher with groups of five rather than groups of three or four. As has been argued in the micro-finance literature, larger groups have a more severe free rider problem and this may explain the higher default rate. Unfortunately, the data size does not permit us to separate this explanation from the alternative that larger groups are made up of riskier borrowers.

Appendix - Variable definitions

Variable	Description
Default	<p>An indicator variable equal to 1 if the small business defaulted on commercial bank loan, 0 otherwise (non-default, or the businesses that repay for the default members.)</p> <p>This is a re-calculation from raw data. In the raw data, I design an excel spreadsheet that uses indicator 0, 1 and 2 to classify different type of default. There are three categories of default types for group lending sample: i) no default as all, so all the members have 0 default. ii) several members default but others repay for them, the default member gets 1 default and others get 2 default (repay) iii) all the group members default, either they all default, or some of the members default but others refuse to repay them, and so called “break the contract,” in this case, all the members get 1 default indicator.</p> <p>In our logit regression model, the above 1 default type equal to one, the 0 and 2 (non-default and the repayers) equal to zero.</p>
Loan features	
Amount, in1000	Amount is defined as the amount of commercial loan, in 1,000 RMB.
Duration	Duration is the total months of commercial loan.
Interest	Interest is the commercial bank loan interest rate.
Variables of interest	
Audited	Equal to 1 if small business’s financial statements have been audited, 0 otherwise.
History with bank	Difference between issue date and first date to open account in bank, trim to 0 if negative. The larger number indicates longer history business with bank, hence implies more loyal clients and stronger motivation to keep healthy relationship with bank. On the contrary, smaller number indicates relatively weak tie between business and bank.
Group size	How many members in group, I have two, three, four and five-members groups.
Control variables	
Ownership features	
Home business	<p>Equal to 1 if borrower’s birth city is the same city she/he runs business.</p> <p>In our sample, all borrowers are local: the business is located in the same city as bank branch.</p>
Firm age	Small business’s age, the larger the age, the better survival rate of small business.
InTA	Log of small business’s total assets.

Employee	Number of employees.
Owner age	Small business owner's age.
Owner gender	Small business owner's gender, equal to 1 if is female, 0 if is male.
Owner's marriage condition	Equal to 0 if single, 1 if married, 2 if divorced or widowed; the higher score implies more complicated individual marriage status.
Total number of shareholder	Total number of shareholders in company.
Owners' share	Borrower's holding assets divided by total assets.
Beneficial owner	Equal to 1 if borrower's holding share is equal to or greater than 50%, 0 otherwise.
Financial features	
Listed assets	Company's initial assets listed in China's National Bureau of Administration for Commerce and Industries system.
Total assets	Company's total assets, in 1,000.
Liability ratio	Total liability divided by total assets.
Debt ratio	Total short-term debt divided by total assets.
Business growth	Current year's total assets minus last year's total assets, then divided by last year's total assets.
Sales growth	Current year's total sales minus last year's total sales, then divided by last year's total sales.
ROA	Net profit divided by current year's total assets.
Net profit margin	Net profit divided by current year's total sales.
Cash flow margin	Operating net cash flow divided by current year's total sales.
Assets turnover	Sales divided by current year's total assets.

Tables

Table 2. 1: Sample selection

The raw data is randomly selected from X bank's national small business client pool with financial statements. It consists of 928 firm-year observations which each firm provides three to five years' financial statement prior borrowing from bank. Since our study only concentrates on after loan performance, I take only the average number of their financial data in our final sample. As the result, I have 291 firm observations before treatment. Table 2.1 details the selection process. I eliminate the observations wherein any of the crucial financial number equal to zero to avoid any small business that provides invalid financial statements or has manual mistakes. I also remove two observations that are missing group member information. As the result, our final sample contains 286 unique small business observations which voluntarily use financial statement to apply for a commercial bank loan.

	Firms
Raw sample	291
Eliminate observations if total assets, total liability or sales equal to zero	(3)
Eliminate observations if missing group member	(2)
Final sample	286

Table 2. 2: Distribution of firms by industry and area

Panel A: Distribution of Firms by Industry

As outlined in Table 2.2 and Table 2.3, the final sample covers 286 firm observations from 24 areas and 11 industries. Among them, 59 are regular customers and 227 are group lending borrowers (Table 2.4). The overall default rate is 19.58% (56 firms default). All the small firms have at least three year's financial statements prior borrowing, and 35 of the financial statement have been audited. 141 firms are running by local business owner, 193 firms have cooperative relationships with banks before borrowing and 60 of them have relatively longer history above average (which is 215 days). Table 2.2 displays the distribution of our sample by industry and province. Panel A shows a trend that small business clusters in manufacturing and wholesale and retail trade industry at 55.95% and 35.31% respectively, the default rate in these two industries are 21.88% and 18.81%. Another notable industry is culture, sports and entertainment which has two variables and both firms default in our sample. Panel B also displays the industry cluster by showing most of the provinces with higher weights in our sample are famous for manufacturing and sales trade.

