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Why do firms go public?

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PREFACE AND ACKNOWLEDGEMENTS

The reason for doing my thesis about why firms go public started with wondering if there's indeed really so little to say about why firms go public as many of the textbooks suggest. Most of the textbooks contain only a couple of lines about this subject and give one or two arguments why firms go public. An often used argument is that going public is just a stage of a firm, when it reaches a certain size the firm performs an initial public offering. However there are enough examples of big privately held firms that contradict this theory, examples from Europe are Bosch and IKEA. The lack of theory in a lot of textbooks about this topic always was a bit odd in my opinion because going public is a very important one and often requires a lot of weighting against each other because going public has massive consequences for a firm.

This subject caught my attention during my study at the Erasmus University and I decided to change my question marks about this topic into doing my master thesis about why firms go public.

I would like to thank my thesis supervisor Dr. R. Huisman for helping me with the master thesis. When I had questions or did not know how to solve some of my problems he was there to help me and give advice how to continue. The Erasmus University's library is an important facility that made it possible to create this thesis since I was able to find and view all the articles which are mentioned in this thesis.

Given that this is my final assignment which is connected with the Erasmus University I would hereby also like to thank the Erasmus University in general because I had an amazing time studying at the Erasmus University. I do not regret my choice, 5 years ago, to study Economics & Business at the Erasmus University at all. The quality of the university facilities, lecturers and the atmosphere on the campus was always great.

ABSTRACT

In this thesis I try to answer why firms go public and which variables have an influence on the probability of an initial public offering. It contains a summary of commonly used motives that explain why firms should or should not go public. To answer why firms go public we take a look at theoretical and empirical literature. We find different motives that explain why firms go public, being able to deleverage and having the opportunity to raise capital to finance growth are the two most important motives that explain our research question.

Keywords:
Initial public offerings, IPO, going public, motives, stock market

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1. INTRODUCTION

Firms have the possibility to fund their investments in several ways. They can use in example retained earnings, loan money from banks, use venture capital or they can decide to go public. Each of these possibilities has its own advantages and disadvantages. Performing an initial public offering (IPO) requires a lot of preparation from a firm and once it decides to go public it usually takes 3 to 12 months until it's really public so in general it's a very time consuming process.

Going public will have major consequences for a firm, examples of these consequences are that the ownership structure and financial structure will change drastically. A firm is able to collect capital by using the security market once it's listed. They are not only able to do this when it goes public but also afterwards by issuing new stocks. But obviously there are not only advantages of going public but also disadvantages.

Although going public is a very important event in the financial world it received little attention in the literature, especially empirical literature is very limited. The interest in this phenomenon seems to be increasing and we can probably expect more research in the near future.

In this thesis we will focus on why firms decide to go public, what the characteristics are of firms that go public and how they differ from similar firms that did not go public. To answer our research questions we will divide our thesis into three parts. First we will describe the road between the decision to go public and the actual offering on the stock market. As mentioned before this is a long road where a lot of very important decisions have to be made by the firm, these decisions will be discussed in chapter 2. The second part will consist of the most common explanations in the existing theoretical literature of what the advantages and disadvantages are of going public. As last we will present existing empirical evidence about why firms should or should not go public. We will review the setups of the empirical studies and their results.

2. PROCESS OF GOING PUBLIC

2.1 Introduction

Before we start to explain what the reasons are for a firm to go public we will first take a look at how the process of going public looks like. There are several decisions which the issuer has to make during the process of going public. These decisions are very important since they can make the difference between a successful IPO and a failed IPO. We will look at this process to get insight in what a firm has to do to actually get their firm listed on the stock market and we will identify various advantages and disadvantages during this process for the firm.

2.2 Investment bank

First of all after the decision to go public has been made the issuer has to select an investment bank. A firm can choose one or multiple investment banks to assist them with going public. When a firm chooses more than one investment bank there's always one investment bank that takes the lead and will be the main underwriter, the remaining selected investment bank(s) will co-manage the process.

There are a number of factors which have an influence on the choice of investment bank. For example the reputation and expertise of the investment bank. Does the investment bank have experience in the firm's industry? Did the investment bank already perform as an underwriter in this industry? And if they did, how did those initial public offerings go? Also important is if the issuer wants that their stocks are mainly held by private or institutional traders. This is also an important factor in the decision given that each investment bank has its own capability.

The investment bank that will be the main underwriter will make a preliminary valuation where it will calculate how much they think the firm is worth. Examples of methods that are used are by establishing the expected growth rate for the industry and company, and valuating with multiples.

2.3 Underwriting

There are two types of underwriting: firm commitment and best effort basis. The most used type with large issues is firm commitment. The firm commitment type of underwriting means that the investment bank (the underwriter) will buy all the securities of the firm which wants to go public at a discount. This discount is usually around 7%. The underwriter will try to resell the securities, the difference between the price at which they sell and the price at which they bought the securities from the issuer is the gross spread. The underwriter guarantees a certain amount of securities that will be sold to investors. This means that the underwriter bears a lot of risk during the initial public offering.

The other type of underwriting, best effort offering, means that the underwriter won't buy the securities. The issuing firm and underwriter will agree about the offering price, the minimum and maximum amount of shares to be sold. The underwriter is basically only an agent in this type of underwriting.

2.4 Marketing of the offering

The issuing firm has to prepare an official registration statement that has to be filed at the U.S. Security and Exchange Commission (S.E.C.)[1]. This registration statement consists of the prospectus which will be included to everybody who buys a security from the firm. The second part of the registration statement isn't published but only provided to the S.E.C. for inspection.

Once S.E.C. verifies the information given by issuer and accepts the statement the marketing of the offering begins. The prospectus is handed out to private and institutional investors to create interest in the security. Another marketing tool that is used to create interest in the security is by giving presentation by the underwriter to private and institutional investors. In the next upcoming months the underwriter will keep marketing the securities to create interest and register the placed orders, which aren't legally binding because securities can't be sold until the effective day, these orders are used as an indication of interest.

[1] If the IPO is carried out in USA, other nations usually have their own version of the S.E.C.

2.5 Effective day

The day before the effective day the underwriter and the issuer meet to discuss the amount of securities that will be sold and at which price. Initial public offerings are often underpriced (Ritter (1987)) which means that the price of the securities will frequently rise on the first day. The reason why the securities are in general underpriced is to make sure that the public offering is a success. If the price is too high and the investors notice this there will be very little interest in the securities. Underpricing at a IPO is often referred to as "leaving money on the table", a lot of literature can be found about this topic.

3. COSTS OF GOING PUBLIC

3.1 Introduction

There are not only advantages for a firm when it goes public but also disadvantages. To understand why a firm goes public it's also important to know what the disadvantages are of going public and compare them with the benefits. What these disadvantages are will be discussed in this chapter. We will use theoretical literature to sum up the most accepted theories about why firms should not go public.

3.2 Profit sharing and loss of control

One of the most obvious disadvantage of going public is that the current owners of a firm will have to share the profits of the firm with a lot of new people. The shareholders can take control of corporate management and might even have the possibility to fire the original owner(s). There are measures to prevent a takeover, in example by not issuing all the securities. However investing in a company where you are not able to fire the management is not very attractive for shareholders and therefore less money will be paid for the securities.

3.3 Fixed costs

Ritter (1987) presents evidence of the two quantifiable cost components of going public. The first component are the fixed costs, these fixed costs are direct costs. Examples are the costs of registration fees, auditing fees, printing costs and the costs which the company made when they were investigating if a public offering would be in their best interest. The total cost of the process to go public is in general between $ 250.000 and $ 1.000.000 in the United States.

Even after the public offering a company has expenses that are an outcome of the decision to go public, in example stock exchange fees, legal fees and accounting fees. Since usually the fixed costs are independent from the size of the firm the result of these fixed costs is that how smaller the company is how less likely it is that it goes public.

3.4 Underpricing

The other costs mentioned by Ritter (1987) of going public are the costs of underpricing. There's asymmetric information between the investors and the issuing company. The investors have less information about the value of the firm than the management of the issuing firm. As a result of this asymmetric information the investors will adjust the price which they want to pay for a security downwards. Underpricing is a consequence for the adverse selection problem and as mentioned in the previous chapter underpricing at IPOs is also to make sure that the IPO will be a success.

Chemmanur and Fulghieri (1995) argue that younger and/or smaller companies have less probability of going public because of underpricing since if a company is small and/or young there's less information about the company which makes the adverse selection problem bigger and thus less attractive to young and/or small companies to go public.

3.5 Forced to release private information

Campbell (1979) described an important reason why specific companies could decide to not go public. It's because companies might lose confidentiality of their policies and operations. Going public could force a company to disclosure certain private information which makes the company lose their competitive advantage, this information could possibly be technologic knowledge that the competitors do not have.

The probability that high-tech companies go public should be small considering the loss of confidentiality factor is an important one for this kind of firms. If private information that required a lot of years of research & development will be released to its competitors if it would go public it is clearly not in their best interest to go public.

3.6 Focus on short-term earnings

New investors are often only investing for the short term and therefore they are only concerned about short-term profit. After this short period they want to sell their stocks and make profit. The effect of this is that a company might become more focused on increasing their short-term earnings rather than focusing on long-term growth. There's even a

possibility that the management will make some dubious decisions to increase short-term earnings which aren't in the best interest of the company on the long run.

3.7 Less incentive for the management.

After an IPO the ownership structure of a firm changes drastically. In general managers will have a smaller portion of the stocks of a firm and ownership will be more dispersed. According to Jensen and Meckling (1976) the result of this dispersion is that the management will have less incentive, and this will result in a lower performance of a firm compared with the period before the IPO.

4. BENEFITS OF GOING PUBLIC

4.1 Introduction

In chapter 3 we reviewed the disadvantages of going public and in this chapter we will do the same but only for the advantages. The most common and accepted theories about why firms should go public will be discussed.

