

The Effect of Banking Relationships on a Firm's Cost of Equity in its IPO

Carola Schenone*
Department of Economics
Northwestern University

December 2001

Abstract

This paper argues that the firm's cost of equity in an IPO can be significantly reduced if the issuing firm has a previously established relationship with a potential IPO underwriter. I test this using a new and unique dataset, in which the firm's banking relationships established prior to the IPO are compared to the underwriting institutions managing the firm's new issue. The estimation results show that firms with a lending relationship with a prospective IPO underwriter face a cost of equity capital that is 16 percent lower than that of firms without banking relationships with potential underwriters. For firms with a relationship with a bank that previously managed a debt issue for the firm, the cost of equity is about 7 percent lower compared to that of firms without a previously established relationship with potential underwriters. These results are robust to the firm's endogenous selection of banking institution prior to the firm's IPO.

*I am very grateful to my advisors Kathleen Hagerty, Mitchell Petersen and William Rogerson for their constant advice and their many comments and suggestions that have improved my work. I am also indebted to Paola Sapienza, Todd Pulvino, Kent Daniel, Phillip Bond and Dino Gerardi for useful discussions. I benefited from comments received in seminars at Kellogg Northwestern University, Universidad de San Andres, and the Southeast Economic Theory Conference 2001. Financial support from the Graduate Research Grant from Northwestern University and the CSIO Scholarship is gratefully acknowledged. I thank Patricia Ledesma and Raj Babu for their help with the data. All remaining errors are mine.

1 Introduction

This paper investigates whether having an established relationship with a bank that can manage IPOs, prior to the firm's IPO, affects the firm's cost of equity capital when the firm goes public. When firms go public, the market and the firm are asymmetrically informed regarding the true value of the firm. Many theorists claim this asymmetric information problem is to blame for the underpricing of IPOs (see for instance Rock [1986]; Beneviste and Spindt [1989] and Beneviste and Wilhelm [1990]; Allen and Faulhaber [1989], Grinblatt and Hwang [1989] and Welch [1989, 1996])¹. A different strand of the finance literature advocates in favor of lending relationships (see Petersen and Rajan [1994,1995], James [1987], Diamond [1984, 1991], Stiglitz and Weiss [1983]). When a bank lends to a firm it obtains information that cannot be easily and credibly conveyed to others. Rajan [1992] points out how this information is generated during the lending process and includes soft information such as the firm's prior projections, it's ability to meet established targets, and the reliability and competence of the firm's managers. Stein [2001] argues that the distinguishing characteristic of small business lending is precisely that it relies on soft data generated by the lending institution, such as the loan officer learning that the borrowing firm's manager is honest and hardworking. The benefits generated through lending relationships are manifold. Petersen and Rajan [1994] show that lending relationships reduce the asymmetric information problem between the firm and the lending bank with the positive effect of expanding the firm's credit availability². This paper lies in the intersection of these two literatures and asks whether lending relationships established prior to the firm's IPO can mitigate the asymmetric information problem between the issuing firm and its underwriter consequently lowering the firm's IPO

¹The underpricing of an IPO is defined as the difference between the offer price and the price at the closing of the offer day.

²Lending relations generate useful information regarding the firm's value - through lending and monitoring the bank obtains information regarding the firm's value that is unavailable to other institutions and that cannot be easily and credibly conveyed. Petersen and Rajan [1994, 1995] show that firms with close ties to financial institutions suffer less of an adverse selection and moral hazard problem when seeking funds and consequently, these firms should be less credit constrained. The authors provide evidence that firms with banking relationships are in fact less credit constrained relative to firms without lending relationships - they show that the availability of funds increases as the firm spends more time in the relationship, as it acquires more financial services with the institution and as it concentrates the borrowing with that relationship rather than turning to multiple relationships.

underpricing.

Before the repeal of the Glass-Steagall Act, commercial banks with close ties to their client firms could not underwrite these firms' equity issues. This hampered any empirical research aimed at answering the questions posed. With the effective repeal of this Act in 1998, some commercial banks began underwriting equity issues either directly (since 1999, when the Glass-Steagall Act was formally repealed) or indirectly through their section 20 subsidiary (between late 1997 and 1999 when the firewalls between the subsidiary and the bank tumbled). This change of regulation is the identifying strategy that allowed me to build a new data set which I use to test whether firms with established relationships with banks that have underwriting abilities do indeed suffer less of an asymmetric information problem when going public, and consequently face a lower cost of equity capital in their IPO.

1.1 The importance of banking relationships established prior to the firm's IPO

We are taught to trust prices: in efficient markets prices hold all available information about the value of the security traded. Yet, it has been repeatedly shown that the IPO market defies this efficient market postulate³. For most IPOs, shares start trading at a value well below the market's value, allowing for huge profit opportunities to be exploited⁴. Many theorists have turned to the asymmetric information problem regarding the issuing firm's value as the cause for this anomaly.

The theoretical models in this strand of thought differ in the information structure they assume. Rock [1986] assumes that some random investors are informed about the firms' value, but neither the firm nor its underwriting bank know the firm's true value. In his model, underpricing compensates uninformed investors for their biased purchases of lower value firms. Beneviste and Spindt [1989] and Beneviste and Wilhelm [1990] also assume that both the underwriting bank and the firm are uninformed about the firm's true value but they assume that there are some investors who repeatedly interact with the investment bank, who are informed about the firm's prospects. In this scenario underpricing compensates informed investors for revealing their private information to the investment bank. Allen and Faulhaber [1989],

³Beginning with Logue [1973], Ibboston [1975] and Ritter [1984]

⁴For a brief institutional analysis on how IPOs are conducted, see the Appendix.

Grinblatt and Hwang [1989] and Welch [1989, 1996] assume that the issuing firm is the only informed party in the IPO. Underpricing is the costly signal that high quality firms choose to send to separate themselves from low quality firms. Figure 1 summarizes the information structure across these models:

Table 1: Who is informed in the market?			
The table shows how different theories blame IPO underpricing on the asymmetric information regarding the issuing firm's value. Notice in all these models the underwriter is uninformed about the firm's value.			
	Firm	Investors	Investment Bank
Rock [1986]	No	Random Investors	No
Beneviste and Spindt [1989]; Beneviste and Wilhelm [1990]	No	Some regular investors	No
Allen and Faulhaber [1989]; Grinblatt and Hwang [1989]; Welch [1989, 1996]	Yes	No	No

In all these models the underwriting bank is uninformed about the firm's value. In this paper I ask what would happen if there was an underwriting institution, informed about the firm's value, that could take the firm public. In particular, I ask what are the benefits to the firm of establishing relationships, prior to the IPO, with banks that can potentially underwrite their equity issues.

The point this paper makes is the following. If the issuing firm has an established relationship with a bank that can manage the firm's IPOs, then the asymmetric information justification for IPO underpricing is no longer tenable, and we would expect this firm to exhibit a lower cost of capital when going public. When the banking institution with which the firm has an established relationship prior to the IPO manages the firm's IPO, then the underwriting bank has an information advantage useful to price the firm's new issue. If, furthermore, all market participants know that the underwriting institution has superior information regarding the firm's value, we would expect lower IPO underpricing. Why? Because in this scenario the investment bank does not need to underprice IPO issues to compensate informed investors for revealing their private information, as in Beneviste and Spindt [1989] and Beneviste and Wilhelm [1990], since the investment bank owns the superior information regarding the firm's value. Furthermore, if the underwriter has superior information regarding

the firm, high value firms will not need to underprice to reveal their type and convince investors to pay higher prices for their shares in future offerings as in Allen and Faulhaber [1989], Grinblatt and Hwang [1989] and Welch [1989, 1996]. Because all investors know that the bank's reputation capital is at stake and further they know that the underwriting house has superior information regarding the firm's value, the underwriting bank itself will, when pricing the issue, separate the firms according to their type based on the superior information the bank has. Finally, uninformed investors should not claim any compensation for participating in the IPO market as in Rock [1986]. Uninformed investors know that the price set by the underwriter is a fully revealing price.

If the firm had a relationship with a bank that could have managed its IPO but the firm chose to switch banks and go public with another bank, IPO underpricing is also expected to be low. This result is due to the fact that the issuing firm had the option of going public with the bank that had private information regarding the firm's value. To see this consider a simple framework⁵ in which there are two types of firms - low and high value firms - and two types of banks- a bank informed about the firm's value and a bank uninformed about the firm's value- with the uninformed bank competing with the informed bank for the underwriting of the firm's IPO. If the firm chooses to switch banks, this reveals the firm is of low value. The following explains why. The uninformed bank cannot offer the issuing firm a price higher than the low firm value: if it offered the firm any price higher than this, the low value firm would always choose the uninformed underwriter who would be selling the firm for a price higher than the firm's true value; if the underwriting bank has any reputation capital at stake it will not make this mistake. Hence the uninformed bank offers a low price to *all* firms that approach the bank: high value firms will keep their relationship bank whilst the low value firm would be indifferent between the inside and the outside bank; therefore when the market observes a firm switching banks it immediately understands it is a low value firm. Firms that have a relationship with a bank that could take them public but choose to switch banks are not underpriced: their offering is priced just as it would be had the firm gone public with its inside bank.

In sum, if asymmetric information regarding the firm's value is to blame for IPO underpricing, and lending relationships mitigate the asymmetric information prob-

⁵ Available from the author upon request.

lem between the borrowing firm and its financial institution, then firms with established lending relationship with banks that can underwrite IPOs should exhibit less underpricing relative to firms that do not have, prior to their IPO, an established relationships with a bank that could take the firm public. I built a new dataset that allows me to test this hypothesis. Let the inside bank be the bank with which the firm has a relationship. The following summarizes the prediction derived from the above hypothesis:

Table 2: Underpricing after the Repeal of the Glass-Steagal Act			
	<i>The inside bank can underwrite</i>		<i>The inside bank cannot underwrite</i>
	(1)	(2)	(3)
	Underwrites	Does not underwrite	
<i>Underpricing</i>	LOW	LOW	HIGH

If the data supports these predictions we could conclude that lending relationships may not lower the firm’s cost of credit (Petersen and Rajan [1994, 1995]) but could lower the firm’s cost of equity in an IPO if the relationship bank can underwrite IPOs.

1.2 Do banking relationships established prior to the firm’s IPO lower the firm’s cost of equity?

The effective repeal of the Glass-Steagall Act allowed me build a new dataset with which I can test the above predictions. The novelties introduced in this unique data set are manifold. First, I establish the link between the IPO underwriter and the banking institutions that have served the firm prior to the IPO date. Information regarding the firm’s lending institution is readily available for public firms, but not so for private firms. For each one of the 1,342 firms that went public between January 1st1998 and December 31st2000, I looked in Dealscan for the identity of the firm’s previous lender. For 398 firms I can identify which banking institution lent its services to the firm up to 5 years prior to the firm’s IPO date. For these 398 firms I recorded *all* of the banking institutions which have served the firm in those 5 years. Once I have this list of banking institutions that have dealt with the firm, I need to compare it with the banking institutions that managed the firm’s new equity issue. From SDC, I obtain a list of the institutions that managed the firms IPO (the book runner, the lead manager and all other managers). For each firm, I now have a list of all banking institutions that have served the firm prior to the IPO and a list of the

banking institutions that have assisted in the IPO. I then check if *any* of the banking institutions that have assisted the firm prior to its IPO *could have been* one of the firm's IPO managers. This comparison needs a bit more thought since commercial banks could lend money to the firm but could not manage the firm's IPO directly, it could only do it indirectly through the bank's section 20 subsidiary. For example Bankers Trust NY Corp. could lend to a firm but could not manage the firm's IPO directly, it could only do it through its section 20 subsidiary BT Alex Brown Inc. Another example is Citigroup Inc., that could lend to firms but could only manage the IPO their client firm's through its section 20 subsidiary Salomon Smith Barney Inc. So to be able to compare whether the firm's previous lender could have managed the firm's equity issue I need a list of all section 20 subsidiaries that operated in the time period studied. Once the complete list of commercial banks and its section 20 subsidiaries are identified, I can compare whether the firm's previous lender could have managed the firm's IPO or if the section 20 subsidiary of the lending bank could have been an IPO underwriter. After making these comparisons I move ahead and I study how firms that could and did go public with their relationship bank differ from firms that could have gone public with their relationship bank but did not go public with this bank, and how they differ from firms that could not have been taken public with their relationship bank. To do this, I need to study the firm's characteristics. This is a very difficult task for firms that are private, since they do not need to report their data in publicly available documents. To gather information of firm's assets, working capital, cash available, revenues, profits, operating cash-flow, total debt and net income I studied the prospectus filed with the SEC by each of the 398 firms. In the prospectus the firms must report their balance sheet, income statement and cash-flow statement. I collect information on the above mentioned firm characteristics from these financial statements. Firms that do not report an entire year of data, or only report the "Pro Forma Statements" are excluded from the sample at this point. This leaves me with 309 firms. For these firms, I also collected soft data reported in the prospectus with which categorical variables useful in the econometric estimation were created. I will use this data set to test whether, when the firm's underwriter is informed about the firm's value, the cost of equity capital of the issuing firm is lower.