Code	Industry title	Non-default		Default		Total	Default Rate
		N	% of sample	N	% of sample		
A	Agriculture, Forestry, Fishing and Hunting	3	1.05%	0	0.00%	3	0.00%
C	Manufacturing	125	43.71%	35	12.24%	160	21.88%
D	Electricity, heat, gas and water production and supply	3	1.05%	0	0.00%	3	0.00%
E	Construction	1	0.35%	0	0.00%	1	0.00%
F	Wholesale and retail trade	82	28.67%	19	6.64%	101	18.81%
G	Transportation and Warehousing	1	0.35%	0	0.00%	1	0.00%
I	Information transmission, software and information technology services	3	1.05%	0	0.00%	3	0.00%
J	Finance and Insurance	2	0.70%	0	0.00%	2	0.00%
L	Rental and business service	4	1.40%	0	0.00%	4	0.00%
M	Scientific and technical services	1	0.35%	0	0.00%	1	0.00%
R	Culture, sports and entertainment	0	0.00%	2	0.70%	2	100.00%
Unclassified		-	-	-	-	5	-
Total		225	78.67%	56	19.58%	286	19.58%

Panel B: Distribution of Firms by province/city

Area Code	Province/City	Non-default	Default	Total	% of sample	Default rate
11	Beijing	8	0	8	2.80%	0.00%
12	Tianjin	5	0	5	1.75%	0.00%
13	Hebei	7	10	17	5.94%	58.82%
14	Shanxi	16	4	20	6.99%	20.00%
15	Neimenggu	7	1	8	2.80%	12.50%
21	Liaoning	14	1	15	5.24%	6.67%
22	Jilin	5	0	5	1.75%	0.00%
23	Heilongjiang	6	0	6	2.10%	0.00%
31	Shanghai	14	1	15	5.24%	6.67%
32	Jiangsu	4	1	5	1.75%	20.00%
33	Zhejiang	9	10	19	6.64%	52.63%
34	Anhui	1	0	1	0.35%	0.00%
35	Fujian	18	12	30	10.49%	40.00%
36	Jiangxi	4	4	8	2.80%	50.00%
37	Shandong	8	8	16	5.59%	50.00%
41	Henan	34	0	34	11.89%	0.00%
43	Hunan	9	4	13	4.55%	30.77%
44	Guangdong	22	1	23	8.04%	4.35%
50	Chongqing	9	0	9	3.15%	0.00%
51	Sichuan	7	0	7	2.45%	0.00%
53	Yunnan	3	0	3	1.05%	0.00%
61	Shanxi	12	0	12	4.20%	0.00%
571	Hangzhou	4	0	4	1.40%	0.00%
574	Ningbo	3	0	3	1.05%	0.00%
Total		229	57	286	100.00%	100.00%

Table 2. 3: Descriptive statistics

Table 2.3 displays the descriptive statistics both for the full sample and for the audited sample. I have 35 firms have audited report over 286 firms in whole sample. The average default rate for full sample and audited sample are 0.2 and 0.06 respectively. The audited sample has much lower default rate, less home business (0.34 compared to 0.49 in full sample), longer history with bank (263 days compared to 216 days in full sample), slightly smaller in group size (2.86 members compare to 3.03 members in full sample), generally larger in size (lnTA is 8.34 compared to 7.79 in full sample), more employees (122 employees compared to 69 employees in full sample), longer survive time (firm age is 9.43 years compared to 8.8 years in full sample), larger liability ratio (0.42 compared to 0.35 in full sample), much lower financial stress (debt ratio is 0.08 compared to 2.4 in full sample), and lower ROA (0.14 compared to 0.2 in full sample).