4.2 Access to capital

By going public a firm is able to gain capital without certain risks or restrictions of other options to raise money. A private firm has other options to obtain capital besides going public, in example borrowing money from a bank. However having too much debt isn't really preferable for a firm, one of the negative consequences is that it will have to pay a lot of interest.

Another option to obtain money is from a venture capitalist, though venture capitalists often have certain demands before they put their money in a company. These demands could in example be that the venture capitalist wants to have a vote in the decision making of a company. By going public a firm will be able to finance their investments without having the disadvantages that are connected with other ways of financing.

4.3 Reward employees

Stocks and stock options can be used as a reward for employees based on their performance. By combining salary and stocks as compensation for employees they are motivated to increase the value of the company since this will increase the value of their stocks as well. Another option is by paying its employees with stocks prior the IPO. These stocks are likely to increase in value after the IPO which means that these stocks can be used to keep important employees.

4.4 Attract better personnel

Going public does not only make it possible for a firm to reward their current personnel but also to attract better personnel. This is mainly the case when we look at the executives and officers. Working for a listed firm does often offer more reputation than working for a private firm. Better personnel will be attracted by a listed firm and these personnel could push the firm upwards in the future.

4.5 In the spotlight

When a company goes public it receives, especially if it's a big company, a lot of attention. The news of a company going public will in example be on internet websites, in news papers and on TV. By being in the spotlight a company can promote itself, its products and attract new customers. Customers will be drawn to the products or services after they were made aware of their existence.

4.6 Lower debt-to-equity ratio

As already explained before having too much debt has negative consequences for a firm. These consequences also influence how much banks demand as interest rate on their loan, how higher the risk how more interest a firm has to pay. If the risk is extraordinary high a bank might not accept to loan money to a firm at all.

Because a firm adds equity and no debt the debt-to-equity ratio is lower after going public. A positive effect of this lower debt-to-equity ratio is that if the firm wants to raise extra money it has better borrowing conditions than before the IPO.

4.7 Managers cash in

An often used reason by the managers to go public is that they are able to cash-in. The managers want to change their work which they put in a firm into money.
Managers have several options to cash in. They can in example sell their firm to another independent owner(s) or to an existing firm where it will become a part of that firm. Going public is also an option for the managers.

5. EMPIRICAL RESEARCH

5.1 Introduction

A lot of theoretical literature can be found about going public though not much literature can be found concerning empirical evidence. This is most likely caused by the lack of the needed data, private firms are in most cases not obliged to report their financial results. The most obvious way to study why firms go public is to compare firms that decide to go public with firms which don't go public and find out what is different for the firms that go public. However the needed information about a private firm is in most cases not public and this makes it impossible to study the difference between firms that remain private and firms that go public.

In this chapter we will take a look at different articles that tested several of the theories mentioned in chapter 3 and 4 about why firms should or should not decide to go public and give an overview of the results of these articles. We will also review variables that have an influence on the probability of going public.

5.2.1 Ownership and operating performance of companies that go public

Mikkelson, Megan Partch and Shah (1997) performed a study regarding the hypothesis that after an IPO the management has less incentive. The reason for this drop in incentive is caused by ownership being more dispersed, the managers will have less stock ownership after an IPO. There are several articles that document this hypothesis. We will take a look at this because if this would be true and it can be proven that there's a significant relationship it could be an important aspect in the decision to (not) go public. The authors use 283 firms that went public in the United Stated between 1980 – 1983. They look 1 year before the IPO and 10 years after the IPO and measure the ownership characteristics and operating performance.

5.2.2 Ownership characteristics and operating performance

As expected we clearly see in table 1 the disappearing link between managerial control and stockownership. CEO/President ownership drops from 24,8% to 5,5% and Officers and directors only have 17,9% of the stocks instead of the 67,9% which they had before the IPO.

Median ownership stakes, board characteristics, and management turnover of companies that went public in the period 1980–1983.

The sample is 283 initial public offerings by unregulated firms through a firm commitment underwriting. Unit offerings are excluded. Data prior to and after the initial public offerings come from the offering prospectus. Data five and ten years after the initial public offerings come from annual meeting proxy statements. Median values are reported in panels A and B. Numbers in parentheses are sample sizes.

	Prior to offering (n = 283)	After offering[a] (n = 283)	Five years after offering (n = 170)	Ten years after offering (n = 84)
Panel A: Ownership				
1. CEO/president[b]	24.8% (262)	15.9%	9.4% (166)	5.5% (83)
2. Officers and directors as a group	67.9 (271)	43.7	28.6 (170)	17.9 (84)
3. All blockholders with board representation[c]	27.9 (103)	19.6	26.5 (41)	10.2 (17)
Types of blockholders:				
4. Majority blockholder[d]	95.9 (33)	54.6	81.1 (10)	66.1 (4)
5. Individuals	10.0 (55)	6.9	8.4 (38)	8.9 (19)
6. Venture capitalists	20.0 (33)	12.5	14.2 (8)	16.8 (5)
7. Financial companies	12.5 (30)	7.8	10.8 (66)	12.3 (45)
8. Nonfinancial companies	14.5 (34)	9.4	19.4 (23)	9.1 (13)

Table 1 – source: Wayne H. Mikkelson, M. Megan Partch, Kshitij Shah. (1997) Ownership and operating performance of companies that go public. *Financial Economics 44* pp. 281-307

An adjusted operating income before deducting depreciation, interest, taxes, and extraordinary items, divided by end-of-year assets is primarily used by the authors to measure the operating performance. They match the operating performance with the median of comparable companies to check for variation in operating performance. For matching operating performances multiple methods are used.

Ordinary least-squares regressions of adjusted operating income divided by assets on characteristics of offering firms and initial public offerings.

The sample is initial public offerings by unregulated firms through a firm commitment underwriting in the period 1980–1983. Unit offerings are excluded. Operating income is measured before depreciation, interest, taxes, and extraordinary items and is adjusted for the median performance measure of firms with the same four-digit SIC code. Year 0 is the year of the offering of stock. The numbers in parentheses following the coefficient estimates are *p*-values. The sample is winsorized at the 5th and 95th percentile values of the dependent variable.

Variable (average value)	Industry-adjusted operating return for year 1 (−0.09)	Average industry-adjusted operating return for years 2 through 5 (−0.08)[a]	Industry-adjusted change in operating return from year −1 to year 1 (−0.13)	Industry-adjusted change in operating return from year 1 to year 5 (−0.00)
1. Intercept (1.0)	−0.41 (0.00)	−0.18 (0.01)	−0.20 (0.06)	0.11 (0.35)
2. Change in ownership stake of officers and directors from before to after the offering (−0.21)	−0.03 (0.77)	0.04 (0.70)	0.02 (0.88)	−0.18 (0.40)
3. Ownership stake of officers and directors following the offering (0.42)	−0.14 (0.62)	−0.10 (0.68)	0.08 (0.82)	0.05 (0.91)
4. Square of the ownership stake of officers and directors following the offering	0.35 (0.25)	0.08 (0.75)	−0.57 (0.57)	−0.18 (0.73)
5. Index variable for offering firm controlled by a majority blockholder prior to the offering (0.13)	0.09 (0.20)	−0.02 (0.73)	0.01 (0.93)	−0.02 (0.90)
6. Index variable for backing by a venture capitalist with a 5% or larger ownership stake prior to the offering (0.13)	0.01 (0.85)	0.03 (0.52)	0.08 (0.09)	0.04 (0.61)

Table 2 – source: Wayne H. Mikkelson, M. Megan Partch, Kshitij Shah. (1997) Ownership and operating performance of companies that go public. *Financial Economics 44* pp. 281-307

Variable (average value)	Industry-adjusted operating return for year 1 (−0.09)	Average industry-adjusted operating return for years 2 through 5 (−0.08)[a]	Industry-adjusted change in operating return from year −1 to year 1 (−0.13)	Industry-adjusted change in operating return from year 1 to year 5 (−0.00)
7. Fraction of outside board directors at the time of the offering (0.44)	0.26 (0.00)	0.04 (0.47)	0.05 (0.51)	−0.22 (0.05)
8. Fraction of shares sold by existing shareholders in the offering (0.18)	0.15 (0.00)	0.19 (0.00)	−0.03 (0.44)	−0.24 (0.05)
9. Assets prior to offering in millions of dollars (22.1)	0.001 (0.03)	0.001 (0.07)	0.001 (0.00)	0.00 (0.85)
10. Years of operating history measured from 0.0 to 5.0 (3.7)	0.02 (0.02)	0.02 (0.03)	0.01 (0.60)	−0.00 (0.88)
p-value of F-statistic	0.00	0.00	0.05	0.29
Adjusted R^2	0.23	0.09	0.06	0.01
Sample size	267	248	146	155

[a]This is computed by averaging the industry-adjusted operating return for years 2 through 5. If a sample firm did not survive until year 5, the average reflects the years with performance measures available.

Table 3 – source: Wayne H. Mikkelson, M. Megan Partch, Kshitij Shah. (1997) Ownership and operating performance of companies that go public. *Financial Economics 44* pp. 281-307

5.2.3 Results

The authors use a multivariate regression to verify if there's a significant relationship between operating performance and ownership characteristics. Table 2 and 3 show the results of the tests. Mikkelson et al. find no support for the hypothesis that there's a relationship between operating performance and ownership characteristics. We see in the result that all the measures of ownership have a very high p-value

Mikkelson, Megan Partch and Shah (1997) write in their conclusion:

"We investigate whether the operating performance of firms that go public is explained by changes in stock ownership by managers. Median operating income falls from 21 cents per dollar of assets in the year before going public to four cents per dollar of assets during the first five years of public trading. However, neither the level of performance after going public nor the change in performance from before to after going public is related systematically to various measures of ownership by officers and directors and other blockholders, such as venture capitalists or parent corporations. We conclude that the changes in equity ownership that result from going public do not lead to changes in incentives that affect operating performance."