Though on a different line, there has been empirical support for the hypothesis that asymmetric information leads to high IPO underpricing. Michaely and Shaw

[1994] find that in markets where uninformed investors know a priori that they do not have to compete with informed investors, IPOs are not highly underpriced. In this way Michaely and Shaw test Rock's model. Muscarella and Vetsuypens [1989] find that underpricing is lower in self-marketed IPOs and IPOs of reverse leveraged buyouts (for both these issues asymmetric information is expected to be lower).

Close to my paper is that of James and Weir [1990]. James and Weir's point is that *issuing private debt claims* before issuing stock can reduce the firm's IPO underpricing, since the existence of inside debt signals to the market that the firm is of high value - only high value firms apply and are granted inside debt and this signal reduces asymmetric information and thus lowers IPO underpricing. In my paper, having a *relationship* with a bank that can manage IPOs reduces the asymmetric information problem between the issuing firm and the underwriter and thus reduces underpricing. James and Weir look at whether the firm had a bank loan, without specifying the identity of the lender. In my paper, it is critical to have the identity of the lender, so that I can establish whether the relationship bank could have managed the firm's IPO and whether it did manage it or not. My paper looks at *the value of having a relationship with a potential underwriter*, whilst their paper looks at the *effect of having some loan* at the time of going public. There is an important reason for the difference in our approach: when James and Weir wrote their paper, commercial banks were refrained by the Glass Steagall Act from managing equity issues, so that the relationship bank could not manage the firm's equity issue. Now commercial banks can underwrite equity issues, so that the bank from which the firm has borrowed prior to the IPO can potentially manage the firm's issue. In my paper I make the connection between the underwriting bank and the bank with which the firm has an established relationship; James and Weir could not have made this connection at the time they wrote their paper.

The rest of this paper is structured as follows. Section 2 describes the data set I built to test the asymmetric information hypothesis for IPO underpricing. Section 3 tests whether banking relationships established prior to the firm's IPO have an effect on the issuing firm's cost of equity. The basic result reveal that firms with established *banking* relationships have an underpricing that's 17 percent lower compared to that of firms *without any* banking relationship with a potential IPO underwriter, and as predicted, whether the firm actually went public with it's relationship bank or not, does not significantly affect the firm's cost of capital. The strength of this result is

put to trial in sections 3.1 and 3.2: section 3.1 performs several robustness checks and section 3.2 controls for the firm’s endogenously selecting their pre IPO banking institution. The results resist all the robustness trials to which they are subjected. Given the revealed importance of the banking relationships, I look deeper into the nature of the relationship in section 4 distinguishing between lending relationships and underwriting relationships. Both lending and underwriting relationships established prior to the firm’s IPO help reduce the issuing firm’s cost of equity, but the magnitude of this effect is significantly different depending of the type of relationship: lending relationships reduce underpricing by about 16 percent, whilst underwriting relationships reduce the firms cost of capital by 7 per cent. The results of this paper are discussed in section 5. Section 6 concludes.

2 Data Description

2.1 Sample Description

The sample in my study consists of IPOs between January 1st 1998 and December 31st 2000 where the contract between the underwriting bank and the issuing firm is a “firm commitment contract” (i.e. fixed price offerings) that exclude ADRs, closed end funds, REITS and financial institutions, and also private placement, rights and unit issues⁶. Further, firms in my sample have at least one reported contact with a bank recorded in DealScan prior to the firm’s IPO. Finally, I require a full year’s data report in the last amended prospectus filed with the SEC⁷. The final sample consists of 309 firms. To see how my sample compares to the samples used in previous research on IPOs, I compare the average per year IPO underpricing in my sample with the average per year IPO underpricing in Jay Ritter’s sample⁸. The underpricing measure is defined as:

$$\text{Underpricing} = \frac{(\text{First closing price} - \text{Offer price})}{\text{Offer Price}} * 100,$$

⁶A detailed explanation of the criteria used to select these IPOs is available from the author upon request.

⁷I use SDC only to obtain the list of issuing firms, the offer date, whether they were venture backed or not, the lockup days, the list of lead underwriters, book managers and set of all underwriters.

⁸In “Summary Statistics on 1975 - 2000 IPOs with an offer price of \$5 or more”

where the first closing price is taken from CRSP⁹. The per year underpricing in my sample of 309 firms is comparable to that reported by Jay Ritter:

Table 3: Per year Comparison of Underpricing

Underpricing is measured as the first day price run up. For Ritter’s sample as well as for mine, the first trading day closing price is taken from CRSP.

Year	Jay Ritter’s Sample	My Sample
1998	20.1	16.95
1999	68.6	66.79
2000	55.5	50.42

If as has been reported previously in the IPO literature, underpricing is negatively correlated with firm size, then my sample consists of larger firms relative to the firms in the samples used in previous works. If in my sample I can find that firms with no relationship with a potential underwriter are more underpriced relative to firms with a relationship with a potential IPO manager, then I am most likely to find this in a sample of smaller firms where underpricing is even larger than in my sample.

2.2 Identifying the firm-bank relationship

I can separate the firms into three groups. If *at least one* of the banks that served the firm prior to the IPO could have been the firm’s IPO underwriter (or if the section 20 subsidiary of a bank that served the firm prior to the IPO could have managed the firm’s IPO), I record the following: “The firm had a relationship with a bank that could have taken the firm public” and code a categorical variable “**Could = 1**”. If none of the banks that lent it’s services to the firm prior to the IPO could have underwritten the firm’s IPO, I record the following: “The firm did not have a relationship with a bank that could have taken the firm public; the banking institution with which the firm dealt with prior to the IPO could not have taken the firm public”. In these cases “**Could = 0**”. Thus,

⁹When the price at the closing of the first trading day is missing, the closing price at the second trading day is used. First day prices were missing from CRSP for five firms and the first closing price was taken from TAQ.

$$\mathbf{Could}_j = \begin{cases} 1 & \text{if at least one bank with a previous relation with firm } j \\ & \text{COULD underwrite } j's \text{ IPO,} \\ 0 & \text{otherwise.} \end{cases}$$

For the cases in which I recorded that the firm’s relationship bank could have taken the firm public, I record whether at least one of these potential underwriters did actually underwrite the client firm’s IPO. If at least one of the relationship banks did underwrite the firm’s IPO, I record this as “**Did = 1**”; if none of the relationship banks that could have underwritten the firm’s IPO actually underwrote the firms IPO, I record this as “**Did = 0**”. Thus,

$$\mathbf{Did}_j = \begin{cases} 1 & \text{if at least one bank with a previous relation with firm } j \\ & \text{DID underwrite } j's \text{ IPO,} \\ 0 & \text{otherwise.} \end{cases}$$

The percentage of firms in the sample which had a relationship with a bank that could take them public and actually were taken public by that bank (i.e. those for which **Could** = 1 and **Did** = 1) is 30.4 percent. The percentage of firms in the sample which had a relationship with a bank that could take them public, but were not taken public by that bank (**Could** = 1 and **Did** = 0) is 17.8 percent. Finally the remaining 51.8 percent of the firms had a relationship with a bank that could not take them public.

2.3 Univariate results

Recall that the importance of the bank and the firm having a relationship prior to the firm’s IPO is the following: the bank with which the firm has a relationship owns private information regarding the firm’s value; this ameliorates the asymmetric information problem between the underwriter and the firm and should thus lower underpricing. Table 4 compares underpricing across the three firm categories:

Table 4: Underpricing across the three firm categories.

Underpricing is measured as the first day price run up:

$$\text{Underpricing} = \frac{\text{First day closing price} - \text{Offer Price}}{\text{Offer Price}} * 100$$
 where the first trading day closing price is taken from CRSP.

Underpricing	Could = 1		Could=0
	Did = 1	Did = 0	
Mean *	25.61	30.28	61.36
Std. Deviation	42.32	67.12	91.16
Median	11.63	9.77	26.49
No Observations	92	54	160
Min	-13.64	-32.81	-24.43
Max	229.96	357.24	697.50
Inter quartile range	34.96	28.00	82.29

*: Significantly different at 1 % level between firms that Could=1=Did and firms for which Could=0 (columns 1 and 3). Also significantly different at 1% between firms for which Could=1 & Did=0 and firms for which Could=0 (columns 2 and 3). Not significantly different between firms for which Could=1 & Did=0 and firms for which Could=1=Did (columns 1 and 2).

These univariate results show that:

1. The cost of IPO equity capital for firms that, being able to go public with the bank with which they had previously been dealing, chose to switch banks and go public with another bank is 31.08 percent lower relative to the cost of IPO equity capital of firms that did not have the choice of going public with their relationship bank. This reduction in underpricing is statistically significant at 1 percent.
2. The cost of IPO equity capital for firms that actually went public with the bank with which they had previously been dealing, is 35.75 percent lower relative to the cost of IPO equity capital of firms that did not have the choice of going public with their relationship bank. This difference in underpricing is statistically significant at 1 percent.

3. Firms with the option of going public with the bank with which they have a previous lending relationship, can lower the cost of their equity capital by approximately 4.67 percent if they actually do go public with their relationship bank. As predicted, this is economically small and statistically insignificant.

Of course, these monotonic relationships do not account for other firm characteristics that could also be driving the firm's IPO underpricing. The following section studies firm characteristics and how firms differ depending on whether they have a banking relationship with a bank that can manage IPOs or with a bank that cannot manage IPOs. I later use these firm characteristics in the multivariate analysis that studies the effects of banking relationships on underpricing.

2.4 Firm characteristics

I studied the financial statements reported in the last amended prospectus filed with the SEC for each of the 309 firms in my sample. From these statements I obtain some important firm characteristics reported below. Note how firms with established lending relationships with a potential IPO underwriter are significantly different from firms without this relationship. Also notice how firms that actually choose to go public with their relationship bank are significantly different from firms that chose to switch banks and go public with a bank other than their relationship bank even though their relationship bank could have managed their IPO. Table 5 shows summary statistics describing firm characteristics:

Table 5: Summary Statistics for Firm Characteristics at the time of the IPO

The data has been collected from the financial statements reported in the last amended prospectus filed with the SEC, and corresponds to the last complete calendar year prior to the firm's IPO, it is recorded in thousands of US dollars. Firm age is measured in years between inception and the IPO date.