Variable	Full Sample				Audited sample			
	Obs	Mean	Median	Std. Dev.	Obs	Mean	Median	Std. Dev.
Year	286	2010.19	2010	0.74	35	2010.14	2010	0.69
Firm	286	146.53	146.5	84.78	35	126.54	140	93.79
Default	286	0.2	0	0.4	35	0.06	0	0.24
Loan_1000	286	2879.02	2500	1746	35	3364.57	3000	2190.39
Loan/ta	280	0.12	0.08	0.13	35	0.07	0.06	0.05
Rate	286	8.3	8.4	1.34	35	8.42	8.4	0.82
Duration	286	13.52	12	5.78	35	14.06	12	5.43
Audited	286	0.12	0	0.33	35	1	1	0
Home business	286	0.49	0	0.5	35	0.34	0	0.48
History	193	215.68	2	367.53	20	263.3	9	428.42
Group size	286	3.03	3	1.21	35	2.86	3	1.5
Firm age	281	8.8	8	4.29	35	9.43	9	3.68
Ave total assets	280	56949.16	30533.15	94861	35	86534.52	43615	130000
LnTA	268	7.79	7.81	1.12	32	8.34	8.21	1
Ave employee	123	68.76	37	109.9	11	121.64	80	106.4
Owner age	177	43.07	43	6.92	17	46.12	46	6.58
Gender	182	0.1	0	0.3	19	0.05	0	0.23
Liability ratio	267	0.35	0.35	0.23	32	0.42	0.36	0.24
Debt ratio	236	2.4	0.07	35.05	27	0.08	0.03	0.1
ROA	248	0.2	0.13	0.28	32	0.14	0.09	0.12

Table 2. 4: Group lending sample

Table 2.4 demonstrates a closer look at individual and group lending by group size. I have 59 individual borrowers, 20.34% of them provide the bank with an audited financial statement; 62.71% of the owners are local people, higher than group lenders; the average history with bank is longer than group lenders at 260 days. And none of the individual borrower in our sample default in there term. For the two, three, four and five-members groups, I have one, forty, twenty, and five groups respectively. I have 7.5% for three-member groups, 11.25% for four-member groups and 20% for five-member groups have audited report. And less than half of the group lenders are local. Interestingly, the history with bank drops dramatically when the group sizes arise. The three-member groups have almost the same loyalty level with individual borrowers, and the four-member groups only have half of the history of cooperating with bank before they apply for a loan. The five-member groups have the shortest history with bank which they spend merely two months before they ask the bank for a loan. As for the default rate, individual borrowers perform very well and none of them go bankrupt in our sample. The only two-member group is not default. 22% and 25% of the three and four-member groups default for their group lending. And the five-member group has the highest default rate that reaches 44%. However due to the small sample for five-member group, it is difficult to conclude that the five-members are suffering from the worst free-riding problem. But the trend in this table did provide some evidence that larger the group size, more likely the downside of free-riding will overwrite the upside of risk-sharing on joint liability in group lending.

Group member	1	2	3	4	5
Number of groups	-	1	40	20	5
Number of observations	59	2	120	80	25
Proportion among group lending sample	20.63%	0.70%	41.96%	27.97%	8.74%
Audited firms	12	0	9	9	5
Percentage of audited	20.34%	0.00%	7.50%	11.25%	20.00%
Home business	37	1	60	33	10
Percentage of local owner	62.71%	50.00%	50.00%	41.25%	40.00%
Average history with bank	259.97	9.00	254.72	112.77	63.54
Default firms	0	0	26	20	11
Default rate	0.00	0.00	0.22	0.25	0.44

Table 2. 5: Contingency tables

The contingency tables in Table 2.5 study further on our hypotheses. Panel A shows that audited firms have 5.71% of default rate while non-audited firms have 21.91% of default rate, this difference is significant in t-test and Pearson Chi square test. Panel B also verify the significant difference on home business and non-home business. The difference on default rate is not as large as audited sample, but still significant in t-test and Pearson Chi square test. In Panel C I separate the loyalty level into two stages: shorting history with bank and longer history. I use the mean value of history with bank as the breakpoint which is 216 days. Any one below this number is count as has shorter history, and any one above this number has a longer history with bank. I also have some omitted observations in the missing history subsample. The longer history subsample has the lowest default rate which is 5%, the less loyalty group has 21.05% of observations default for the bank loan. This difference is significant in Pearson chi square test. Table 2.5 introduces the simple and classic two by two models to test the hypotheses and shows that audited financial statement, home business and history with bank do make difference on controlling bank loan repayment risk.

Panel A: Default versus Audit

	Non-audited	audited	Total
Non-default	196	33	229
default	55	2	57
Default rate	21.91%	5.71%	19.93%
T-test		3.401***	
Pearson Chi^2		5.051**	

Panel B: Home business sample

	Non-Home	Home	Total
Non-default	109	120	229
default	36	21	57
Default rate	24.83%	14.89%	19.93%
T-test	2.330**		
Pearson Chi^2	5.226**		

Panel C: History with bank sample

	Missing history	Shorter History	Longer history	Total
Non-default	67	105	57	229
default	26	28	3	57
Default rate	27.96%	21.05%	5.00%	19.93%
Pearson Chi^2	12.241***			

Table 2. 6: Pearson Correlations

Table 2.6 provides Pearson correlations between variables impacting the default of commercial loans. The default indicator has a significantly negative correlation with loan maturity duration, audited financial statement, loyalty with bank and firm age, and also has significantly positive correlation with the size of group lending. Audit indicator is significantly positively correlated with total assets of small business. And the loyalty is significantly negatively correlated with group size.