Rather finding a significant relationship between operating performance and ownership characteristics they find that the variation in operating performance can be mainly explained by the size and age of a firm:

"The performance of industry-matched firms after going public, while larger and more established companies' median performance is not different from the performance of industry-matched firms. However, large and established companies experience significant declines in performance from before to after going public. The declines in performance appear to be associated primarily with offerings that include a large proportion of shares sold by current holders. We suspect that these declines in performance reflect the decision to go public following favorable performance rather than the consequences of changes in ownership."

5.3 Motives provided in prospectuses

Rydqvist and Högholm (1995) explore why firms go public by looking at the reasons which the firms give in their prospectuses. In most cases a firm gives 2 or 3 reasons why they go public. The used data in their study is from 1970 till 1991 and contains initial public offerings from in Sweden. The outcome of the 127 prospectuses that were used in this research can be found in table 4.

Stated motives for going public.[a]

	N	%
A. Financial	123	97
Firm financing	122	96
Growth financing	81	64
Facilitate future reissuance[b]	61	48
Reduce debt/equity ratio	28	22
Improve credit rating	3	2
Portfolio rebalancing	23	14
Provide liquidity for current owners	10	8
Facilitate succession of control	13	10
B. Productivity	93	73
Incentives	48	38
Employee stock ownership	46	36
Stakeholder stock ownership	9	7
Performance evaluation	6	5
Publicity	85	67
Make firm's products better known	75	59
Attract more qualified personnel	30	24
Increase employee status	19	15
Increase bargaining power vs suppliers	10	8

Table 4 – motives stated in 127 prospectuses – source: Rydqvist and Högholm. (1995) Going public in the 1980s: Evidence from Sweden. *European Financial Management, Vol 1, No 3* pp. 287 - 315

According Rydqvist and Högholm the motives provided by the firms can be divided into two categories: financial and productivity related. When we look at the results we can see that financial motives (97%) are almost always stated in the prospectus of a firm that goes public. Especially being able to grow seems to have a big influence in the decision to go public: 64% say they go public so they can grow immediate and 48% state that they do this because growing as a firm in the future will be easier after going public. With the new equity it will be in example possible to do a takeover.

Rydqvist and Högholm also find evidence that firms go public to lower their debt-to-equity ratio however reducing leverage is with improving credit rating the least important motives to go public when look at firm financing motives. Portfolio rebalancing motives are also mentioned but not as often as firm financing motives.

Productivity related motives are with 73% less often mentioned compared to financial motives. If firms go public for productivity motives they do this most of the time to get their products in the spotlight (67%) and boost sales. We also find evidence that firms go public because afterwards it's possible to make employees stockholders (36%) which give employees an incentive to increase the value of the firm.

If the current personnel aren't qualified enough and better qualified personnel are required a firm can go public to make the firm more attractive for personnel to work there. 24% mentioned this argument in their prospectuses. Making it possible for stakeholders to become shareholders (7%), increase employee status (15%), increase bargaining power (8%) and wanting a daily evaluation of the stock market (5%) are other motives which are given by the issuer.

5.4.1 Pagano, Panetta and Zingales (1998)

Pagano, Panetta and Zingales (1998) performed one of the most if not the most extensive empirical research about why firms go public. Because this is probably the largest empirical work about why firms go public we will take an extensive look at it. In their empirical analyses they used a database of Italian private firms. They try to answer their research question, "Why do companies go public" by analyzing the characteristics of firms that went public ex ante and ex post.

5.4.2 Data

They need data, in example balance sheets, income statements and interest rates on loans of privately held firms, for their analyses which is in general not available. However they managed to get this data from different sources that are normally not giving this information away, in example the Bank of Italy provided data to them.

The 30.000 nonfinancial Italian private firms are reduced by removing firms that have a very low / no probability to go public in the period which they researched (1982 – 1992). They do this by removing the firms which do not qualify for going public because they do not meet the requirements of the Italian version of S.E.C. One of those requirements is that a firm needs to have positive year earnings in the 3 years before it goes public.

The given reason for only using nonfinancial firms by Pagano et al. is that financial firms have completely different accounting information and nature of operations. After removing the nonfinancial firms they keep 69 nonfinancial firms (40 independent and 29 carve-outs) which went public and meet the requirements between 1982 and 1992.

5.4.3 Independent companies and carve-outs

After adjusting their database Pagano et al. also separate independent companies and carve-outs (and spin-offs). They argue that subsidiaries might already have some of the advantages and disadvantages of going public if their parent company is already publicly traded and therefore have different motivations why they should or should not go public. Examples of these advantages and disadvantages which are given by Pagano et al. are that a subsidiary can already indirectly finance investments via the equity market and they are already forced to release auditing.

5.4.4 Panel A: Costs of going public

Pagano et al base predictions using several theories about costs (Panel A) and benefits (Panel B) of going public. The predictions are divided in 2 parts: the probability of an IPO and the consequence after IPOs. We will now take a closer look at these costs and benefits which are mentioned and describe how they will influence the probability and what the consequences are after an IPO according the authors.

Adverse selection.

Adverse selection is basically caused by investors having less information about how much a firm is worth than the issuers. As explained before the size and age of a firm should have an influence because how bigger and older a firm is the more information, in general, is available about the firm. However the data used by Pagano et al. does not contain any age

information of how old the firms are and they only use the size of a firm to test for adverse selection.

Administrative expenses and fees.
A lot of the fixed expenses that are a result of the decision to go public are not influenced by the size of the company. The probability of an IPO should be higher for a big firm compared to a small firm.

Loss of confidentially.
If loss of confidentially is indeed an important reason to not go public could be measured by looking at the research & development expenses. Firms with a relative high amount of ongoing research & development can decide to not go public since they could be forced to release secret information. However the data does not contain any research & development expenses. The authors mention that loss of confidentially can also be tested by looking at the effect of listing on corporate taxes. If a firm goes public it will be forced to release information about their tax expenses. This information is often very detailed and competitors will be able to subtract knowledge about a firm (e.g. how much is paid on R&D) that wouldn't have been possible to acquire if the firm would have stayed private.

5.4.5 Panel B: Benefits of going public

Overcoming borrowing constrains.
According Pagano et al. firms with a large amount of current and/or future investments, high growth and high leverage should be more appealed by the opportunity to go public. To check for growth they use the increase in sales rate. Going public to finance current investments is tested by looking at capital expenditure over plant, property and equipment (CAPEX). Future investments are measured using the median of the market-to-book ratio value of equity of public companies in the same industry (MTB).

Greater bargaining power with banks.
Firms that have to pay a relative high interest rate on their loans have the option to go public as an alternative way for financing their investments. Banks will have more competition for lending their money to a listed firm and a result of this is that on average the cost of credit will drop. Pagano et al. predict that firms that pay a lot on interest will have a higher probability of going public and that after an IPO the interest rate will drop.

Liquidity

When a firm goes public there will be a lot more liquidity for the stocks of a firm. If someone wants to sell a stock of a private firm he can only do this by informal searching and the costs are relatively high compared to when the stock is on an exchange market. Since this liquidity factor is correlated with size they argue that size should have a positive effect on the probability of going public.

Windows of opportunity

If the managers of a firm notice that similar listed firms in their industry are overvalued they could decide to go public since they know that there's a high probability that they will receive too much money for their stocks. This theory suggests that firms in overvalued industries have a higher probability of going public. To check this theory the authors use the median market-to-book ratio of listed firms in the same industry (MTB). However a problem emerges since a high MTB could also suggest that a firm has a high expected future growth and goes public to be able to finance this growth. The authors will use ex-post results to separate the two theories, if firms go public to finance future investments we should see investments rise after the IPO.

Pagano et al. also mention some other benefits however they do not have the needed data to test those theories. When we look at the theories we see that a lot of them argue that the probability of going public is correlated with the size of a firm. So we definitely expect a significant relationship between size and the probability of going public.

Determinants of the Decision to Go Public

The effect of the variables listed on the probability to go public is estimated by a probit model. The estimation method is maximum likelihood. The dependent variable is 0 if the company is not listed and 1 on the year of listing (observations for public companies are dropped from the sample). The sample is restricted to all company-years that satisfy the listing requirement as of that year. Subsidiaries of foreign corporations are excluded from the sample. The independent-IPO sample excludes all subsidiaries of publicly traded companies from the sample; the carve-out sample is restricted to subsidiaries of publicly traded companies. Sales is the lagged value of the logarithm of revenues. CAPEX is the lagged value of capital expenditures over Property Plant and Equipment. Growth is the rate of growth of sales in that year. ROA is the lagged value of EBITDA over total assets. Leverage is the lagged value of the ratio of the book value of short plus long term debt divided by book value of short plus long term debt plus book value of equity the year before. Bank rate is the lagged value of the relative cost of borrowing for firm i relative to the average borrowing rate of all the firms in the sample. The concentration of borrowing is the lagged value of the Herfindahl index of the lines of credit granted by different banks. The industry MTB is the median market-to-book value of equity of firms in the same industry which traded on the Milan Stock Exchange. The regression also includes a constant term and calendar year dummies (not reported). Standard errors are in parentheses. The tax effect is the average value of the calendar year dummies in the three years when there was a tax incentive to go public. The p-value of an F-test for the hypothesis that the joint effect of these three variables equals zero is also reported.