Firm Characteristics	Could = 1		Could=0
	Did = 1	Did = 0	
Total Assets ^{***}	1,030,130 (2,769,725)	160,580 (276,873)	30,944 (45,099)
Total Debt ^{***}	365,528 (759,515)	58,413 (95,480)	9,354 (19,713)
Short term debt	21,868 (65,925)	8,207 (20,448)	2,916 (8,028)
Long term debt ⁺	344,118 (731,461)	51,018 (97,743)	6,069 (15,119)
Working Capital ⁺	125,896 (415,908)	8,052 (60,134)	6,763 (11,430)
Cash ⁺	54,721 (172,634)	11,700 (24,198)	5,559 (7,210)
Shareholders Equity	260,163 (1,152,002)	27,775 (120,412)	3,035 (19,452)
Revenues ^{**}	1,030,147 (4,224,491)	162,722 (348,926)	39,699 (79,414)
Gross Profits ^{***}	248,577 (730,912)	44,689 (73,695)	12,967 (20,056)
Net Income	40,903 (309,372)	-1,273 (40,023)	-2,867 (10,703)
Operating Cash-flow	89,387 (437,605)	9,863 (50001)	-826 (16,021)
$\left(\frac{\text{Profits}}{\text{Revenues}} \right)$	0.27 (0.54)	0.32 (0.36)	0.24 (0.85)
$\left(\frac{\text{Total Debt}}{\text{Total Assets}} \right)^+$	0.55 (0.40)	0.37 (0.47)	0.30 (0.77)
$\left(\frac{\text{Operating Cash flow}}{\text{Total Assets}} \right)$.01 (0.16)	-0.10 (0.65)	-0.001 (2.57)
Firm	9.55 (13.21)	9.58 (12.25)	7.59 (9.01)
No. Observations	94 (30.4%)	55 (17.8%)	160 (51.8%)

^{**} Significantly different across all firm categories at 1%; ^{***} Significantly different across all firm categories at 5%; ^{*} Significantly different across all firm categories at 10%; ⁺ Significantly different at 1% between firms Could=1=Did and Could=1 Did=0 & also between firms Could=1=Did and Could=0. Standard errors reported in brackets.

The values of total assets, total debt, debt to assets, short and long term debt, cash, working capital, revenues, and gross profits are significantly different (at the 1 percent level) between firms that *could and did* go public with their bank and firms that *could not* go public with their bank (difference between columns 1 and 3).

The values of total assets, total debt, debt to assets, long term debt, cash, working capital, and gross profits are significantly different (at the 1 percent level) between firms that *could and did* go public with their bank and firms that *could but did not* go public with their bank (difference between columns 1 and 2).

The values of total assets, total debt, long term debt, revenues and gross profits are significantly different (at the 1 percent level) between firms that *could and did not* go public with their bank and firms that *could not* go public with their bank (difference between columns 2 and 3).

The values of shareholders equity, cash-flows, short term debt and revenues is significantly different between firms that *could and did* go public with their bank and firms that *could but did not* go public with their bank at 10 percent level.

Finally, there is no significant difference between cash-flow margins and profit margins across the three types of firms.

The above results suggest that firms that had a relationship with a bank that could take them public and actually did go public with that bank are larger firms relative to firms that could be taken public by their bank but choose to switch banks and these are in turn larger firms relative to those that could not be taken public by their bank: the value of their assets, revenues, cash and working capital is higher for these firms. The summary statistics also suggest that firms that can be taken public by their bank and are actually taken public by this bank are more leveraged and have larger outstanding debt levels at the time of going public relative to firms that choose to switch banks and go public with a bank different from the one they were dealing with. Whether these latter firms are more profitable than the former is not clear since their cashflow margins are not significantly different but the gross profits are significantly different at 1 % level.

2.4.1 A new measure of firm uncertainty

Previous research¹⁰ has indicated that the uncertainty regarding the issuing firm’s value has a significant effect on the firm’s IPO underpricing. In studying the firm’s last amended prospectus filed with the SEC, I found important firm characteristics that describe the uncertainty about the firm’s future prospects that have not been considered before. I use this soft data to create a categorical variable that will later serve the role of control for firm uncertainty¹¹.

A firm that is precise and transparent in describing the use of its IPO proceeds informs the market about the firm’s available projects and future prospects. This reduces the uncertainty regarding the firm’s future value. Firms which in the last amended prospectus state they have not yet figured out what to do with the IPO proceeds are clearly introducing uncertainty regarding the firm’s future investment opportunities. Consider for example the declaration of Visual Networks (VNWK; IPO on February 5th 1998):

“The principal purposes of the offering are to increase the Company’s working capital and equity base, create a public market for the Company’s Common Stock, facilitate future access to public capital markets and provide increased visibility and credibility for the Company in its

¹⁰For instance, Ritter [1984], Beatty and Ritter [1986], Muscarella and Vestuypens [1989], Carter and Manster [1990] and James and Weir [1990].

¹¹Firms with no operating history prior to the IPO and that only plan to begin operations conditional on the IPO’s consummation generate a much greater uncertainty regarding its future prospects than a firm with an established operating history. Studying each firm’s prospectus allowed me to tell apart these two types of firms in my sample and distinguish them with a dummy variable which I called *Idea*

$$Idea_j = \begin{cases} 1 & \text{if firm } j \text{ has } \textit{not} \text{ operated to date} \\ 0 & \text{otherwise} \end{cases}$$

Firms for which I defined $Idea = 1$ have a statement in their prospectus similar to this one from Landcare USA: “The Company was founded in 1997 and has conducted no operations to date. LandCARE USA, Inc. was formed to become a leading national provider of landscape, lawn care, [...]. LandCARE USA, Inc. conducted no operations prior to the IPO.”

There are 8 firms which are “an idea” (around 3% of the sample). Of these 8 firms, 5 had a relationship with a bank that could manage IPOs and 3 of them actually did go public with this bank. Firms that are an “Idea” are small firms, with small and negative cashflow margin. Given that there are only 8 firms in my sample which are an idea, I will not be able to identify whether firms that are an idea are more (or less) underpriced than firms that are not an idea. Because I lack identifying power, I dropped this variable.

marketplace [...] The Company has no current plans for the net proceeds of the offering”

And consider that of DSET Corp. (DSET; IPO 13th of March 1998):

“The Company expects to use the net proceeds from this offering for general corporate purposes and working capital. The Company has not yet identified specific uses for such proceeds and will have broad discretion over their use and investment.”

Neither of these firms is reducing the uncertainty regarding their future prospects and investment opportunities. Compare these declarations with the one from Loud-eye Technologies Inc. (LOUD; IPO March 15th, 2000):

“We expect to use approximately \$9.0 million of the net proceeds in 2000 for capital expenditures primarily associated with expansion of our encoding and hosting infrastructure and other technology and systems upgrades. In addition, we plan to use approximately \$2.0 million of the proceeds to establish production and sales facilities in Santa Monica, California and New York, New York. [...]”

To capture the difference in the uncertainty regarding these two types of firms, I defined the following categorical variable¹²:

$$Transparent = \begin{cases} 1 & \text{if the firm gives a precise list of uses of proceeds} \\ 0 & \text{otherwise} \end{cases}$$

There are 98 firms (31.72 percent) which are not transparent. Firms which are transparent are significantly larger firms (value of total assets is significantly larger), have significantly higher cash-flow margins (cash-flow over revenues) and significantly higher net income before taxes.

The following table illustrates how underpricing varies depending on the firm’s transparency. More transparent firms face a significantly lower cost of equity capital in their IPO. The mean underpricing for transparent firms is more than 16 percent

¹²For the firms in the sample I have reported the uses of proceeds as described in the last amended S1 filing with the SEC. This is the information used to create the dummy variables on “transparency”. This information and the dummy variables are available from the author upon request.

lower than the mean underpricing of not transparent firms. These results are reported in table 6:

Table 6: Underpricing according to the degree of firm uncertainty: IPO transparency

The information from which the data in this table has been defined comes from the Use of Proceeds section in the firms last amended S1 filing with the SEC.

Firm Transparency:	Transparent	Not Transparent
Mean	47.43*	64.10
Std. Deviation	(91.42)	(76.80)
Median	13.94	31.54
No Observations	108	98

*: Significantly different from “Not Transparent” at 10%

3 The impact of the firm’s pre IPO banking relationship on its cost of equity capital

The univariate results presented in the previous section (table 4) do not control for firm and market characteristics (other than the relationship variable) that affect the firm’s IPO underpricing. The results in this section account for these controls using the variables introduced above.

3.1 Multivariate analysis

I estimate a regression of the form:

$$\begin{aligned} \text{Underpricing} = & \beta_0 + \beta_{\text{Could}} \mathbf{Could} + \beta_{\text{Did}} \mathbf{Did} + \beta_{\text{Firm}} \text{ Firm Characteristics} \\ & + \beta_{\text{IPO}} \text{ IPO Characteristics} + \beta_3 \text{ Controls} + \varepsilon \end{aligned}$$

The empirical prediction stated in section 3.2 translates into the following:

1. $\beta_{\text{Could}} < 0$: Firms that could have gone public with their relationship bank but go public with another bank are *less* underpriced relative to firms that do not have the option of going public with their relationship banks.

2. $\beta_{Did} < 0$: Firms that actually go public with their relationship bank face a lower cost of equity capital relative to firms that switch banks.
3. β_{Did} economically insignificant: Underpricing should not be significantly different for firms that switched banks at the time of choosing an underwriter relative to firms that do not switch banks and keep their relationship bank as their IPO underwriter.

The results from estimating the above equation are reported in table 7.

Table 7: The impact of pre IPO lending relationships on the firm's cost of equity capital in an IPO

The dependant variable is underpricing. In addition to the variables reported each regression also include year fixed effects, a categorical variable for the exchange where shares start trading, a standardized measure the offer price and an intercept. The results do not change if the firm's age is replaced by log (1+age).

	(1)	(2) ^a	(3)	(4)	(5) ^b	(6)
Asymmetric Information						
Could	-17.08** (8.77)	-15.32* (9.14)	-15.62** (8.78)	-17.00** (8.74)	-21.59** (9.96)	-16.73* (8.77)
Did	0.59 (10.05)	-3.07 (10.46)	-0.37 (10.04)	-0.22 (10.03)	3.58 (10.53)	1.71 (10.09)
Firm uncertainty						
Transparency			-11.55* (6.96)			
Firm characteristics						
Log (Assets)	-10.19*** (2.55)	-10.24*** (2.65)	-10.32*** (2.54)	-11.09*** (2.60)	-13.14*** (2.84)	-10.46** (2.55)
$\left(\frac{\text{Total Debt}}{\text{Total Assets}} \right)$	-8.89** (4.04)	-8.62** (4.17)	-8.31** (4.04)	-8.82** (4.03)	-6.87* (4.23)	-8.47** (4.05)
$\left(\frac{\text{Cash}}{\text{Assets}} \right)$	40.78*** (15.57)	38.96* (15.91)	35.44** (15.85)	34.92** (16.03)	33.65** (17.40)	41.55** (15.57)
Age of firm at time of IPO (in years)	-0.66** (0.29)	-0.70*** (0.29)	-0.64** (0.29)	-0.61** (0.29)	-0.48 (0.30)	-0.64** (0.29)
IPO Characteristics						
$\left(\frac{\text{IPO Proceeds}}{\text{Total Assets}} \right)$	-0.08* (0.04)	-0.07* (0.04)	-0.07* (0.04)	-0.07* (0.04)	-0.09** (0.04)	-0.08** (0.04)
Nasdaq	19.52* (8.86)	19.37** (9.20)	17.31** (8.93)	19.57** (8.85)	21.08** (9.79)	19.50** (8.85)
Underwriter Classification						
Underwriter's Ranking (according to market share)				-1.59** (0.82)		
Subsidiary						-7.61 (6.52)
Number of Observations	305	305	305	305	305	305
Adjusted R squared	0.3870	0.3810	0.3907	0.3911	0.3985	0.3878

Standard errors are reported in parenthesis. ***: Significant at 1%; ** at 5%; * at 10%.

^a This regression includes industry fixed effects. ^b This regression includes bank fixed effects.