	Default	Amount	Rate	Duration	Audited	History	Group Size	Home	Firm Age	lnTA	Employee	Owner Age	Gender	Beneficial Owner
Default	1.00													
Amount	-0.02	1.00												
Rate	-0.03	-0.01	1.00											
Duration	-0.14**	0.00	-0.04	1.00										
Audited	-0.13**	0.10*	0.03	0.03	1.00									
History	-0.20***	0.08	0.09	0.17**	0.04	1.00***								
Group Size	0.29***	0.01	-0.10	-0.18***	-0.05	-0.19	1.00							
Home	-0.14**	-0.10*	0.03	-0.08	-	0.11	-	1.00						
					0.16***		0.15***							
Firm Age	-0.15**	0.06	0.04	0.10	0.05	0.10	-0.13**	-0.05	1.00					
			-											
lnTA	-0.05	0.34***	0.12*	-0.02	0.18***	0.12	-0.04	-	0.24***	1.00				
			*					0.14**						
Employee	-0.14	0.05	0.01	0.32***	0.15*	-0.15	-0.11	-0.01	0.17*	0.25**	1.00			
Owner Age	-0.06	0.00	0.01	-0.05	0.14*	-0.08	-0.06	-0.01	0.24***	0.01**	0.07	1.00		
Gender	0.03	0.09	0.02	0.10	-0.05	-0.05	-0.09	0.07	-0.03	0.01	-0.02	-0.08	1.00	
Beneficial Owner	0.07	-0.04	0.04	-0.17***	-0.10*	-0.04	0.12**	-	-0.06	-0.07	-0.03	-0.04	-0.05	1.00
								0.14**						

***, **, * denote significance at 1, 5 and 10 percent level, respectively.

Table 2. 7: Determinates on small business default rate

The main results show in Table 2.7. Models 1 to 4 show logit regression results that take an individual variable of interest into account in the model one by one. Model 1 shows a negative significant correlation between audited financial statement and default rate. Model 2 displays a weak but significant negative correlation between loyalties with default rate. Model 3 reveals a significant positive relationship between group size and default rate. And Model 4 shows significant negative correlation between home business and default. Hence auditing, history and home business have a negative impact on default rate. In other words, the companies who were audited, have longer cooperative histories with banks and the local owner run businesses are less likely to go into default. On the contrary, larger groups are more likely to go into default compared to smaller groups.

Models 5 to 7 check the robustness of auditing's native correlation with default rate after introducing other risk control variables. And the result is straightforward that auditing holds a significantly negative correlation with default rate in all tests. Due to the availability of the data I do not have some of the control variables in our logit regression models but firm age has a negative correlation with bankruptcy in most of the tests. This indicates that when a business survives long enough, it is less likely it go into default when borrowing from the bank.

	Model 1		Model 2		Model 3		Model 4	
	Coefficient	Z	Coefficient	Z	Coefficient	Z	Coefficient	Z
Amount	1.03E-06	0.01	-9.22E-06	-0.06	-3.4E-05	-0.38	-4E-05	-0.44
Rate	-0.03	-0.28	0.07	0.40	0.01	0.10	-0.04	-0.33
Duration	-0.51	-1.27	-0.56	-1.33	-0.50	-1.15	-0.53	-1.16
Audited	-1.43*	-1.9						
History			-0.003**	-2.09				
Group size					0.68***	4.09		
Home business							-0.73**	-2.29
Firm age	-0.10	-2.18	-0.08	-1.29	-0.09***	-1.82	-0.10**	-2.21
Cons	6.03**	1.23	5.55	1.07	3.13	0.58	6.60	1.19
N	281		193		281		281	
Pseudo R2	0.085		0.126		0.142		0.086	

	Model 5		Model 6		Model 7	
	Coefficient	Z	Coefficient	Z	Coefficient	Z
Amount	-3.77E-06	-0.02	-4E-05	-0.44	2.78E-05	0.15
Rate	-0.02	0.41	0.05	0.34	0.06	1.65
Duration	-0.50	-1.32	-0.48	-1.13	-0.45	-1.08
Audited	-1.634**	-0.52	-1.768**	-2.01	-1.803**	-0.21
History	-1.474**	-2.09			-1.322**	-1.79
Group size			0.714***	4.09	0.685***	3.7
Home business			-0.69		-0.35	-0.76
Firm age	-0.107**	-1.31	-0.076*	-1.64	-0.080*	-0.96
Cons	5.94	1.07	2.83	0.48	2.56	-0.16
N	193		281		193	
Pseudo R2	0.132		0.178		0.196	

***, **, * denote significance at 1, 5 and 10 percent level, respectively.

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