Variable	Whole Sample	Independent IPOs	Carve-Outs
Sales	0.202[a]	0.230[a]	−0.070
	(0.044)	(0.055)	(0.088)
CAPEX	0.167	0.343[b]	−0.770
	(0.180)	(0.169)	(0.528)
Growth	0.234[c]	0.322[b]	−0.428
	(0.131)	(0.150)	(0.415)
ROA	0.791[c]	1.170[b]	1.768[c]
	(0.449)	(0.485)	(1.045)
Leverage	−0.032	0.183	−0.596
	(0.277)	(0.317)	(0.492)
Bank rate	−4.093	5.070	−16.156
	(5.535)	(4.460)	(12.424)
Concentration	0.151	−0.668	−0.193
of borrowing	(0.575)	(0.832)	(0.731)
Industry MTB	0.241[a]	0.206[b]	0.333[b]
	(0.065)	(0.081)	(0.174)
No. of observations	5,350	4,919	431
Pseudo-R^2	0.100	0.143	0.131
Tax effect	0.511	0.854	0.176
F-test (p-value)	0.050	0.011	0.500

[a] Coefficient significantly different from 0 at the 1 percent level or less.
[b] Coefficient significantly different from 0 at the 5 percent level.
[c] Coefficient significantly different from 0 at the 10 percent level.

Table 5 – source: Pagano, Panetta and Zingales , (1998) Why do companies go public - an empirical analysis. The Journal of Finance Vol LIII, NO 1

5.4.6 Ex-ante determinants

With the selected variables Pagano et al. run probit model to find which variables are important in the decision to go public. They use the variables that were mentioned in the predictions based on benefits, costs and ROA.

ROA was added by the authors because they argue that the profitability may affect the probability of an IPO. In example the profit requirement in the last 3 years for Italy is an argument why profitability can have an effect on the probability. It also could be possible that a firm experiences a temporary profitability boost and the investors do not know that this is only temporarily and mistakenly think it's permanent. The management could exploit this miss pricing by going public. However the opposite effect can be expected if we argue that more profitable firms need less external financing since they should create enough capital on their own.

The maximum likelihood estimates of the model can be found in table 5. When we look at the whole sample we see that size (measured with sales) is a very important determinant since it's even (positive) significant at a 1% significance level. This confirms that a big firm has a higher probability of going public than a small firm. The industry market-to-book ratio (future investment) is another determinant which is significant different from zero at a 1% significance level and positive as expected. These two variables seem to be the biggest determinants of the decision to go public.

Less convincing results can be found for the determinant growth, it's only significant at a 10% level. Investment (CAPEX) is not significant at all. Investment and growth are two variables which measure the firm's need of financing. We also find insignificant result when we take a look at the cost of credit and the availability of credit.

5.4.7 Difference between carve-outs and independent IPOs

The authors test the hypothesis if the determinants for independent IPOs and carve-outs are indeed different with a likelihood ratio test. The result of the test is that they are significantly different at a 1% level.

When we look at the differences between independent firms and carve-outs we see that size does not have a significant influence in the decision to go public for carve-outs while it does have a significant influence for independent firms. Pagano et al. mention that this could possibly be explained with sunk costs. A part of costs which have to be paid when a company wants to go public are sunk costs for the subsidiary. These costs have already been made or are already being made since it's a subsidiary of a listed firm, examples of these costs are the accounting costs of annual reports and disclosure costs. Other differences in variables are growth and investment. The independent firms that went public invest more and have a higher growth compared to carve-outs.

Effects of the Decision to Go Public

For each of the variables listed we estimate the following specification:

$$y_{it} = \alpha + \sum_{j=0}^{3} \beta_j IPO_{t-j} + \beta_4 IPO_{t-n} + \sum_{j=0}^{3} \gamma_j QUOT_{t-j} + u_i + d_t + \epsilon_{it},$$

where u_i and d_t are respectively a firm-specific and calendar year–specific effect, IPO_{t-j} are dummy variables equal to one if year $t - j$ was the IPO year, IPO_{t-n} is a dummy variable equal to one if the IPO took place more than three years before, and $QUOT_{t-j}$ are dummy variables equal to one if company i satisfied the listing requirements in year $t - j$. By using a fixed effect model we are using each company before the IPO as a control for itself after the IPO. The table only reports the coefficients on the IPO and post-IPO dummy variables. The independent sample excludes subsidiaries of publicly traded companies, and the carve-out sample is restricted to subsidiaries of publicly traded companies. The number of observations is reported below the definition of each sample and may vary slightly because of data availability. ROA is EBITDA over total assets at the end of the previous year. CAPEX is capital expenditures over property plant and equipment. Financial investment is divided by total assets. Leverage is book value of short plus long term debt divided by book value of short plus long term debt plus book value of equity. Equity financing is the equity issued divided by total capital (total debt plus equity). Debt financing is debt issues divided by total capital. Payout is dividends paid divided by net income plus depreciation. Taxes is taxes paid divided by operating income. Growth is the rate of growth of sales in that year. Interest rate is the relative cost of credit of firm i measured as one plus the median rate paid on all the outstanding credit lines divided by one plus the average rate paid by all firms in the sample during that year. The concentration of credit is the Herfindahl index of the credit lines outstanding. The number of banks is the number of banks with a credit line outstanding. Heteroskedasticity robust standard errors are reported in parentheses. The last column reports the p-value of an F-test of the hypothesis that the sum of the coefficients of all the post-IPO dummies are equal to zero.

	Sample Used	Year 0	Year +1	Year +2	Year +3	Year >3	F-test
ROA	Whole sample	−0.008	−0.015[a]	−0.020[a]	−0.028[a]	−0.031[a]	0.000
	19,804	(0.006)	(0.006)	(0.007)	(0.007)	(0.005)	
	Independent	−0.009	−0.010	−0.029[a]	−0.036[a]	−0.027[a]	0.000
	18,425	(0.008)	(0.007)	(0.009)	(0.010)	(0.008)	
	Carve-outs	−0.009	−0.029[a]	−0.018[b]	−0.029[a]	−0.048[a]	0.000
	1,379	(0.010)	(0.010)	(0.010)	(0.009)	(0.009)	
CAPEX	Whole sample	0.023	0.016	−0.017	−0.041[a]	−0.042[a]	0.304
	18,251	(0.018)	(0.017)	(0.018)	(0.016)	(0.016)	
	Independent	−0.010	−0.009	−0.027	−0.091[a]	−0.070[a]	0.017
	16,929	(0.023)	(0.023)	(0.027)	(0.022)	(0.022)	
	Carve-outs	0.064[a]	0.028	0.002	0.032	0.010	0.136
	1,322	(0.027)	(0.027)	(0.023)	(0.024)	(0.024)	
Leverage	Whole sample	−0.051[b]	−0.031	−0.054[a]	−0.064[a]	−0.116[a]	0.000
	19,803	(0.021)	(0.022)	(0.018)	(0.018)	(0.014)	
	Independent	−0.070[a]	−0.047[b]	−0.048[a]	−0.050[a]	−0.094[a]	0.000
	18,424	(0.027)	(0.026)	(0.024)	(0.025)	(0.019)	
	Carve-outs	−0.002	0.022	−0.015	−0.036	−0.095[a]	0.016
	1,379	(0.033)	(0.037)	(0.027)	(0.026)	(0.224)	
Financial investments	Whole sample	0.024[b]	0.002	−0.007	−0.015	−0.006	0.949
	19,796	(0.015)	(0.015)	(0.012)	(0.013)	(0.011)	
	Independent	0.013	−0.001	0.003	−0.032[a]	0.001	0.704
	18,417	(0.016)	(0.015)	(0.014)	(0.012)	(0.014)	

Table 6 – source: Pagano, Panetta and Zingales , (1998) Why do companies go public - an empirical analysis. The Journal of Finance Vol LIII, NO 1