The first column of table 7 reports the basic regression which studies the effect of previous banking relationships on IPO underpricing controlling for firm characteristics and IPO characteristics. The results show that having a relationship with a bank that can manage IPOs does actually lower IPO underpricing; the coefficient on **Could** is negative and significant. Whether the relationship bank actually took the firm public does not have a statistical nor an economically significant effect on underpricing. Ceteris paribus, the cost of capital for firms with banking relationships with a potential IPO underwriter is about 17 percent lower relative to the cost of capital for firms without a relationship with a bank that could take the firm public. This is statistically significant and economically very significant. If the relationship bank actually takes the firm public this raises the cost of capital by an extra 0.59 percent which is both economically and statistically highly insignificant. These results do not reject the hypothesis that having an established relationship with a bank that can manage the firm's IPO reduces the cost of capital of these firms issuing equity for the first time.

I control for observable firm characteristics using log assets, the firm's age at the time of the IPO, cash to assets ratio and the debt to assets ratio. As in previous research, larger firms (as measured by the firm's total assets) have lower underpricing. As in Carter and Manaster [1990] and Ritter [1984], I find that younger firms are more underpriced relative to older ones: the coefficient on the firm's age is negative and significantly different from zero.¹³

The results also show that firms with a higher cash to assets ratio have significantly higher underpricing. Firms go public because they need the cash to fund their investment projects. If the firm has a high cash to assets ratio, investors may grow wary about the reasons why the firm is going public. Is the firm going public to fund an investment project or are the firm's managers wanting to sell the firm? The positive coefficient on the cash to assets ratio indicates investors view these issues as particularly risky, and thus demand a higher discount for purchasing these shares.

I control for IPO characteristics using the ratio of IPO proceeds to total assets, a categorical variable for the exchange where the issue starts trading and year fixed

¹³Petersen and Rajan [1994] emphasize that the effect of the firm's reputation may not increase linearly with the age of the firm. It is reasonable to believe that the change in the firm's reputation smoothes over time: as a firm grows older, the effect of an additional year declines. To see whether this affects my results, I replace the age of the firm with the log of 1 plus the age of the firm. This does not change the results.

effects. As expected, issues that start trading in Nasdaq are relatively more underpriced relative to issues trading in the NYSE or in the AMEX market. Beatty and Ritter [1986] show that smaller offerings are more speculative on average relative to larger offerings and find that firms with higher IPO proceeds exhibit lower underpricing. The results reported are consistent with this previous finding.

3.1.1 Robustness of the Results

This section tests the robustness of the above results. In particular, is the sign and magnitude of the effect of having a relationship with a bank that can potentially manage IPOs driven by unobservable firm characteristics? Is it driven by bank characteristics? Could it be driven by the type of underwriting institution managing the IPO? This section addresses these questions.

Unobservable firm characteristics Recall that the firms in this sample went public between the years 1998 and 2000. During this time period many high technology firms went public. These firms are relatively intensive in the use of human capital and may lack the physical capital needed for debt collateral. So it could be possible that these high tech firms do not have relationships with banks, and in particular do not have a relationship with a bank that can potentially take the firm public¹⁴. Further, high technology firms have shown a significantly higher underpricing relative to other firms¹⁵. Can it be that technology firms do not have, prior to their IPO, an established relationship with a bank that can potentially underwrite IPOs and this is the driving force behind the coefficient on **Could**? To control for this column 2 of table 7 includes industry fixed effects. The results do not change significantly when these control variables are included. The variable of interest **Could** is negative, and statistically significant. The magnitude of the coefficient on **Could** is slightly diminished: controlling for industry fixed effects, having a relationship with a bank that can manage the firm's IPO can reduce the firm's cost of equity capital by more than 15 percent, which is both economically and statistically significant. When the firm actually went public with its relationship bank, the cost of capital

¹⁴This is not very significant: more than 22% of the high technology firms in my sample have a relationship with a bank that can take them public. And of these high technology firms that could have gone public with their bank, more than 45% of them actually did go public with their bank.

¹⁵The high technology firms in my sample exhibit about 24% higher underpricing relative to the other firms in the sample

is further reduced by about 3 percent which as predicted is both economically and statistically not significant. Notice how including industry fixed effects diminishes the explanatory power on the cash to assets ratio. This is consistent with the fact that firms in different industries need to hold very different amounts of cash in their balance sheets due to the nature of their different operating activities.

To further guarantee the robustness of my results, I checked the business description given by each firm in the prospectus it filed with the SEC. I coded a categorical variable equal to 1 if the business description indicated the issuing firm is a high technology firm¹⁶. Including this categorical variable for technology firms in the regression equation slightly increases the significance of the coefficient on **Could** and **Did** (results not reported).

As the previous literature on IPOs indicates, firm uncertainty is highly correlated with underpricing. Could it be the case that firms that do not have a relationship with a potential IPO underwriter, prior to the IPO date, are firms for which the market has little or no information regarding the future prospects of the firm? Maybe it is the case that more opaque firms keep away from the market and therefore do not establish banking relationships with potential IPO underwriters. If this were the case, then firm uncertainty would be driving the result on **Could**. Column 3 of table 7 includes the transparency measures of firm uncertainty I defined in the previous section. The inclusion of this variable does not eliminate the effect of previous banking relationship on the firm's cost of equity capital. Again, having a relationship (prior to the IPO) with a potential IPO underwriter reduces the firm's cost of equity capital by approximately 15 percent both economically and statistically significant. The results also show that, as expected, the coefficient on firm transparency is negative and statistically significant: firms that precisely describe the uses of proceeds and inform the market about their future investment projects can reduce the cost of equity capital by over 11 percent, indicating that spelling out the firm's future projects does in fact help solve part of the asymmetric information problem that leads to high cost of equity capital in an IPO. Since the transparency variable is measuring asymmetric information regarding the firm's true value, it is reasonable that including this variable in the basic regression equation takes away some of the explanatory power of the other

¹⁶For instance, when the firm's business description is "Provider Internet System Solutions" or "Provider cellular phone services", the categorical variable for technology was set to 1. If the business description is "Construction" it was set to 0.

measures of asymmetric information, in particular, takes away some of the power of **Could**.

Thus, the results of the basic regression equation are robust to unobservable firm characteristics. The results so far do not allow us to reject the impact banking relationships have in reducing the firm's cost of equity capital in an IPO. I now test whether these results are robust to bank characteristics.

Unobservable bank characteristics Are firms that go public with the bank with which they have a previously established relationship going public with a bank that, on average, underprices less than other banks? In this section I test the robustness of the results to different characteristics of the underwriting bank.

First I test whether the results are robust to the underwriting bank's reputation. As in previous literature, I use the underwriting bank's market participation as a proxy for reputation. The results are consistent with Beatty and Ritter [1986], Carter and Mansater [1990], Michaely and Shaw [1994], Hanley and Wilhelm [1995]: the higher the reputation of the underwriter, the lower the firm's IPO underpricing¹⁷. The effect of the underwriter's reputation on IPO underpricing is reported in column 4 of table 7: choosing an underwriter with higher reputation reduces underpricing by more than 1 percent which though statistically significant, economically its magnitude is not significant. Notice that the inclusion of the reputation of the IPO underwriter does not diminish the effect of having an established relationship with a potential underwriter on the firm's cost of capital: the coefficient on **Could** is both economically and statistically significant, and indicates that having an established relationship with a potential underwriter decreases the firm's cost of equity capital by approximately 17 percent, as indicated by the basic regression in column 1 of the same table.

Column 5 of table 7 further tests whether the results are robust to the inclusion of bank fixed effects. The reported results show that including bank fixed effects does not drive away the result on the importance of previously established banking relationships.

Issues underwritten by section 20 subsidiaries are, on average, less underpriced relative to issues managed by investment banks. Suppose most firms for which **Could**

¹⁷This result still holds true if measure of underwriter reputation used is the number of deals managed by each underwriting bank in each of the three years studied.

= 1 have a relationship with a section 20 subsidiary (or with their parent commercial bank) prior to the IPO. Then we need to make sure that the variable **Could** is picking up the effect of the lending relationship and not the effect of the IPO being underwritten by an underwriter that on average underprices less; i.e. it is important to disentangle the effect of **Could** from the effect of the underwriter’s identity on the firm’s underpricing. If we do not control for the underwriter’s identity, then we cannot be sure that the result on **Could** actually measures the effect of the pre IPO lending relationship on underpricing; it could be capturing the fact that most firms with pre IPO banking relationships with banks capable of underwriting IPOs have a relationship with the underwriting institution that underprices the least.

Commercial banks have entered the underwriting business underwriting IPOs under their affiliates called section 20 subsidiaries since the end of 1997 and the beginning of 1998. Since March 1999, commercial banks can underwrite IPOs directly. I created the following categorical variable to distinguish section 20 subsidiaries from issues underwritten by other underwriting houses:¹⁸

$$S = \begin{cases} 1 & \text{if the lead underwriter is a section 20 subsidiary,} \\ 0 & \text{otherwise.} \end{cases}$$

The results of including the underwriter’s classification in the regression equation are reported in column 6 of the table 7. The inclusion of the underwriter’s classification does not alter significantly the results of the basic regression. We can safely conclude that the effect of having an established relationship (prior to the IPO) with a bank that can manage the firm’s IPO is not driven by the bank’s category, i.e. is not driven by the fact that some banks underprice less on average than other banks.

Therefore, the results reported are robust to underwriter characteristics, and do not allow us to reject the hypothesis that the cost of capital for firms with banking relationships with a potential IPO underwriter is in fact lower relative to the cost of equity for firms without a relationship with a bank that could take the firm public.

The question that arises now is whether the results are driven by firms self selecting into the category **Could**= 1 or **Could**= 0, depending on their belief regarding under which category they would face a lower cost of equity capital. To further check the robustness of my results I control for firm self selection in the following section.

¹⁸See Appendix B for a description and discussion of the classification of each firm under different types of underwriters.

3.2 Controlling for firm selection

Consider the firm's choice of banking relationship prior to its IPO. Whether the firm establishes a relationship with a bank that can underwrite IPOs or with a bank that cannot underwrite IPOs is not random. Firms could self select into the categories **Could=1** or **Could=0** depending on their belief regarding under which category the firm would have lower future IPO underpricing. Suppose that, prior to the IPO, the firm's manager believes future IPO underpricing will be higher if the firm has, at the time of the IPO, an established relationship with a bank that can manage IPOs. In this case she will choose to establish a relationship with a bank that cannot manage IPOs. But if before the IPO she expects future IPO underpricing to be lower if at the time of the IPO the firm has an established relationship with a bank that can manage IPOs, then she will choose to establish a relationship with a bank that eventually will be able to take the firm public.

Some of the characteristics behind the manager's belief and choice of bank are observable to the market (such as firm size), but others are unobservable to the market (such as the value of the firm's prospects, the quality of the management, and the value of the projects the firm is taking). Therefore, the firm's choice of bank prior to the IPO depends, in part, on information that is unobservable to the market and that is (or could be) related to the firm's future IPO underpricing.

Once the firm chooses with which bank to establish a relationship, the market observes this choice and uses it to infer the manager's private information regarding the firm's value. In this way, the market can update its belief regarding the firm's unobservable characteristics and can incorporate this updated belief into the firm's IPO underpricing. The Heckman two step procedure allows for the incorporation of this updated information.

3.2.1 The firm's choice of bank - The selection equation

Recall that from the firm's choice of bank the market will infer valuable information regarding the firm's value which must be incorporated in the IPO underpricing equation.

Whether firm i establishes a relation with a bank that can do IPOs or not depends on certain observable and unobservable firm characteristics. Let the observable firm characteristics be I_i where I_i are variables that affect firm i 's choice of bank with

which to establish a relationship but *do not* affect the firm’s underpricing (these are the instrumental variables needed for the Heckman estimation). Variables in I_i are, for example: the firm’s credit rating at the time of establishing the relationship with the bank, the amount the firm borrowed from the bank, and the firm’s total assets and its debt position at the time the relationship was established. These affect the firm’s choice of bank but not its underpricing.