	Sample Used	Year 0	Year +1	Year +2	Year +3	Year >3	*F*-test
	Carve-outs	0.039	0.010	−0.019	−0.004	−0.027	0.999
	1,379	(0.026)	(0.030)	(0.021)	(0.026)	(0.021)	
Equity	Whole sample	0.062[a]	0.010	0.004	0.005	−0.004	0.063
financing	19,801	(0.019)	(0.010)	(0.012)	(0.013)	(0.010)	
	Independent	0.067[a]	0.004	0.007	−0.002	0.002	0.136
	18,422	(0.022)	(0.013)	(0.014)	(0.015)	(0.014)	
	Carve-outs	0.048	0.018	−0.002	0.014	−0.010	0.320
	1,379	(0.034)	(0.019)	(0.022)	(0.024)	(0.015)	
Debt	Whole sample	0.003	0.014	−0.001	−0.007	−0.021	0.886
financing	19,698	(0.027)	(0.025)	(0.025)	(0.022)	(0.018)	
	Independent	0.016	0.019	0.031	−0.022	−0.030	0.892
	18,325	(0.038)	(0.031)	(0.032)	(0.024)	(0.024)	
	Carve-outs	−0.024	0.005	−0.042	−0.008	−0.032	0.457
	1,373	(0.037)	(0.044)	(0.040)	(0.034)	(0.033)	
Payout	Whole sample	−0.001	−0.053	−0.055	−0.041	−0.052	0.609
	17,667	(0.085)	(0.085)	(0.077)	(0.098)	(0.131)	
	Independent	−0.060	−0.009	−0.106	−0.020	−0.184	0.382
	16,374	(0.111)	(0.119)	(0.090)	(0.135)	(0.146)	
	Carve-outs	−0.097	−0.212	0.013	−0.094	0.069	0.757
	1,293	(0.192)	(0.237)	(0.184)	(0.319)	(0.438)	
Taxes	Whole sample	0.021[b]	0.018	0.025	0.014	0.018	0.050
	18,096	(0.012)	(0.017)	(0.019)	(0.021)	(0.014)	
	Independent	0.014	0.009	0.014	−0.034	0.018	0.736
	16,902	(0.015)	(0.024)	(0.024)	(0.025)	(0.020)	
	Carve-outs	0.027	0.022	0.029	0.057	0.005	0.101
	1,194	(0.021)	(0.025)	(0.029)	(0.035)	(0.024)	
Growth	Whole sample	0.031	0.029	−0.003	0.015	0.005	0.282
	17,347	(0.023)	(0.021)	(0.022)	(0.026)	(0.019)	
	Independent	0.016	0.017	−0.040	−0.023	0.016	0.898
	16,137	(0.036)	(0.029)	(0.031)	(0.036)	(0.027)	
	Carve-outs	0.038	0.038	0.045	0.051	−0.046	0.260
	1,210	(0.029)	(0.031)	(0.031)	(0.037)	(0.032)	
Interest	Whole sample	−0.0023[a]	−0.0016	−0.0038[a]	−0.0034[a]	−0.0016	0.005
rate	11,797	(0.0011)	(0.0012)	(0.0014)	(0.0013)	(0.0011)	
	Independent	−0.0035[a]	−0.0035[a]	−0.0060[a]	−0.0062[a]	−0.0025	0.001
	11,017	(0.0015)	(0.0018)	(0.0020)	(0.0019)	(0.0016)	
	Carve-outs	−0.0006	−0.0003	−0.0021	−0.0001	−0.0009	0.535
	780	(0.0017)	(0.0017)	(0.0018)	(0.0016)	(0.0017)	
Concentration	Whole sample	−0.002	−0.006	−0.013	−0.025[b]	0.010	0.372
of credit	19,099	(0.008)	(0.011)	(0.016)	(0.009)	(0.011)	
	Independent	−0.005	−0.025[a]	−0.040[a]	−0.043[a]	−0.026[a]	0.000
	17,751	(0.010)	(0.006)	(0.008)	(0.010)	(0.009)	
	Carve-outs	0.006	0.022	0.026	−0.005	0.031	0.370
	1,348	(0.014)	(0.025)	(0.038)	(0.020)	(0.026)	
Number of	Whole sample	1.47[a]	2.28[a]	3.16[a]	3.25[b]	−0.002	0.000
banks	19,254	(0.578)	(0.636)	(0.685)	(0.777)	(0.597)	
	Independent	2.13[a]	3.67[a]	4.92[a]	4.77[a]	1.92[a]	0.000
	17,844	(0.610)	(0.780)	(0.879)	(1.003)	(0.629)	
	Carve-outs	0.654	0.944	1.637	2.488[a]	−0.349	0.149
	1,410	(1.082)	(1.054)	(1.073)	(1.234)	(1.113)	

[a] Coefficient is significantly different from 0 at the 5 percent level or less.
[b] Coefficient is significantly different from 0 at the 10 percent level.

Table 6 part 2– source: Pagano, Panetta and Zingales , (1998) Why do companies go public - an empirical analysis. The Journal of Finance Vol LIII, NO 1

5.4.8 Ex-post consequences

The second method used by Pagano et al. to find which determinants are important is by taking a look at the ex-post performance of firms. The results can be found in table 6.

The first effect which we notice is the decreasing profitability (ROA). This effect is especially big for carve-outs. The authors give a possible explanations for this effect: adverse selection could explain this if you argue that firms go public when profitability is about to drop or that firm will use "window dressing" to make their firm look better than it actually is when it is about to go public.

In table 6 we see that investments (CAPEX) drops after an IPO for independent firms (significant after 2 years), this is not the case for carve-outs where we see that investments rise after an IPO. A drop in investments after an IPO is a surprise if we look at theoretical literature where going public to be able to finance growth (investments) is an often used motivation. The declining CAPEX makes the windows of opportunity theory more suitable as explanation for the positive significant MTB variable which was found as an ex-ante determinant instead of the theory that firms go public to finance growth. There's also a big difference for the leverage determinant. Where independent firms deleverage right after the IPO carve-outs only do this in the long run.

As last we will take a look at the cost of credit. Pagano et al. mention that there are two complications when we want to test for a lower cost of credit after an IPO. The fist one is the extreme variable character of the bank rates in the period which we use. To get rid of this problem they decide to work with relative interest rates. For each company they compare the interest rate for firm *i* at time *t* with the interest rate of the whole sample at *t*. The second problem is to decide which interest rate should be used since most firms have loans from multiple banks. They decide to use the median rate charged as solution to this problem.

The result for the interest rates determinant is significantly different from zero. We find that the relative cost of credit drops in the first 3 years. However in the years after we don't find a significant difference from zero. This effect seems to only exist for independent IPOs. According to the authors there are three possible explanations for this drop. Leverage drops and that makes a firm safer to loan to after an IPO. Second given reason is that after an IPO

there's in general more information available of a firm, this makes it easier and less costly to gather creditworthiness information for banks of the firm that wants to loan money. This lower information cost could cause a lower interest rate for a firm. Third reason is as explained before the greater bargaining power of firms after an IPO since they have the option to finance their investments on the security market therefore banks have more competition which will result in lower interest rates. The authors say in their article that it's not really possible to make a distinction between these explanations.

5.4.9 Conclusion

Pagano et al. start their conclusion by mentioning that this empirical research is performed with Italian firms and that the result could be different for other countries. However the results should be very similar to other comparable European countries.

The authors mention a couple of findings in their conclusion:
Pagano, Panetta and Zingales (1998):
"Our first finding is that the probability of an IPO is positively affected by the stock market valuation of firms in the same industry. This result is neither surprising nor unique to our sample. The clustering of IPOs is a well-established regularity both in the United States (Ritter (1984)) and other countries (Loughran et al. (1994), Ljungqvist (1995)). But our approach allows us to distinguish whether this positive relationship reflects a higher investment need in sectors with good growth opportunities (and correspondingly high market-to-book ratio) or the owners' attempt to exploit sectoral mispricing. In the Italian case, investment and profitability decrease after IPOs— making the explanation based on mispricing appear more appropriate."

The second finding is that the size of a firm has a significant influence on the probability of an initial public offering. This is not unexpected at all since a lot of the theories that we previously discussed predict a correlation between size and the probability of an IPO. Another conclusion of this article is that firms are able to get a lower short term interest rate and more banks are prepared to give a loan after an IPO.

As last they also discuss the difference between Europe and United States. The results which they find are in line with previous findings of other authors.

Pagano, Panetta and Zingales (1998):

"Our results are again strikingly similar to the evidence for other European countries—and stand in a related contrast to the United States. We find that companies do not go public to finance subsequent investment and growth, but rather to rebalance their accounts after a period of high investment and growth. IPOs also do not appear to finance subsequent investment and growth in Spain (see Planell (1995)) and in Sweden (see Rydqvist and Högholm (1995)). In contrast, in the United States newly listed companies feature phenomenal growth (see Mikkelson et al. (1995)). Again, this difference may reflect the more mature age of European IPOs: Mikkelson et al. (1997) also find that in the United States older firms are more likely to use the funds raised to pay down debt than to finance growth."

5.5.1 Chemmanur, He and Nandy

Chemmanur, He and Nandy (2008) focus on the relationship between the decision to go public and the product market characteristics. Their objective is to close the theoretical and empirical literature gap on this matter. They differentiate 9 hypotheses from the current theoretical literature and test them.

Here are the first 4 predictions:
H1: Smaller and younger firms are less likely to go public.
H2: Firms operating in industries characterized by less information asymmetry and more stock market liquidity are more likely to go public.
H3: Firms operating in industries where it is easier for public investors to evaluate the firm are more likely to go public.
H4: Firms operating in more capital intensive industries and in those characterized by greater riskiness of cash flows are more likely to go public.

Some of these hypotheses are already discussed in this thesis. Smaller and younger firms are less likely to go public because of asymmetric information between investors and the management of a firm. We can also apply this on entire industries instead of a single firm which means that firms that operate in industries where there's a lot of information asymmetry are less likely to go public. A comparable theory is: firms that are operating in industries where it's easier for investors to evaluate the value of a firm are more likely to go public and for that reason firms in complex industries are less likely to go public.

H4 predicts that firms that are active in relative capital intensive industries or industries where there is a relative high riskiness of cash flows have a higher probability of going public since going public (and therefore being able to get capital from the equity market) will outweigh the disadvantages for this kind of firms more often.

H5: Firms with a greater market share in their product market are more likely to go public.
H6: Firms operating in more concentrated industries are more likely to go public.
H7: Firms operating in industries where the value of confidentiality is greater (e.g., high tech firms) are less likely to go public.

Predictions 5,6 and 7 are related with the loss of confidentiality argument. The authors use the models of Bhattacharya and Ritter (1983) and Maksimovic and Pichler (2001) which state that if a firm has a large market share it's more likely that it decides to go public so it can raise capital at a cheaper rate. The reason why going public is especially interesting for the industry leader(s) according the theory is that the benefits from expanding scale by going public are larger (for a given cost of going public) for firms with a large market share.

If there is not much competition (high concentration) in an industry loss of confidentiality has a smaller influence in the decision to go public. The costs of going will be lower and therefore it will be more likely that a firm will go public. If a firm is active in an industry where the value of confidentiality is very high (in example high-tech industries) it's less likely that a firm goes public. They test this in the sixth and seventh prediction.

H8: Firms with higher total factor productivity (TFP) are more likely to go public.
H9: Firms with higher levels of output growth and higher levels of capital expenditures are more likely to go public.

For the last two hypotheses the authors use a model of Clementi (2002). In this model firms operate in an industry with decreasing returns to scale. Going public is costly and before the firm goes public there is a borrowing constraint that prevents a firm to reach its optimal scale of production. If there suddenly would be a persistent increase in the firm's total factor productivity the firm will have more possible investments with a positive net present value. The consequence of this improved total factor productivity is that it's more likely that the benefits (being able to expand and invest in new projects) are higher than the costs of going public compared with before the increase of the firm's total factor productivity. A result of the increasing firm's total factor productivity is that capital expenditures will be higher for firms that go public compared to firms that remain private and firms that go public will also have higher growth of output since they will expand their production.

5.5.2 Data

To perform the empirical research the authors mainly use the Longitudinal Research Database (LRD) which is a large database with private and public manufacturing plants from the United States, they use the data from 1972 till 2000. The LRD database contains information e.g. how much employees a firm has, capital expenditures and total value of

shipments. They also use two other sources (CRSP and I/B/E/S) to complete the needed data to perform their research. They remove the equity carve-outs from their database since they have other motives to go public.

5.5.3 Probit model

Chemmanur, He and Nandy estimate the following probit model to test their predictions:

$$Pr\,(IPO_{ijt} = 1) = F(\beta_1 SIZE_{i,t-1} + \beta_2 SGTH_{i,t-1} + \beta_3 MSHR_{i,t-1} + \beta_4 TFP_{i,t-1} + \beta_5 CAPINT_{i,t-1}$$
$$+ \beta_6 AGE_{i,t-1} + \beta_7 CAPR_{i,t-1} + \beta_8 INDRSK_{j,t-1} + \beta_9 HI_{j,t-1} + \beta_{10} TOV_{j,t-1} + \beta_{11} HTEK_{i,t-1}$$
$$+ \beta_{12} LIST_{j,t-1} + \beta_{13} STDEV_{j,t-1} + \beta_{14} FORERR_{j,t-1} + \beta_{15} NUMA_{j,t-1} + \beta_{16} SP500_{t-1}),$$

We will give short definitions and the predicted effects of the variables to be able to understand the probit model:

SIZE: size, needed to test for prediction H1
Natural logarithm of capital stock of the firm. We expect a positive relation between size and the probability of going public.

AGE: age, needed to test for prediction H1
Natural logarithm of age of the firm. We expect a positive relation between age and the probability of going public.

TFP: total factor productivity, needed to test for prediction H8
This variable measures the relative productivity of a firm (firm's productivity compared to other firms in the same industry). We expect a positive relation between total factor productivity and the probability of going public.

CAPINT: Capital intensity, needed to test for prediction H4
Firm's capital stock over total employment is used as proxy for capital intensity of an industry. We expect a positive relation between capital intensity and the probability of going public.

INDRSK, industry risk, needed to test for prediction H4

Proxy used for riskiness of cash flow is the industry median of five years coefficient of variation of firm sales. We expect a positive relation between industry risk and the probability of going public.

CAPR: capital expenditure ratio, needed to test for prediction H9

Capital expenditure over capital stock is used as proxy for the relative investment intensity of firms. We expect a positive relation between capital expenditure ratio and the probability of going public.

SGTH: sales growth, needed to test for prediction H9

Average growth in sales of the last three years. We expect a positive relation between sales growth and the probability of going public.

MSHR: Market share, needed to test for prediction H5

Market share of a firm in their industry. We expect a positive relation between market share and the probability of going public.

HTEK: high tech firms, needed to test for prediction H7

Dummy variable, SIC codes are used to determine the high tech firms. We expect a negative relation between high tech firms and the probability of going public.

TOV: share turnover, needed to test for prediction H2

Mean of the share turnover of firms in the same industry. This is used as the industry's stock market liquidity. We expect a positive relation between share turnover and the probability of going public.

LIST: number of public firms listed in CRSP, needed to test for prediction H3

If there are a lot of firms of the same industry listed it's usually easier to evaluate a firm which wants to go public. They used the number of public firms listed in CRSP as proxy. We expect a positive relation between number of listed firms and the probability of going public.

HI: industry herfindahl index, needed to test for prediction H6
Sum of the square of all firm's market share (in sales) in the industry. This is used as a proxy for the concentration in an industry. We expect a positive relation between industry herfindahl index and the probability of going public.

STDEV: industry average standard deviation in analysts' forecast, FORERR: industry average analysts' forecast error and NUMA: industry average number of analysts following. All needed to test for prediction H2
Authors use three different proxies to measure for information asymmetry. A high STDEV, high FORERR or a low NUMA means that there's a lot of asymmetric information in that particular industry. We expect a negative relation between asymmetric information and the probability of going public.

As last they add SP500 (annual return on the SP500 index) to account for the cyclical IPO pattern over time.

5.5.4 Results of the probit model

The maximum likelihood estimates can be found in table 7, 8 and 9. They use three different panels to give an overview of their results. Panel A consists of firm specific product variables as explanatory variables. In panel B industry specific variables are added. And as last panel C consists of all the explanatory variables (panel B with asymmetric information variables added). The authors use methodology from Petersen (2005) in their regression framework (using fixed effects and adjust the standard errors for correlations within clusters).

Determinants of the Going Public Decision: This table presents the effects of firm specific product market variables, industry specific characteristics and asymmetric information on firm's decision to go public. The effect of the variables on the probability of going public is estimated by the following probit model. $Pr\ (IPO_{jt} = 1) = F\ (\beta_1 SIZE_{i,t-1} + \beta_2 SGTH_{i,t-1} + \beta_3 MSHR_{i,t-1} + \beta_4 TFP_{i,t-1} + \beta_5 CAPINT_{i,t-1} + \beta_6 AGE_{i,t-1} + \beta_7 CAPR_{i,t-1} + \beta_8 INDRSK_{j,t-1} + \beta_9 HI_{j,t-1} + \beta_{10} TOV_{j,t-1} + \beta_{11} HTEK_{i,t-1} + \beta_{12} LIST_{j,t-1} + \beta_{13} STDEV_{j,t-1} + \beta_{14} FORERR_{j,t-1} + \beta_{15} NUMA_{j,t-1} + \beta_{16} SP500_{t-1})$ where F(.) is the cumulative distribution function of a standard normal variable. The dependent variable is 0 if the firm is private and 1 on the year of the IPO. Note that the sample does not contain any existing public firms. *SIZE* is the lagged value of logarithm of capital stock. *SGTH* is the average growth in sales in the past 3 years. *MSHR* is the lagged value of a firm's market share in terms of total value of shipment in its 3 digit SIC industry. *TFP* is the lagged value of weighted average of plant level Total Factor Productivity at the four digit SIC level, where one regresses the value of output (total value of shipments adjusted for changes in inventories) on labor (production worker equivalent man hours), capital stock, and material inputs (intermediate inputs, fuels, and energy consumed). *CAPINT* is the lagged value of capital stock per worker. *AGE* is the natural logarithm of firm age. *CAPR* is the lagged value of capital expenditures over capital stock (CAPEX Ratio). *HTEK* dummy is 1 if the firm is in the 3 digit SIC code of 357, 366, 367, 372, 381, 382, 384, and 0 otherwise. *INDRSK* is the median of the 5 year standard deviation in sales at the SIC 3 digit industry level of all the firms covered in the LRD that year. It is also lagged by one year. *HI* is the lagged value of Herfindal Index in the 3 digit SIC industry level. The higher the Herfindal Index, the more concentrated the industry is. *LIST* is the total number of firms in the same 3 digit SIC industry that are listed in the CRSP in the last year. *TOV* is the mean of stock turnover (calculated as trading volume over total number of shares outstanding) at the 3 digit SIC level in the last year. *NUMA* is the 3 digit SIC industry level mean of the number of analysts covering firms in an industry. *FORERR* is the 3 digit SIC level mean of average analysts forecast errors across firms in the industry. *STDEV* is the 3 digit SIC level mean of the standard deviation in Analysts Forecast of EPS. *NUMA, FORERR,* and *STDEV* are all measured from I/B/E/S and the observations are lagged by a year. *SP500* is the last year's annual return of the Standard & Poor's 500 index. All dollar values are in real terms. All observations are firm year observations. Panel A presents results on the effects of firm specific product market variables on the firm's decision to go public. Panel B presents the effect of firm specific variables along with industry specific characteristics on the firm's decision to go public. Panel C presents the effect of firm specific variables along with industry specific characteristics and asymmetric information variables on firm's decision to go public. Calendar year dummies and Industry dummies are included in some specifications. Heteroskedasticity corrected robust standard errors, which are clustered on firms, are in parentheses. ***, **, and * indicate significance at the 1, 5, and 10 percent level respectively.