The firm’s choice of bank is observable and is recorded by a variable C_i ¹⁹ which describes the selection equation:

$$C_i = \begin{cases} 1 & \text{if firm } i \text{ establishes a relation with a bank that can do IPOs} \\ & \gamma' I_i \geq \varepsilon_i \\ 0 & \text{if firm } i \text{ establishes a relation with a bank that } \textit{cannot} \text{ do IPOs} \\ & \gamma' I_i < \varepsilon_i \end{cases} \quad (1)$$

where ε_i are the unobservable firm characteristics, known by the firm but not by the market, that affects the firm’s choice of bank. They might also affect the firm’s IPO underpricing at a later stage. For example, the value of the firm’s management and the value of its projects, are private information of the firm that affect both the firm’s choice of bank and its IPO underpricing.

Once the firm’s choice of bank is revealed, the market updates its beliefs regarding the unobservable firm characteristics.

Observable variables affecting the choice of bank prior to the IPO date:

Variables in I_i It is important to identify those firm characteristics that affect the firm’s pre IPO choice of bank that do not affect the firm’s underpricing. These variables will prove useful instruments in the estimation: if we are able to find these instruments then the results of the estimation will be independent of the functional form chosen. One such instrument can be the firm’s credit rating at the time of establishing the lending relationship. I search in Dealscan for the firm’s credit rating. Unfortunately, this is missing for many firms so in the regression equation I control for whether the firm is rated or not:

$$Rated_j = \begin{cases} 1 & \text{If firm } j \text{ is rated} \\ 0 & \text{otherwise} \end{cases}$$

Other variables that affect the firm’s choice of banking institution prior to the IPO can be the firm’s size and its leverage ratio *at the time the relationship started*.

¹⁹Same as *Could* before.

Again, this information is not easily available for private firms. In the prospectus filed with the SEC most of the firms report their balance sheet for years prior to the IPO. So using these balance sheets I record for each of the 309 firms in my sample, the value of the firm's total assets and total debt. These are the instrumental variables that will be used to estimate the selection equation. Summary statistics for these variables are reported in table 8.

Table 8: Summary Statistics for Firm Characteristics at the time of the Relationship

I have collected these firm characteristics from the financial statements reported in the last amended prospectus filed with the SEC. It corresponds to the closest complete calendar year to the date the firms began its relationship with the banking institution. The data is recorded in thousands of US\$ dollars. S&P Credit rating is recorded from Dealscan.

Firm Characteristics	Could = 1		Could=0
	Did = 1	Did = 0	
Total Assets	1,038,187 (2,788,847)	149,500 (265,904)	29,230 (45778)
Total Debt	380,968 (777,923)	55,158 (93,182)	8,283 (17,291)
Age of firm at the time of the relationship	8.87 (13.29)	8.69 (12.22)	6.75 (8.92)
Percentage of firms rated above B	9.6% (9 firms)	0	0
Percentage of firms rated below B	30.85% (29 firms)	1.81% (1 firm)	1.25% (1 firm)
No. Observations	94	55	160

Standard errors reported in brackets.

3.2.2 The firm's IPO underpricing - The regression equations

I now turn to the underpricing equation. Let underpricing be described by the following two regression equations,

$$U_{1i} = \beta' X_i + v_{1i} \Leftrightarrow \gamma' I_i \geq \varepsilon_i \quad (2)$$

$$U_{2i} = \beta' X_i + v_{2i} \Leftrightarrow \gamma' I_i < \varepsilon_i$$

where X_i are characteristics of the firm affecting the firm's underpricing *but not* its previous choice of bank. Some of the variables in X_i are: transparency of the firm (how precise the firm is when declaring the use of the IPO proceeds), the type of underwriter that managed the firm's IPO, the firm's leverage ratio, the firm's assets, and sales for the year closest to the date of the IPO.

In the regression equations 2: v_{1i} and v_{2i} are firm characteristics that are private information of the firm, hence unknown to the market, that affect the firm's underpricing. As discussed above, some of the firm's private information that affects its choice of bank may also affect its underpricing, therefore ε_i is correlated with both v_{1i} and with v_{2i} .

If the regression equations were estimated using OLS, the estimates of β would be biased since X_i is correlated with ε_i ²⁰ and ε_i is correlated with both v_{1i} and with v_{2i} , and so, X_i is correlated with v_{1i} and v_{2i} . Therefore, both $E(v_{1i} | X_i, \gamma' I_i \geq \varepsilon_i)$ and $E(v_{2i} | X_i, \gamma' I_i < \varepsilon_i)$ are different from zero. Hence, OLS estimates of the regression equations (2) will be biased. The basic idea behind the Heckman two step procedure is to estimate $E(v_{1i} | X_i, \gamma' I_i \geq \varepsilon_i)$ and $E(v_{2i} | X_i, \gamma' I_i < \varepsilon_i)$ and replace them in the regression equations 2, and then estimate these equations using OLS.

Under certain standard assumptions on the error terms²¹, the market's updated belief regarding the unobservable firm characteristics are:

$$\begin{aligned} E(v_{1i} | X_i, C_i = 1) &= E(v_{1i} | X_i, \gamma' I_i \geq \varepsilon_i) = -\sigma_{1\varepsilon} \frac{\phi(\gamma' I_i)}{\Phi(\gamma' I_i)} \\ E(v_{2i} | X_i, C_i = 0) &= E(v_{2i} | X_i, \gamma' I_i < \varepsilon_i) = \sigma_{2\varepsilon} \frac{\phi(\gamma' I_i)}{1 - \Phi(\gamma' I_i)} \end{aligned} \quad (3)$$

3.2.3 Heckman two step estimation

The **first step** requires finding estimates of the coefficients γ in the selection equation

$$C_i = \begin{cases} 1 & \text{if } \gamma' I_i \geq \varepsilon_i \\ 0 & \text{if } \gamma' I_i < \varepsilon_i \end{cases}$$

²⁰The characteristics of the firm are correlated with the firm's private information that leads to a certain choice of bank.

²¹That ε_1, v_{1i} and v_{2i} have a trivariate normal distribution with the following covariance matrix: $\Sigma = \begin{pmatrix} \sigma_1^2 & \sigma_{12} & \sigma_{1\varepsilon} \\ & \sigma_2^2 & \sigma_{2\varepsilon} \\ & & 1 \end{pmatrix}$, where $\sigma_j^2 = \text{var}(v_j), j = 1, 2$ and $\sigma_{12} = \text{cov}(v_1, v_2)$, $\sigma_{j\varepsilon} = \text{cov}(v_j, \varepsilon), j = 1, 2$ and $\sigma_\varepsilon^2 = \text{var}(\varepsilon) = 1$.

I do this using a probit maximum likelihood method which yields consistent estimates of γ , call these $\hat{\gamma}$. In the **second step** replace γ with $\hat{\gamma}$ in $\frac{\phi(\gamma'I_i)}{\Phi(\gamma'I_i)}$ and $\frac{\phi(\gamma'I_i)}{1-\Phi(\gamma'I_i)}$. Thus we have estimates of the market's updated information regarding the firm's unknown characteristics, given its choice of bank: $\hat{E}(v_{1i} | \gamma'I_i \geq \varepsilon_i) = \sigma_{1\varepsilon} \frac{\phi(\hat{\gamma}'I_i)}{\Phi(\hat{\gamma}'I_i)}$ and $\hat{E}(v_{2i} | \gamma'I_i \geq \varepsilon_i) = \sigma_{2\varepsilon} \frac{\phi(\hat{\gamma}'I_i)}{1-\Phi(\hat{\gamma}'I_i)}$. Given the market's updated beliefs regarding the unknown firm characteristics, the regression equations become:

$$U_i = \beta'X_i + \sigma_{2\varepsilon} \left[\frac{\phi(\hat{\gamma}'I_i)}{1-\Phi(\hat{\gamma}'I_i)} * (1 - C_i) \right] - \sigma_{1\varepsilon} \left[\frac{\phi(\hat{\gamma}'I_i)}{\Phi(\hat{\gamma}'I_i)} * C_i \right] + \xi_i$$

where $E(\xi_i) = 0$, for $i = 1, 2$. Now the underpricing regression equations can be estimated using OLS. This procedure gives consistent estimates of β , $\sigma_{1\varepsilon}$, $\sigma_{2\varepsilon}$.

3.2.4 Two step Heckman estimation results

Table 9 below shows the results of the probit estimation of the selection equation:

Table 9: The firm's choice of bank

Probit estimation where the dependant variable is a binary variable $C_i = 1$ if the firm chose to set up a relationship with bank that could potentially underwrite the firm's equity issue. The balance sheet data (assets and debt) corresponds to the year the banking relationship was established (which is at most 5 years before to the firms IPO). Since at that time the firm was a private firm, this data is not readily available. I collect it from the prospectus the firm filed with the SEC (the firms reports, in that filing, balance sheets corresponding to years prior to the IPO). The firm's credit rating also corresponds to the year the firm established it's banking relationship, I collect it from Dealscan.

	0.42*** (0.06)
Log (Assets)	
$\left(\frac{\text{Total Debt}}{\text{Total Assets}} \right)$	0.57*** (0.21)
Rated	0.92** (0.44)
Age (in years) at the time of the relationship	0.0002 (0.008)
Loan	-3.09* (1.84)
	305
Number of Observations	
Pseudo R squared	0.3393

***: Significant at 1%; **: at 5%; *: at 10%. Standard errors are reported in parenthesis.

Table 10 shows the results on the estimation of the regression equation.

Table 10: The impact of pre IPO lending relationships on the firm's cost of equity capital in an IPO

The dependant variable is underpricing. In addition to the variables reported each regression also includes year fixed effects, a categorical variable for the exchange where shares start trading, a standardized measure of the offer price and a constant term. The results do not change if the firm's age is replaced by $\log(1+\text{age})$.

	(1)	(2)	(3)
<i>Asymmetric Information</i>			
Could	-28.27* (21.92)	-24.08 ^a (23.43)	-28.61** (23.25)
Did	0.80 (9.15)	0.15 (9.65)	2.10 (8.55)
<i>Firm uncertainty</i>			
Transparent		-11.15 ^a (7.07)	
<i>Firm characteristics</i>			
Log (Total Assets)	-8.89*** (3.63)	-9.29*** (3.63)	-9.05*** (3.63)
$\left(\frac{\text{Total Debt}}{\text{Total Assets}} \right)$	-8.66** (4.15)	-8.09** (4.16)	-8.19** (4.17)
$\left(\frac{\text{Cash}}{\text{Assets}} \right)$	38.98*** (15.89)	34.55** (16.10)	39.78*** (15.90)
Age of firm at time of IPO (in years)	-0.65** (0.29)	-0.64** (0.29)	-0.64** (0.29)
<i>IPO Characteristics</i>			
$\left(\frac{\text{IPO Proceeds}}{\text{Total Assets}} \right)$	-0.07* (0.04)	-0.07* (0.04)	-0.08* (0.04)
Nasdaq	20.08** (8.93)	17.79** (9.02)	20.08** (8.92)
<i>Underwriter Classification</i>			
Subsidiary			-7.67 (6.54)

Endogeneity Correction

$\left(\frac{\hat{\phi}(\gamma'Z)}{\hat{\Phi}(\gamma'Z)} \right)$	3.89 (15.41)	3.70 (9.66)	4.53 (15.74)
$\left(\frac{\hat{\phi}(\gamma'Z)}{1 - \hat{\Phi}(\gamma'Z)} \right)$	-13.17 (0.48)	-8.49 (20.23)	-13.26** (2.89)
Number of Observations	305	305	305
Adjusted R squared	0.3837	0.3869	0.3845

***: Significant at 1%; ** at 5%; * at 10%; ^a at 15%. Standard errors are bootstrapped and are reported in parenthesis.

Controlling for firm selection does not drive out the effect of banking relationships on the firm's cost of equity capital. Rather, it reinforces the importance of establishing prior to the IPO a relationship with a bank that can manage IPOs. Column 1 of table 10 reports the basic regression:

$$\begin{aligned}
 U_i = & \beta_0 + \beta_{\text{Could}} \mathbf{Could} + \beta_{\text{Did}} \mathbf{Did} + \beta_{\text{Firm}} \text{Firm Characteristics} + \\
 & + \beta_{\text{IPO}} \text{IPO Characteristics} + \beta_3 \text{Controls} + \\
 & + (1 - C_i) \sigma_{2\varepsilon} \left[\frac{\phi(\hat{\gamma}'I_i)}{1 - \Phi(\hat{\gamma}'I_i)} \right] - C_i \sigma_{1\varepsilon} \left[\frac{\phi(\hat{\gamma}'I_i)}{\Phi(\hat{\gamma}'I_i)} \right] + \xi_i
 \end{aligned}$$

The results indicate that having a relationship with a bank that can potentially manage IPOs reduces the firm's cost of capital by over 28 percent, which is both economically and statistically very significant. Furthermore, actually going public with the relationship bank is as predicted, both economically and statistically highly insignificant. The results concerning the firm's cash to assets ratio, leverage ratio, and age are consistent with the previous findings in table 7.