Panel A: Effect of Firm Specific Product Market Variables

	Reg. 1	Reg. 2	Reg. 3	Reg. 4	Reg. 5	Reg. 6	Reg. 7	Reg. 8
Size	0.207***	0.215***				0.223***	0.232***	
	[0.009]	[0.009]				[0.009]	[0.010]	
Sales Growth	0.387***	0.386***	0.333***	0.374***	0.383***	0.398***	0.396***	0.373***
	[0.036]	[0.037]	[0.028]	[0.030]	[0.030]	[0.039]	[0.039]	[0.032]
Market Share	1.249***	1.146***	2.887***	2.827***	2.689***	1.499***	1.380***	3.231***
	[0.301]	[0.340]	[0.251]	[0.243]	[0.248]	[0.305]	[0.354]	[0.318]
TFP	0.284***	0.272***	0.262***	0.262***	0.256***	0.297***	0.285***	0.265***
	[0.067]	[0.066]	[0.052]	[0.053]	[0.054]	[0.067]	[0.066]	[0.055]
Capital Intensity			0.003***		0.003***			0.002***
			[0.000]		[0.000]			[0.000]
Ln(Age)				0.148***	0.132***			0.03
				[0.018]	[0.018]			[0.022]
CAPEX Ratio	0.359***	0.350***	0.145**	0.157**	0.191***	0.503***	0.500***	0.264***
	[0.089]	[0.090]	[0.067]	[0.069]	[0.070]	[0.093]	[0.095]	[0.074]
Hitech Dummy	0.639***	0.409***	0.673***	0.656***	0.681***	0.630***	0.390***	0.448***
	[0.035]	[0.058]	[0.033]	[0.032]	[0.033]	[0.037]	[0.061]	[0.058]
SP500	0.631***	0.632***	0.672***	0.629***	0.618***			
	[0.081]	[0.082]	[0.083]	[0.088]	[0.089]			
Year Dummies	No	No	No	No	No	Yes	Yes	Yes
Industry Dummies	No	Yes	No	No	No	No	Yes	Yes
Number of obs	486322	481870	480613	491107	480613	457511	453292	452188
Pseudo R^2	0.15	0.16	0.08	0.08	0.09	0.2	0.21	0.14

Table 7 – source: Chemmanur, He and Nandy (2008) The going public decision and the product market

Panel B: Combined Effect of Firm Specific Product Market Variables and Industry Characteristics								
	Reg. 1	Reg. 2	Reg. 3	Reg. 4	Reg. 5	Reg. 6	Reg. 7	Reg. 8
Size	0.209***	0.229***	0.205***	0.222***				
	[0.009]	[0.009]	[0.009]	[0.009]				
Sales Growth	0.403***	0.403***	0.375***	0.382***	0.373***	0.366***	0.380***	0.371***
	[0.035]	[0.037]	[0.038]	[0.039]	[0.031]	[0.032]	[0.029]	[0.030]
Market Share	0.841**	0.987***	1.319***	1.457***	2.999***	3.225***	2.791***	3.024***
	[0.350]	[0.356]	[0.327]	[0.344]	[0.242]	[0.302]	[0.236]	[0.292]
TFP	0.295***	0.297***	0.281***	0.290***	0.251***	0.264***	0.257***	0.266***
	[0.069]	[0.069]	[0.067]	[0.068]	[0.054]	[0.055]	[0.054]	[0.055]
Capital Intensity					0.003***	0.003***	0.002***	0.002***
					[0.000]	[0.000]	[0.000]	[0.000]
Ln(Age)					0.116***	0.03	0.099***	0.017
					[0.019]	[0.022]	[0.019]	[0.021]
CAPEX Ratio	0.443***	0.594***	0.360***	0.511***	0.196***	0.263***	0.247***	0.308***
	[0.084]	[0.088]	[0.090]	[0.094]	[0.071]	[0.074]	[0.065]	[0.068]
Industry Risk	1.375***	1.715***	0.575***	0.637**	0.174	-0.352	0.949***	0.650***
	[0.164]	[0.227]	[0.209]	[0.282]	[0.211]	[0.283]	[0.178]	[0.237]
Herfindahl Index	0.263**	0.390***	0.236	0.449***	0.205	0.522***	0.251**	0.500***
	[0.133]	[0.144]	[0.162]	[0.169]	[0.141]	[0.151]	[0.108]	[0.120]
Turnover	0.126***	0.124***	0.103***	0.074***	0.097***	0.064***	0.118***	0.105***
	[0.006]	[0.014]	[0.008]	[0.017]	[0.007]	[0.013]	[0.006]	[0.011]
Hitech Dummy			0.563***	0.569***	0.630***	0.637***		
			[0.039]	[0.040]	[0.034]	[0.036]		
SP500	0.599***		0.583***		0.597***		0.644***	
	[0.087]		[0.086]		[0.092]		[0.093]	
Year Dummies	No	Yes	No	Yes	No	Yes	No	Yes
Observations	465921	438286	465921	438286	460398	433136	460398	433136
Pseudo R-square	0.14	0.18	0.16	0.2	0.09	0.13	0.06	0.1

Table 8 – source: Chemmanur, He and Nandy (2008) The going public decision and the product market

Panel C: Combined Effect of Firm Specific Product Market Variables, Industry Characteristics, and Information Asymmetry Variables (the Complete Model)

	Reg. 1	Reg. 2	Reg. 3	Reg. 4	Reg. 5	Reg. 6	Reg. 7	Reg. 8
Size	0.215***	0.229***	0.202***	0.223***				
	[0.009]	[0.010]	[0.010]	[0.010]				
Sales Growth	0.378***	0.399***	0.382***	0.377***	0.360***	0.371***	0.369***	0.364***
	[0.039]	[0.038]	[0.040]	[0.041]	[0.033]	[0.031]	[0.033]	[0.033]
Market Share	1.566***	0.567	1.344***	1.200**	3.514***	3.317***	3.429***	3.610***
	[0.342]	[0.496]	[0.497]	[0.503]	[0.393]	[0.405]	[0.365]	[0.416]
TFP	0.290***	0.288***	0.275***	0.279***	0.253***	0.255***	0.244***	0.251***
	[0.067]	[0.071]	[0.069]	[0.070]	[0.056]	[0.058]	[0.056]	[0.057]
Capital Intensity					0.002***	0.002***	0.002***	0.002***
					[0.000]	[0.000]	[0.000]	[0.000]
Ln(Age)					0.03	0.013	0.077***	0.029
					[0.022]	[0.022]	[0.020]	[0.022]
CAPEX Ratio	0.537***	0.590***	0.354***	0.505***	0.295***	0.311***	0.196***	0.267***
	[0.092]	[0.092]	[0.096]	[0.099]	[0.075]	[0.071]	[0.075]	[0.078]
Industry Risk	0.575*	1.942***	0.252	0.721**	-0.468	1.026***	-0.228	-0.485
	[0.305]	[0.228]	[0.261]	[0.320]	[0.329]	[0.237]	[0.266]	[0.335]
Herfindahl Index	0.517***	0.685***	0.514**	0.786***	1.015***	0.822***	0.571***	0.888***
	[0.161]	[0.201]	[0.219]	[0.222]	[0.186]	[0.180]	[0.205]	[0.206]
Turnover	0.069***	0.126***	0.077***	0.065***	0.052***	0.116***	0.072***	0.049***
	[0.018]	[0.016]	[0.010]	[0.020]	[0.017]	[0.014]	[0.009]	[0.018]
Hitech Dummy			0.466***	0.508***			0.357***	0.405***
			[0.061]	[0.070]			[0.061]	[0.067]
Number of Firms	0.003***		0.001**	0	0.004***		0.002***	0.002***
Listed in CRSP	[0.000]		[0.000]	[0.000]	[0.000]		[0.000]	[0.000]
Std. Dev. of		-0.056**	-0.036*	-0.045	-0.042*	-0.038**	-0.039*	-0.032
Analysts Forecasts		[0.028]	[0.022]	[0.030]	[0.024]	[0.019]	[0.020]	[0.021]
Analysts Forecast		-0.003	-0.02	-0.005		0	-0.014	-0.001
Error		[0.010]	[0.013]	[0.014]		[0.001]	[0.011]	[0.001]
Number of		-0.009*	-0.005	-0.015**		0.010**	0.007	0.003
Analysts		[0.005]	[0.005]	[0.006]		[0.005]	[0.005]	[0.006]
SP500			0.375***				0.471***	
			[0.110]				[0.111]	
Year Dummies	Yes	Yes	No	Yes	Yes	Yes	No	Yes
Observations	437658	363437	366717	363437	371714	359745	362984	359745
Pseudo R-square	0.19	0.17	0.15	0.19	0.12	0.09	0.09	0.13

Table 9 – source: Chemmanur, He and Nandy (2008) The going public decision and the product market

Panel A shows that a lot of predictions which the authors made are supported by the results. SIZE coefficients are all significant at a 1% level and positive. This supports the H1 prediction where we expected that smaller firms are less likely to go public. We find similar results for sales growth and the CAPEX ratio, coefficients are significant at a 1% level and positive. This is what was expected when we look at the H9 prediction: Firms with a higher output growth and higher increase of capital expenditures are more likely to go public.

Total factor productivity variable is also significant at a 1% level and positive. This supports the expectation that firms with a relative high TFP are more likely to go public (H8). H5 predicts that firms with a big market share in their product market have a higher probability to go public. The results support this since most regressions show a positive significant relationship at a 1% level (and one at a 5% level) for market share.

The only unexpected result that we find is a positive relation between high tech firms and the probability of going public. This is the opposite of what was expected when we take a look at H7. The authors mention that a possible explanation for this is that they only use manufacturing firms in their sample and that means that service high tech firms (e.g. ICT) are not included in this empirical research.

If we move on to panel B where industry level variables, industry risk (industry median of firm sales variation), herfindahl index (industry concentration) and turnover (expected stock market liquidity), are added we see only confirmations of the expectations. In general the variables are positive and significant at a 1% or 5% level. We can deduct from these results that firms operating in industries where stock market liquidity is relative high (H2), firms operate in an industry that has a relative great riskiness of cash flows (H4) or operate in a concentrated industry (H6) are more likely to go public.

In panel B, regression 5 till 8, they also test the effect of capital intensity (CAPINT) and AGE. They remove SIZE in these regressions because of multicollinearity problems. The authors find as expected a positive significant relationship between the probability of an IPO and a relative capital intensity of an industry (H4). Also AGE is positive and significant at a 1% level (in two of the three regressions) and prediction H1 is once again supported. Relative old firms have a higher probability of going public.

Information asymmetry variables are added in panel C. The amount of listed firms (LIST) from the same industry, which should make it easier to evaluate a firm if the amount of listed firms is high, has a positive and significant influence on the probability of an IPO. This is consistent with H3.

Most regressions show a negative significant result at a 5% or 10% level for STDEV (industry average standard deviation in analysts' forecast). This once again confirms prediction H2 since a low industry average standard deviation in analysts' forecasts should indicate that asymmetric information is a small problem in an industry and therefore increase the probability of an IPO. Analysists forecast errors (FORERR) variable is negative (as predicted) but does not show a significant relationship. The amount of analysts following the industry (NUMA) variable is positive and significant after removing size to prevent correlation issues (regression 6), this is consisted with the H2 prediction. How higher the amount of analysts that are following an industry how less asymmetric information there should be and for that reason increase the probability of an IPO.

The authors also run a Cox proportional hazard model with the same variables and find very similar results as the probit model.

5.5.5 Dynamic pattern of various firm specific product market characteristics

The second part of the article of Chemmanur, He and Nandy consists of analyzing the dynamic pattern of various firm specific product market characteristics with a regression framework, 5 years before and 5 years after the IPO. They test if the patterns of the firms that went public is different compared with the pattern of all the firms (private and public) in the sample. They take a look at the following firm characteristics: total employment, total wage, material cost, rental and administration expense, TFP, sales, capital expenditure, sales growth and market share.

They find an inverted U-pattern for TFP (relative productivity) around the IPO for firms that went public. TFP rises and reaches its peak in the year of the IPO and drops after the IPO. Sales growth has like TFP an inverted U-pattern with its peak in the year of the IPO. There is no significant difference between firms that went public and firms that stayed private when Chemmanur, He and Nandy look at the market share patterns.

Sales and capital expenditure, of firms that went public increase faster compared to firms in the same industry from 5 years before the IPO till 5 years after the IPO. For several different cost factors (total employment, total wage, material cost, rental and administration expense) a faster increasing pattern for firms that went public was found compared to similar firms that didn't go public. However this effect can be explained when the growth in size around the IPO of the firms that go public is taken into account.

5.5.6 Conclusion

In the conclusion Chemmanur, He and Nandy (2008) write the following summary about the results of the Probit and Cox proportional hazard model:
"Our findings are as follows. First, firms with larger size, sales growth, total factor productivity (TFP), market share, capital intensity, and high tech firms are more likely to go public. Second, firms operating in less competitive and more capital intensive industries, and those in industries characterized by riskier cash flows, are more likely to go public. Third, firms with projects that are cheaper for outsiders to evaluate, and operating in industries characterized by less information asymmetry and greater average liquidity of already listed equity are more likely to go public. Our results are robust - we present our analysis using both a probit model and a Cox proportional hazard model and arrive at the same conclusions."

The authors end their article by summing up the findings of their dynamic pattern analysis of firm performance in the 5 years before and after the initial public offering and give a conclusion regarding these findings:
"Our analysis of the dynamic pattern of firm performance around the IPO indicates that while TFP and sales growth exhibit an inverted-U shaped pattern (with peak productivity and sales growth occurring in the year of IPO), sales, capital expenditures, employment, total labor costs, materials costs, and selling and administrative expenses exhibit a consistently increasing pattern in the years before and after the IPO. However, the dynamic pattern in various firm performance variables before and after the IPO (and especially the inverted-U shaped pattern of productivity changes) that we document around the IPO is inconsistent with the notion that the operating post-IPO underperformance of firms is generated solely by earnings management by firms immediately prior to the IPO. In particular, the consistent growth in firm productivity that we document for five years before the IPO is unlikely to be generated purely by the manipulation of accounting numbers, since the performance effects of such manipulation are likely to be confined to the years immediately prior to the IPO, and would

not persist over so many years (especially given the fact that measures of economic performance such as TFP, being derived from a variety of different performance measures, are much harder to manipulate compared to accounting numbers). Instead, the above dynamic pattern of various variables (and especially the inverted-U shaped pattern of productivity changes) is broadly consistent with the performance implications of a firm increasing its scale of operations around the IPO (making use of the external financing raised), and subsequently facing decreasing returns to scale which leads to the fall in the productivity."

6. CONCLUSION

In this thesis I attempted to give a literature overview about why firms go public and which factors have an influence on this decision. First we used theoretical literature to find different possible motives for and against going public. As second we took a look at empirical evidence.

The most obvious and most used motive stated in the current literature is that a firm has an extra possibility to finance current and future investments after going public. We saw in the paper of Rydqvist and Högholm that firm financing is the most used motive in the prospectuses of firms that go public. We also got confirmation of firms going public to be able to finance investments in the article of Chemmanur, He and Nandy.

If a firm does decide to finance investments with equity from the stock market the leverage will drop. A lower leverage will in example allow firms to obtain better bargaining power against banks. We saw evidence of this in the article of Rydqvist and Högholm where 22% of the firms stated that they go public to reduce the debt/equity ratio. In the article of Pagano, Panetta and Zingales we got another confirmation of this theory: Independent firms deleverage right away and carve-outs only do this in the long-run.

Other motives found in the literature are that a firm has the ability to reward personnel with stocks and attract better personnel if it goes public. Results of Rydqvist and Högholm confirm these theories since almost half of the prospectuses contained the motive that a firm has the ability to use employee stock ownership once it's listed. The logic of giving employees stocks or stock options is to give employees more incentive. Rydqvist and Högholm find that 24% of the firms want to attract better personnel by going public. Pagano, Panetta and Zingales also found evidence that companies decide to go public to exploit mispricing on the stock market, firms go public when an industry is overvalued. The last motives to go public that were discussed in this thesis are the publicity factor that comes into play if a firm goes public and the ability of the owners to cash-in.

We did not only study why firms should go public but also why it shouldn't go public. We found several disadvantages: The possibility of losing control of a firm by the original owners, too much focus on short-term profit and profit sharing are examples of those disadvantages.

Rules in a country might force a firm to release private information if it wants to go public. If this information is crucial for a firm it could decide to not go public and prevent that their competitors will get the information. Chemmanur, He and Nandy find the opposite of this theory however this is probably caused by the used data (only manufacturing firms)

There are also quantitative costs, fixed costs (in example auditing fees) that are a result of the desire to go public that have to be paid by a firm in the process of going public and possibly even after it's listed. Another cost is due to adverse selection, asymmetric information between investors and the managers of a firm results in underpricing at the initial public offering. In essence this means that a firm will sell their stocks for less than they are actually worth. Chemmanur, He and Nandy show us results where we see the existence of a relationship between asymmetric information and the probability of an IPO.

As last disadvantage we found a declining incentive for the management after an IPO, which results in a lower profitability. Mikkelson, Megan Partch and Shah tested this hypothesis and rejected it. There is a drop of profitability after an IPO but this is not caused by the change in the ownership structure but by size and age.

If we look at other variables that have an influence on the decision to go public we saw that size and age of a firm are definitely an important determinant since a lot of theories state that the probability of an IPO should be bigger for older and bigger firms. We found proof of this in the articles of Pagano, Panetta and Zingales and Chemmanur, He and Nandy. Other examples of variables which have a relationship with the probability of an IPO are the capital intensity of an industry, industry's stock market liquidity, market share of a firm, concentration in an industry, total factor productivity, growth of sales and capital expenditure, for all these variables the probability of an IPO increases if the variable has relative high value.

We found several theories that explains our research question however it remains difficult to say something about why firms go public. There's very little empirical research literature for the reason that the needed data is very hard to acquire. And even if we find empirical results the question is if we can project the findings of those articles to other countries. In most empirical researches the authors use a database with firms of only 1 country. The conditions between countries for firms can differ fundamentally. The stock market could be

completely different as in the country which was used in an empirical research and alter the motives of going public. Also the conditions on the stock markets change over time. We can conclude that there's still a lot of work that has to be done to completely understand why firms go public.

REFERENCES

Bhattacharya, S., and Ritter, Jay (1983) "Innovation and Communication: Signalling with Partial Disclosure," *Review of Economic Studies,* Vol. 50, pp. 331-346.

Campbell, Tim (1979) "Optimal investment financing decisions and the value of confidenti. *Journal of Financial and Quantitative Analysis*, Vol. 14, 913-924.

Chemmanur T., P. Fulghieri (1995), "Information production, private equity financing, and the Going public decision", Working paper, Columbia University

Chemmanur, He and Nandy (2008), "the going public decision and product market"

Clementi, Gian Luca (2002) "IPOs and the growth of firms," Working paper, New York University.

Jensen, M., and Meckling, W. (1976) "Theory of the Firm: Managerial Behavior, Agency and Ownership Structure," *Journal of Financial Economics*, Vol. 3, pp. 305-360.)

Katrina Ellis, Roni Michaely, Maureen O'Hara (1999) "A Guide to the Initial Public Offering Process" Johnson Graduate School of Management

Maksimovic, Vojislav, and Pichler, Pegaret (2001) "Technological innovation and initial public offerings," *The Review of Financial studies*, Vol. 14, pp. 459-494

Mikkelson, Wayne H., Partch, M. Megan and Shah, Kshitij (1997) "Ownership and operating performance of companies that go public," *Journal of Financial Economics* Vol. 44, pp. 281-307.

Pagano, Marco, and Ailsa Röell, (1996), The choice of stock ownership structure: Agency costs, monitoring and the decision to go public, *Quarterly Journal of Economics, forthcoming*.

Pagano, Marco, Panetta, Fabio and Zingales, Luigi (1998) "Why do companies go public," *Journal of Finance* Vol. 53, pp. 27-64.

Petersen, Mitchell, (2005) "Estimating Standard Errors in Finance Panel Data Sets: Comparing Approaches," Working paper, Kellogg School of Management, Northwestern University and NBER.

Rajan, Raghuram G., and Henri Servaes, 1997, The effect of market conditions on initial public offerings, *Journal of Finance* 52, 507–529.

Ritter, Jay R. (1987) "The cost of going public" Working Paper #487, University of Michigan

Rock, Kevin, (1986), Why new issues are underpriced, *Journal of Financial Economics* 15, 187–212

Rydqvist, K. and Högholm, K. (1995) "Going public in the 1980s: Evidence from Sweden" *European Financial Management*, Vol 1, No 3, pp 287-315.