Column 2 of table 10 checks the robustness of this result when firm transparency is included in the basic regression equation²². Just as was the case in table 7, firms which are transparent and report in detail their future projects and how they will

²²Similar results are obtained when controlling for firm characteristics using industry fixed effects.

allocate the proceeds of the IPO to these projects, do help to reduce the uncertainty regarding the value of the firm and thus lower the firm’s cost of equity capital by over 11 percent which is precisely the result from the previous estimation. Again, note how the inclusion of this variable slightly takes explanatory power from the **Could** measure of asymmetric information.

Finally, column 3 of table 10 tests the robustness of the basic result to the underwriter’s classification, and the categorical variable controlling for whether the underwriting bank is a section 20 subsidiary is included. The results reported show that the results are robust to bank characteristics. As before, having a relationship with a bank that can potentially take the firm public reduces underpricing by about 28 percent both statistically and economically significant.

Note that the endogeneity correction terms ($\frac{\phi(\hat{\gamma}'I_i)}{\Phi(\hat{\gamma}'I_i)}$ and $\frac{\phi(\hat{\gamma}'I_i)}{1-\Phi(\hat{\gamma}'I_i)}$) are not significant and this result is robust across different specifications of the first step probit selection equation and different specifications of the second step regressions. This suggests that firms do not select into the categories of **Could** = 1 and **Could** = 0. Why is the matching of firms with banking institutions random? When firms set up their banking relationship they did not know and they could not forecast that the Glass-Steagall Act would have been repealed. This dataset records relationships established up to 5 years prior to the firm’s IPO date. At that time, the issuing firms could not have predicted the Glass-Steagall Act would be repealed. This explains why firms did not self select into the categories **Could**= 1 and **Could**= 0. Though the recent merger wave in financial firms will probably complicate any study attempted to see whether now that the Glass-Steagall Act has been repealed firms are in fact self-selecting into these categories²³.

Thus, even controlling for firm self selection, we cannot reject the hypothesis that, having a previously established relationship with a bank that can manage IPOs does in fact lower the firm’s cost of equity capital.

Given that the effect of the banking relationships is robust to firm characteristics, banking characteristics and furthermore to the firm’s self selection into the banking

²³Given that firms know that now their relationship bank may take them public and that this has an effect on the firm’s equity cost of capital, firms may select to establish a banking relationship with the bank that would, in the future, lower their cost of equity capital when going public: it could be building a relationship with a potential IPO underwriter or with a bank that will not eventually be able to take the firm public. But as stated above the recent mergers in the banking industry may hamper this exercise.

relationship that they believe would produce for them the lowest cost of equity capital in a future IPO, I now turn to explore the nature of the banking relationship deeper and study whether lending relationships differ from underwriting relationships. In particular, does it matter whether a firm chose to establish a lending relationships, i.e. borrowed money from the bank itself; or chose an underwriting relationship, i.e. hired the bank to manage the firm’s private or public debt placement, thus arranging for others to lend money to the firm?

4 The Nature of the Relationship

The categorical variables **Could** and **Did** described above record whether the underwriting bank has valuable information regarding the issuing firm. But they do not control for the nature of the banking relationship. In this section I look deeper into the relationship between the firm and the bank and distinguish between lending relationships (the bank lends its own funds to the firm) and underwriting relationships (the bank managed the firm’s private or public debt issue).

For each bank-firm contact, I create a categorical variables to capture the nature of the banking relationship. *Loan* equals 1 if the bank with which the firm has a relationship actually lent some of its own funds to the firm (as a term loan, a revolver loan, a stand by letter of credit, a lease, a bridge loan or a note)

$$Loan_j = \begin{cases} 1 & \text{if firm } j \text{ has a loan from the bank} \\ 0 & \text{otherwise} \end{cases}$$

When *Loan* = 0 it is because the banking relationship is an underwriting relationship, i.e. the bank managed the firm’s prior public or private debt issue.

The percentage of firms in the sample that had a bank loan is 92.18 percent; for the remaining 7.77 percent of the firms the bank underwrote some debt issue. For the subsample of firms for which the bank underwrote a debt issue: the percentage of firms for which the bank underwrote the firm’s *private* placement of debt is 87.50 percent; and for the remaining 12.50 percent of the firms, the bank underwrote a *public* debt issue. I do not have enough identification power to consider these two categories separately and so will group firms that have done a private or public debt placement with their relationship bank as having a previous *underwriting* relationship with their relationship bank.

Table 11 summarizes the underpricing for firms with bank loans and firms that have received underwriting services from their relationship banks.

Table 11: Underpricing with different types of banking relationships

If the bank lent it's own funds to the firm, then the firm had a lending relationship with the bank. If the bank managed the firm's (private or public) debt placement, then the firm had an underwriting relationship.

Type of Relationship:	Could=1				Could=0
	Lending		Underwriting		(5)
	Did (1)	Did Not (2)	Did (3)	Did Not (4)	
Mean	21.21*	31.65	40.52	-5.30	61.36
Std. Deviation	34.56	67.82	60.56	38.92	91.16
Median	11.72	9.77	11.11	-5.30	26.49
No Observations	71	52	21	2	160
Percentage out of the total sample	23.2%	16.99%	6.86%	0.65%	52.29%

*: Significantly different at 10 % level between firms that Could =1=Did that had a Loan from the relationship bank (Loan=1) and firms for which Could=1=Did that had a previous debt issue underwritten by the relationship bank (Underwriting=1). Also significantly different at 1% between firms that Could =1=Did that had a Loan from the relationship bank and firms for which Could=0

Given that only two firms with underwriting relationships chose to switch banks, I lack the identification power to estimate how the cost of capital differs between firms with an underwriting relationship that chose to switch banks at the time of the IPO and firms without any previously established relationship with a potential IPO underwriter (columns 4 and 5). I will also lack identification power to compare how the cost of capital of these switching firms differs relative to that of firms that actually do go public with their (underwriting) relationship banks (columns 3 and 4). Finally I will not be able to compare how the cost of capital differs between

firms with underwriting relationships and firms with lending relationships both of which decide to switch bank and go public with an outside underwriter (columns 2 and 4). Yet there are interesting comparisons that can be made. I can compare the cost of capital of firms with lending relationships that actually went public with their relationship bank and firms with lending relationships that chose to switch banks (columns 1 and 2). I can also study how the cost of capital of firms that went public with their lending relationship bank differs from the cost of capital of firms without a relationship with a potential IPO underwriter (columns 1 and 5). I can also compare how the cost of equity capital differs between firms that could have gone public with their lending relationship bank but actually went public with another bank and firms that do not have a lending relationship with a potential IPO underwriter (columns 2 and 5). The final comparison I can establish is between the cost of capital of firms with lending relationships with potential IPO underwriters and the cost of capital of firms with underwriting relationships (columns 1 and 3). This last comparison can suggest whether the type of banking relationship matters and whether there is any banking relationship that can lower the firm's cost of equity capital relative to the other type of banking relationship. The arrows in table 11 show the comparisons of firm's cost of capital that we can make.

The univariate results shown in table 11 reveal that, as predicted, firms that could have gone public with their lending relationship bank but choose to switch banks and go public with another bank do not face a significantly different cost of capital relative to the firms with previously established lending relationships with the bank that actually took them public. Also firms without a relationship with a potential underwriter face a higher cost of equity capital relative to firms with a lending relationships with a potential underwriter (regardless of whether the firm actually went public with this bank or not). That is, firms with lending relationships that went public with their relationship bank save over 40 percent in the cost of equity relative to firms without a relationship with a possible underwriter; firms with lending relationships with possible IPO underwriters that switched from its lending relationship bank save 30 percent in the cost of equity compared to firms without a relationship with a prospective underwriter. What matters to lower asymmetric information (and thus the firm's cost of equity capital) is that there be at least one potential underwriter with private information regarding the firm's value; whether this bank actually took the firm public or not does not significantly affect underpricing.

Table 11 shows that firms that were taken public by a bank from which they previously borrowed face a 19.31 percent lower underpricing relative to firms that were taken public by the bank that previously underwrote some debt issue for the firm. This suggests that the *type* of banking relationship established prior to the IPO does matter: firms with lending relationships face a significantly lower cost of equity capital relative to firms with underwriting relationships.

Of course these univariate results do not control for other firm characteristics that could be driving the firm’s cost of equity capital in an IPO. The following section accounts for this.

4.1 Does the nature of the relationship matter?

This section looks deeper into the nature of the relationship and asks whether the firm’s cost of capital differs depending on the nature of the banking relationship once we control for firm, bank, and IPO characteristics. I estimate an equation of the form:

$$\begin{aligned}
 \textit{Underpricing} = & \beta_0 + \beta_{\textit{CouldLoan}}(\mathbf{Could* Loan}) + \beta_{\textit{DidLoan}}(\mathbf{Did* Loan}) + \\
 & + \beta_{\textit{CouldUnderwriting}}(\mathbf{Could * Underwriting}) + \\
 & + \beta_{\textit{Firm}} \textit{Firm Characteristics} + \beta_{\textit{IPO}} \textit{IPO Characteristics} + \\
 & + \beta_{\textit{Controls}} \textit{Controls} + \varepsilon
 \end{aligned}$$

Notice that in estimating this regression equation I am not making a distinction between firms that did go public with their underwriting relationship bank and firms that did not go public with their underwriting relationship bank. I am not making this distinction because there are only 2 firms that had an underwriting relationship and chose to switch banks and therefore I do not have enough identification power to make this distinction.

The following summarizes the predictions resulting from the hypothesis of this paper. A firm with a *lending* relationship with a bank that could take it public and actually took it public faces a lower asymmetric information problem relative to a firm without an established relationship with a potential underwriter. Thus the former should exhibit a lower cost of equity capital. For otherwise equal firms,

the difference in underpricing between them is $\beta_{CouldLoan} + \beta_{DidLoan}$ and we expect $\beta_{CouldLoan} + \beta_{DidLoan} < 0$ and economically very significant. If the firm had a *lending* relationship with its bank, the difference in the cost of capital between firms that keep their underwriter and firms that switch banks is $\beta_{DidLoan}$ and the prediction is that $\beta_{DidLoan} < 0$ and economically insignificant since for both these firms asymmetric information is low (firms that switch banks reveal they are low value firms, reducing the asymmetric information problem regarding their value). Finally, a firm with an *underwriting* relationship with a bank that could take the firm public faces a lower asymmetric information problem relative to a firm without a relationship with a potential underwriter. Thus the former should exhibit a lower cost of equity capital. Since the difference in underpricing between otherwise equal firms is $\beta_{CouldUnderwriting}$ we expect $\beta_{CouldUnderwriting} < 0$.

Table 12 shows the results from the estimation. Column 1 reports the basic regression. Firms with a lending relationship with a bank that can manage IPOs face a significantly lower cost of equity capital relative to firms without a relationship with a potential underwriter, specifically, firms with lending relationships with possible underwriters face a cost of equity capital over 16 percent lower than firms which do not have an established relationship with potential IPO underwriters. If the firm actually goes public with the (lending) relationship bank, then the firm's cost of capital is further reduced by over 5 percent, which is statistically insignificant and economically small, as predicted. The surprising result is that the cost of equity capital of firms with a relationship with a bank that previously managed the firm's debt issue is only 7 percent lower relative to the cost of capital of firms that do not have an established relationship with a potential IPO underwriter. This suggests that lending relationships are more valuable than underwriting relationships: firms with lending relationships with IPO managers face a cost of capital that's at least 9 percent lower compared to the cost of equity capital faced by firms with underwriting relationships with potential IPO managers.

Table 12: Does the nature of the banking relationship matter? The impact of different types of banking relationships on the firm's cost of equity capital in an IPO

The dependant variable is underpricing. In addition to the variables reported each regression also includes: a categorical variable for the exchange where shares start trading, a standardized measure of the offer price and an intercept. The results do not change if the firm's age is replaced by log (1+age).

	(1)	(2)	(3)
Asymmetric Information			
Lending bank could have managed the IPO: Could * Loan	-16.58* (8.87)	-14.92* (8.90)	-16.28* (8.87)
Lending bank did manage the IPO: Did * Loan	-5.39 (10.74)	-6.69 (10.73)	-4.16 (10.79)
Underwriting bank could have managed the IPO: Could*Underwriting	-7.07 (12.89)	-6.83 (12.85)	-5.97 (12.92)
Firm uncertainty			
Transparent		-11.63* (6.97)	
Firm characteristics			
Log (Assets)	-10.13*** (2.54)	-10.24*** (2.53)	-10.39*** (2.55)
$\left(\frac{\text{Total Debt}}{\text{Total Assets}} \right)$	-9.03** (4.04)	-8.43** (4.05)	-8.62** (4.06)
$\left(\frac{\text{Cash}}{\text{Assets}} \right)$	38.87*** (15.66)	33.54** (15.94)	39.67*** (15.67)
Age of firm at time of IPO (in years)	-0.64** (0.29)	-0.62** (0.29)	-0.63** (0.29)
IPO Characteristics			
$\left(\frac{\text{IPO Proceeds}}{\text{Total Assets}} \right)$	-0.07* (0.04)	-0.07* (0.04)	-0.08** (0.04)
Nasdaq	18.14** (8.93)	15.85* (9.01)	18.17** (8.93)
Underwriter Classification			
Subsidiary			-7.28 (6.52)
Number of Observations	305	305	305
Adjusted R squared	0.3877	0.3914	0.3882

***: Significant at 1%; **: at 5%; * at 10%; ^a at 20%. Standard errors are reported in parenthesis.

These results, as well as the previously mentioned results, are robust to firms' unobservable characteristics (reported in column 2 of table 12) and to bank characteristics (reported in column 3 of table 12).

5 Discussion of the results

The results of section 3 show that banking relationships established prior to the firm's IPO can significantly reduce the cost of equity for firms issuing shares for the first time. This result is robust to firms self-selecting, before their IPO, the banking relationship they believe will produce for them the lowest cost of equity in the case they decide to go public in the future. The importance of banking relationships survive various other robustness checks. Given the strength and importance of the effect of banking relationships on the firm's cost of equity, the paper moves on to look deeper into different types of relationships, in particular lending versus underwriting relationships. The results in section 4 indicate that firms with *lending* relationships face a significantly lower cost of capital when compared to firms with *underwriting* relationships. This result begs the question of why lending relationships are more valuable than underwriting relationships. There are several possible explanations for this fact and choosing between them is an interesting topic for further research. In the remaining of this section I describe two possible hypothesis for this finding.

First, firms with an underwriting relationship have either done a private or a public debt placement through which the market learned information about the firm. Firms with bank loans are well known by the bank which lent its funds to the firm but not by the outside public capital market investors. Therefore when going public firms with underwriting relationships suffer less of an asymmetric information problem relative to firms with lending relationships. If the benefit of the banking relationship is to lower the asymmetric information regarding the firm's value, then there is more to gain from the relationship when the market knows little or nothing about the firm, thus there is more to be learnt and gained from the lending relationship. But the results indicate that, not only there is more to be learned in lending relationships, but that actually more is learnt. This raises the following question: why do lending relationships generate more information than underwriting relationships? Lending relationships usually involve the repeated interaction between the firm and the bank who is constantly monitoring the firm and evaluating the firm's projects, the quality of the management and the outcome of the firm's investments. Underwriting relationships do not involve such a constant and continuous interaction between the firm and the underwriting bank: once the underwriting bank fulfilled its due diligence obligation and underwrote the firm's debt issue its incentives to follow

the firm and monitor the firm’s projects and the quality of its management are less than the incentives of the bank who lent its own funds to the firm and is waiting for the firm to repay its debt to the bank. When the bank who previously underwrote the firm’s debt issue is called again to underwrite the firm’s equity issue, the firm could have changed and the underwriting relationship bank was not there to monitor the changes in the firm’s value. Will the bank called to underwrite the equity issue for a firm for which it previously underwrote a debt issue scrutinize the firm and learn as much about the firm as the bank that has been constantly monitoring the firm’s activities? Probably not. In sum, the results in section 4 could be interpreted as being consistent with the lending relationship literature: underwriting relationships are arm’s length relationships that generate less information relative to bank debt. This explains why more is actually learnt following a lending relationship relative to an underwriting relationship.

Note that the market is more informed regarding the firm’s value when the firm has some debt issue underwritten prior to the IPO (for instance, these firms must file with the SEC). If there is a legal liability issue in virtue of which the firm and its underwriter choose to underprice IPO shares for fear of being sued for mispricing shares (see Tinic [1988]), then the threat of being held legally liable for mispricing is lower when the market has more information regarding the firm’s value; i.e. when the firm has previously issued debt. In this sense the results of section 4 contradict the legal liability argument for underpricing of IPOs. Given that banks with lending relationship face a higher legal liability threat than banks with underwriting relationship, the legal liability theory would predict that lending relationship banks underprice more than underwriting relationship bank, which is contrary to my findings.

A second hypothesis for why lending relationships are more valuable than underwriting relationships arises from comparing the probability of going public with the relationship bank conditional on a previous *lending* relationship with the probability of going public with the relationship bank conditional on a previous *underwriting* relationship²⁴:

$$\Pr(\mathbf{Did} = 1 | \mathbf{Could} = 1 \text{ and } Loan = 1) = 57.7\%$$

$$\Pr(\mathbf{Did} = 1 | \mathbf{Could} = 1 \text{ and } Underwriting = 1) = 91.30\%$$

²⁴See table 11.

This strongly suggests that there could be a significant lock-in effect in underwriting relationships: firms are more likely to keep their relationship bank when the bank has previously underwritten the firm's debt issue. If underpricing is a way for banks to extract rents from their information monopoly (because the underwriting bank receives a positive kick back from the institutional investors to whom they assign a high allocation of underpriced shares), then this could explain why underpricing is higher when the previous banking relationship is of the underwriting type relative to the lending type. That underwriting relationships generate a greater lock-in effect relative to lending relationships is in contrast to Rajan's [1994] result that bank debt gives the lender more bargaining power over the profits of the firm relative to arm's length debt. Rajan's findings would predict that lending relationships generate a greater lock in effect relative to underwriting relationships. Which is contrary to my findings here.

The explanation for why lending relationships are more valuable than underwriting relationships is an open question for future research.

6 Conclusions

This paper shows that since the effective repeal of the Glass-Steagall Act the cost of equity capital for issuing firms with established relationships with prospective IPO underwriters has been significantly reduced.

This result has significant policy implications for countries debating whether to keep or repeal their national version of the Glass-Steagall Act. The results of this paper indicate that allowing for universal banking can significantly reduce the cost of capital to issuing firms which in turn means firms will not allow profitable investment opportunities go awry because of the lack of accessible funds. In passing The Second Banking Directive each European Union nation has an incentive to allow for universal banking since not doing so would put domestic banks at a competitive disadvantage²⁵. The results of this paper reinforce the policy makers' incentives to allow for universal banking.

²⁵The Second Banking Directive states the Principle of Mutual Recognition in virtue of which banks are to be regulated by and conform to the regulation and legislation of their home country: if a bank does business in any EU nation, the authorities of the host nation recognize the primacy of the home nation. See "The European Union Financial Development: The single market, the single currency, the single bank" Neil B. Murphy.

An interesting question that emerges from the results in this paper is why are lending relationships so much more valuable than underwriting relationships. This is a topic for further research.

7 Appendix A

7.1 A brief description of the IPO procedure.

It is said that a private firm “goes public” or that it “does an initial public offer (IPO)”, the first time that it accesses the public capital market through the selling of securities. The following is a brief summary of the IPO procedure.

When a firm goes public, it must find an underwriter that manages the IPO. Having a well known underwriter is crucial since an investment bank with big reputation capital at stake will help signaling whether the IPO is a good one, or not. Firms approach different underwriters who make different offers to the issuing firm. Once the underwriters are chosen, they must begin their due diligence procedure: the underwriters managing the IPO must study in excruciating detail the firm. This study culminates in a written report to be filed with the Security and Exchange Commission (SEC): the Red Herring or Prospectus. This report consists of all the firm’s relevant information (risk, past profitability, expected future profitability) and an educated guess of the IPO offer price. Once the report is finished the underwriters form a group of underwriters, called a syndicate, that will be in charge of selling the issue. Following the establishment of the syndicate, the red herring is filed with the SEC. The prospectus is circulated amongst thousands of institutions that the underwriters predicts would be willing to buy shares of the issuing firm. Following this initial approach to investors, the Chief Executive Officer of the firm goes on a Road Show with the investment bankers. The purpose of this road show is to introduce the firm and its CEO to potential investors. Following the firm’s presentation in the Road Show, underwriters and institutional investors begin the price talks and the book building process: underwriters extract indications of interest from potential investors. The investment bank suggests an offer price to these investors and they respond with an indication of interest, such as saying whether they’d buy shares at all, or how many shares they would buy at a suggested offer price, and in some cases saying how their demand would change for different offer prices. These indications of interest do not oblige the investor in any way, and are kept private information between the investor and the underwriter. Revisions from the first tentative price follow. Finally, an offer price is set. Once the offer price is set, under the firm commitment agreement²⁶ with

²⁶Underwriters and issuing firms sign a firm commitment contract or a best efforts contract. Under the first agreement, the investment bank purchases the shares from the firm at the offer price and

the issuing firm, the investment bank buys from the firm all the shares to be offered, and then the IPO begins, with the underwriter selling the newly issued shares. After the issue is sold, the syndicate of underwriters dissolves, the IPO is over, and the firm trades in the stock market. The banks profits are a fraction of the IPO proceeds, usually the underwriting bank keeps 7 percent of the offer price.

8 Appendix B

8.1 The classification of underwriters

I created the following four categorical variables to identify the underwriter's type²⁷:

$$\begin{aligned}
 C &= \begin{cases} 1 & \text{if the lead underwriter is a commercial bank} \\ 0 & \text{otherwise} \end{cases} \\
 S &= \begin{cases} 1 & \text{if the lead underwriter is a section 20 (or 4(k)(4)(E)) subsidiary} \\ 0 & \text{otherwise} \end{cases} \\
 I &= \begin{cases} 1 & \text{if the lead underwriter is an investment bank} \\ 0 & \text{otherwise} \end{cases} \\
 O &= \begin{cases} 1 & \text{all other non depository institutions} \\ 0 & \text{otherwise} \end{cases}
 \end{aligned}$$

I classify the lead underwriter of all IPOs between January 1st1998 December 31st2000 according to the following criteria.

1. Classification into investment bank/commercial bank using COMPUSTAT.

must sell them to investors at that price. Under the latter, the underwriter does not buy the shares from the firm, and promises to make its best efforts to sell all of the issued shares, but if he can't, then he is not stuck with unsold shares, as is the case with firm commitment agreements.

²⁷I classify the lead underwriter of all IPOs between January 1st1998 December 31st2000 according to the following criteria.

- (1). Classification into investment bank/commercial bank using COMPUSTAT.
- (2). For those not classified in step1: I check the Federal Reserve's web site for all section 20 subsidiaries (and section 4(k)(4)(E) subsidiaries) and their parent organization: <http://www.federalreserve.gov/generalinfo/subsidiaries/>. This information is updated frequently.
- (3). If I still cannot classify the underwriter, I check the Carter and Manster ranking of underwriters. All underwriters in their ranking are investment banks.
- (4). If I cannot classify the underwriters with all the above information, I use the National Information Center (NIC) web site: <http://www.ffiec.gov/nic/>. No institution in NIC appears as a section 20 subsidiary. In NIC some section 20 subsidiaries appear as "Other non depository institutions" and some investment banks appear as "Other institution". I give priority to the classification in the Federal Reserve's web site.

2. For those not classified in step1: I check the Federal Reserve’s web site for all section 20 subsidiaries (and section 4(k)(4)(E) subsidiaries) and their parent organization: <http://www.federalreserve.gov/generalinfo/subsidiaries/>. This information is updated frequently.
3. If I still cannot classify the underwriter, I check the Carter and Manster ranking of underwriters. All underwriters in their ranking are investment banks.
4. If I cannot classify the underwriters with all the above information, I use the National Information Center (NIC) web site: <http://www.ffiec.gov/nic/> . No institution in NIC appears as a section 20 subsidiary. In NIC some section 20 subsidiaries appear as “Other non depository institutions” and some investment banks appear as “Other institution”. I give priority to the classification in the Federal Reserve’s web site.

The percentage of issues in the sample underwritten by subsidiaries of commercial banks is 34.95 percent (108 firms). The mean underpricing for these issues is 40.91. The percentage of issues in the sample underwritten by investment banks is 59.55 percent (184 firms). The mean underpricing for these issues is 48.34 percent and the standard deviation is 73.75. Issues underwritten by commercial banks subsidiaries show significantly lower underpricing.

Issues underwritten by commercial banks represent a small fraction out of the sample, 2.59 percent (only 8 firms). The mean underpricing for such small sample is not reliable. The remaining 2.91 percent of the issues (9 firms) were underwritten by other non depository institutions. Again, the mean underpricing for such small sample is not reliable. Table B1 shows the percentage of firms underwritten by each type of underwriter.

Table B1: Percentages of firms within each category

	Could = 1		Could=0
	Did = 1	Did = 0	
Underwriter is a:			
Commercial bank	1.06	0	4.38
Investment bank	60.64	60.00	58.75
Section 20 subsidiary	38.30	32.73	33.75
Other non depository institution	0	7.27	3.13

Table B2 shows the mean underpricing of issue underwritten by each type of underwriter:

Table B2: Underpricing of issues underwritten by each underwriter type.

Underwriter is a:	Commercial Bank	Investment Bank	Section 20 Subsidiary	Other non depository institution
Mean	63.69	48.34	40.91	14.65
Std. Deviation	(53.68)	(73.75)	(85.55)	(43.22)
Median	46.35	17.26	13.94	0
No. Observations	8	181	108	9

References

- [1] Allen, F. and G.R. Faulhaber, 1989, "Signalling by Underpricing in the IPO Market" *Journal of Financial Economics*, Vol. 23, 303-323.
- [2] Andreson, S.C., T.R. Beard, and J. A. Born, 1995, "Initial Public Offerings: Findings and Theories", Kluwer Academic Publishers
- [3] Beatty, R. and J. Ritter (1986), " Investment banking, Reputation and the Underpricing of Initial Public Offerings" *Journal of Financial Economics*, Vol. 15, 213-232.
- [4] Beneviste, L.M. and P.A.Spindt, 1989, "How Investment Bankers Determine the Offer Price and Allocation of New Issues" *Journal of Financial Economics*, Vol. 24, 343-361
- [5] Brav, A. and P. Gompers, 1997, "Myth or Reality? The Long Run Underperformance of Initial Public Offerings: Evidence from Venture and Non Venture Capital-Backed Companies" *Journal of Finance* 52, 1791-1821.
- [6] Brav, A., C. Geczy and P. Gompers, 2000, "Is the Abnormal Return Following Equity Issuances Anomalous?" *Journal of Financial Economics*, Vol. 56, 209-249.
- [7] Carter R. and S. Manaster, 1990, "Initial Public Offers and Underwriter Reputation", *Journal of Finance*, Vol.45, Issue 4, 1045-1067.
- [8] Cornelli, F. and D. Goldreich, 2000, "Book Building and Strategic Allocation" forthcoming in the *Journal of Finance*.
- [9] Diamond, D., 1984 , "Financial Intermediation and Delegated Monitoring" *The Review of Economic Studies*, Vol. 51, Issue 3, 393-414.
- [10] Diamond, D., 1991, "Monitoring and Reputation, the Choice Between Bank Loans and Directly Placed Debt", *Journal of Political Economy*, Vol. 99, 688-721.
- [11] Field, L.C. 1995, "Is Institutional Investment in Initial Public Offerings Related to Long Run Performance of these Firms?", mimeo UCLA.

- [12] Gande, A. M. Puri, Saunders, A, Igno Walter, 1997, “ Bank Underwriting of Debt Securities: Modern Evidence”, *The Review of Financial Studies*, Vol. 10, Issue 4, 1175-1202.
- [13] Gande, A., M. Puri, Saunders A., 1999 “Bank Entry, Competition and Market for Corporate Securities Underwriting” *Journal of Financial Economics* Vol. 54, 165-195.
- [14] Gompers P. and J. Lerner, 1999, “Conflict of Interest in the Issuance of Public Securities: Evidence from Venture Capital”, *Journal of Law and Economics* Vol. 42, No.1, 1-28.
- [15] Gompers P. and J. Lerner, 2000, “Is the Abnormal Return Following Equity Issuances Anomalous?” *Journal of Financial Economics* Vol. 56, No. 2.
- [16] Grinblatt, M. and C.Y. Hwang, 1989, “Signalling and the Pricing of New Issues”, *Journal of Finance* Vol.44, 393-420
- [17] Hanley K.W., 1993, “The Underpricing of Initial Public Offers and the Partial Adjustment Phenomenon”, *Journal of Financial Economics*, Vol. 37, 239-257.
- [18] Hanley, K. and W.J. Wilhelm, 1995, “Evidence on the Strategic Allocation of Initial Public Offerings”, *Journal of Financial Economics*, 37, 239-257.
- [19] Houston J. and C. James, 1996 “Bank Information Monopolies and the Mix of Private and Public Debt Claims”, *Journal of Finance*, Vol. 51, Issue 5, 1863-1889.
- [20] Ibboston, R.G., 1975, “Price Performance of Common Stock New Issues”, *Journal of Financial Economics*, Vol 2, 235-272.
- [21] James, C., 1987, “Some Evidence on the Uniqueness of Bank Loans”, *Journal of Financial Economics* Vol. 19, 217-235.
- [22] James C. and P. Weir, 1990, “Borrowing Relationships, Intermediation and the Cost of Issuing Public Securities”, *Journal of Financial Economics*, Vol. 28, 149-171.
- [23] James, C. 1992, “Relationship- Specific Assets and the Pricing of Underwriting Services” *Journal of Finance*, Vol. 47, Issue 5, 1865-1885.

- [24] Jenkinson, T.J. and A.P. Ljungqvist, 1996, "Going Public: Theory and Evidence on how Companies raise Equity Finance", Clarendon Press, Oxford
- [25] Kroszner R.S. and R. Rajan, 1994, "Is the Glass- Steagall Act Justified? A Study of the U.S. Experience with Universal Banking Before 1933", The American Economic Review, Vol. 84, Issue 4, 810-832.
- [26] Kroszner R.S. and R. Rajan, 1997, "Organization Structure and Credibility: Evidence from Commercial Bank Securities Before the Glass-Steagall Act" Journal of Monetary Economics, Vol 39, 475-516.
- [27] Kroszner R.S., 1998, "Rethinking Bank Regulation: A Review of the Historical Evidence", Journal of Applied Corporate Finance, 48-58.
- [28] Ljungqvist, A.P. N. Vikran, S. Rajdeep, 2001, "Hot Markets, Investor, and IPO Pricing" manuscript, Stern School Business, NYU.
- [29] Maddala, G.S. "Limited dependent and qualitative variables in econometrics", Econometric Society Monographs No. 3
- [30] Michaely R. and W.H.Shaw, 1994, "The Pricing of Initial Public Offerings: Tests of Adverse Selection and Signaling Theories", The Review of Financial Studies, Vol. 7, 279-319.
- [31] Michaely R. and W.H.Shaw, 1998, "Underwriter Choice, Institutional Holdings and future IPO performance", Advances in Quantitative Analysis of Finance and Accounting, Vol. 6, 137-150.
- [32] Muscarella C., M. Vetsuypens, 1989, "A Simple Test of Baron's Model of IPO Underpricing", Journal of financial Economics, Vol. 24, 125-135.
- [33] Muscarella C., M. Vetsuypens, 1989, " The Underpricing of "Second" Initial Public Offerings", The Journal of Financial Research, Vol. 12, No. 3.
- [34] Petersen, M and R. Rajan, 1994, "The Benefits of Lending Relationships: Evidence from Small Business Data", Journal of Finance, Vol. 49, Issue 1, 3-37.
- [35] Petersen, M and R. Rajan, 1995, "The Effect of Credit Market Competition On Lending Relationships", Quarterly Journal of Economics, Vol. 60, Issue 2, 407-443.

- [36] Puri, M. 1996, "Commercial Banks in Investment Banking Conflict of Interest or Certification Role?", *Journal of Financial Economics*, Vol. 40, 373-401.
- [37] Puri, M. 1999 "Commercial Banks as Underwriters: Implications for the Going Public Process", *Journal of Financial Economics*, Vol. 54, 133-163.
- [38] Rajan, R. 1992, "Insiders and Outsiders: The Choice between Informed and Arm's Length Debt", *Journal of Finance*, Vol. 47, Issue 4, 1367-1400.
- [39] Rock K., 1986, "Why New Issues are Underpriced", *Journal of Financial Economics*, Vol.15, 187-212.
- [40] Sharpe, S., 1990, "Asymmetric Information, Bank Lending and Implicit Contracts: A stylized model of customer relationships" *Journal of Finance*, Vol. 45, 1069-1087.
- [41] Stein, J., 2001, "Information Production and Capital Allocation: Decentralized vs. Hierarchical Firms" forthcoming in the *Journal of Finance*.
- [42] Stiglitz, J. and A. Weiss, 1981, "Credit Rationing in Markets with Imperfect Information", *American Economic Review*, Vol. 71, 393-410.
- [43] Tinic, S.M., 1988 "Anatomy of Initial Public Offerings of Common Stock", *Journal of Finance*, Vol 43, 798-822.
- [44] Welch, I ,1989, "Seasoned Offerings, Imitation Costs and the Underpricing of Initial Public Offerings" *Journal of Finance*, Vol. 44, 421-449
- [45] Welch, I. 1992 "Sequential Sales, Learning and Cascades", *Journal of Finance*, Vol. 47, 695-732.