

# Going Private Transactions and Product Market Competition

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## **Abstract**

This article investigates the effect of product market competition on going-private decision. Using a sample of U.S. firms that went private from 1990 to 2015, I find that firms operating in concentrated industries are more likely to go private. The results are robust to different model specifications. In addition, characteristics of the firms that went private are significantly different from those of the firms remaining public, even at the time of IPO.

**Keywords:** product market competition, agency problem, information disclosure, going private, voluntary delisting

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## 1. Introduction

Going-private has become a prominent phenomenon in the economy since the 1980s. Figure 1 demonstrates the number of firms that went private every year from 1980 to 2015. As can be seen from the graph, many public companies went private in the 1980s. A large fraction of these transactions is completed through leveraged buyouts (LBOs), with the incentive to reduce free cash flows and associated agency problems. The few years after 2000 witnessed another surge of the going private transactions, due to the development of the private equity market. After the adoption of Sarbanes–Oxley Act of 2002, more firms decide to delist voluntarily from the exchange to avoid the increasing compliance costs. Even though the number of going private firms started to decrease since 2010, the ratio of voluntary delisted firms to initial public offers (IPOs) is still high. Given the large number of deals and the trend in the going-private market, it is important to understand the economic forces that drive firms' going private decisions.

Many previous studies have documented the positive abnormal returns associated with going-private transactions. Ranging from 18% to 40%, these transactions generate an annualized cumulative abnormal return of 25% on average. In addition, acquirers typically pay a 20% to 40% premium over the current stock price. Unlike other corporate controlled deals, going private transactions generally do not involve the combination of two previously separated entities. Therefore, shareholder gains from these transactions cannot be attributed to the synergies created through mergers or acquisitions. Investigating the driving forces for firms to go from public to private enables us to understand the source of value creation.

Despite the fact that going private transactions are associated high abnormal returns and premiums, Bharath, Dittmar and Sivadasan (2014) document that the going private firms gain no plant-level efficiency relative to their peer groups. The increase in firms' productivity documented by previous literature are mainly due to selling and closing of the inefficient plants. In addition, they find that firms' investments and employment decrease within the six years after going private. Specifically, firms that went private decrease their capital by 15.1% and employment by 3.3% compared to the firms that remain public. Understanding the determinants for going private decisions matters to investors and managers, as they could make tremendous gains from these deals. More importantly, knowing the mechanisms behind going private transactions are important to regulators and policy makers since it affects the productivity, capital investment, and unemployment of the economy.

This article investigates the forces that drive firms' going private decisions. Specifically, I focus on the effects of product market competition on going private decisions. Using a sample of firms that went private from 1990 to 2015 in the United States, I find that firms in less competitive industries are more likely to go private. The characteristics at the time of IPO of the firms that went private and those that remain public are significantly different. Even after matching firms' characteristics at the time of IPO, the effects of product market competition on firms' going private decisions still hold. In addition, the results are confirmed using tariff cut as a quasi-natural experiment.

Firms make decisions on whether to remain public based on the cost-benefit analysis. Product market competition affects firms' voluntary delisting decisions as it affects the costs and benefits of being listed, mainly through the following mechanisms.

Firstly, firms go private to reduce agency problems. Agency problems arise because of the separation between firms' ownership and control. For public firms, the dispersed ownership structure lead to overinvestment by management. Jensen (1986) shows that going private leads to efficiency gains by reducing the agency problem, as it realigns incentives of management and shareholders. In addition, it reduces the amount of free cash flows management could control as the going private transactions are often associated with a certain level of debt payment. On the other hand, Allen and Gale (2000) theoretically prove that governance mechanisms are less important for firms in changing product environments. Firms in competitive markets must operate more efficiently to survive the changing environment. In such circumstances, the standard agency framework may not apply. Competition itself acts as an external mechanism to ensure resources are utilized efficiently. Therefore, firms operating in more competitive markets are less likely to go private due to the agency concerns.

Secondly, firms may go private to avoid information disclosure to their competitors. Public firms are required to disclose information, which may be utilized by their competitors to compete against the firm. Previous studies show that proprietary costs are higher in concentrated industries. Therefore, firms operating in high competitive industries are less likely to go private if information disclosure is a major concern.

In addition, product market competition may also affect going private decisions through other channels. For example, firms tend to go private when they are undervalued by the market. Product market competition provides benchmark valuations for the company. The more companies

operating in the same industry, the easier for investors to obtain the correct valuation. In addition, investors may come across more serendipitous information in competitive industries. Therefore, their costs of information production are lower. Based on the arguments above, firms operating in more competitive industries should be less likely to go private.

To investigate the effect of product market competition on voluntary delisting, I collect data on firms that went private from 1990 to 2015. Firms that remained public until the end of 2015 are used as control group in the study. Product market competition is measured by the four firm concentration ratio provided by the Census Bureau. Raith (2003) points out that “if product markets vary principally in size or entry costs, then low levels of industry concentration are suggestive of intense industry competition”. Ideally, I would use the Herfindahl-Hirschman index provided by the Census Bureau. However, the Census HHI is only available for manufacturing industries. Therefore, I use the four firm concentration instead. The measurement of four firm concentration ratio has been used by many studies in industrial organization.

The paper relates to two different strands of literature. First, it contributes to existing literature on going-private decision by adding one additional explanatory factor: product market competition. Since the 1980s, a large number of studies investigate the determinants of voluntary delisting decisions. DeAngelo et al. (1984) and Lehn and Poulsen (1989) show that cost saving is a major determinant of delisting via LBOs. Kim and Lyn (1991) argue that smaller firms are more likely to go private. In addition, Lehn and Poulsen (1989), Kim and Lyn (1991), Weir and Wright (2006) and Thomsen and Vinten (2014) show that firms are more likely to go private if they have lower growth prospects. Furthermore, Pour and Lasfer (2013), and Thomsen and Vinten (2014) show that the going private firms tend to perform poorly compared to those that remain public. Previous studies find mixed results in the effect of default risks. Opler and Titman (1993) document that high bankruptcy costs deter firms’ going private decisions, while Bharath and Dittmar (2010) show that the going private firms pay a higher default risk premium for their corporate bonds.

Despite the large number of studies on going-private transactions, few of them study the interaction between product market competition and going-private. Focusing on industrial characteristics enables us to understand the source of efficiency gains. The results also provide implications for regulators. Also, the study may provide empirical foundations to build theoretical models for going private decisions.

On the other hand, there are many studies investigating the relationship between product market competition and IPOs. For example, Chod and Lyandres (2010) find that there are more benefits of going public in competitive industries as the idiosyncratic risks are higher in those industries. Chemmanur and He (2011) show that firms are less likely to go public out of competition concerns in highly concentrated industries. In addition, Chemmanur He and Nandy (2009) find that firms operating in more concentrated industries are more likely to go public. They also show that industry concentration increases in subsequent years as more firms go public. However, going private not necessarily reverses the consequences of an IPO. Motivations for firms to go private can be very different from those of IPOs. For example, the two activities result in very different capital structure. In addition, the primary reason for firms to go public is the need to raise capital whereas firms usually go private to reduce inefficiency. Investigating the effects of competition on going private transactions helps understand the underlying differences between the two events.

The rest of the paper is organized as follows. Section 2 discusses the theories of going-private decision and develops the hypothesis. Section 3 describes the hazard regression model. Section 4 describes the sample and variables used to test the hypothesis. Section 5 demonstrates results for the hazard model analysis. Section 6 conducts robustness tests and Section 7 concludes.

## **2. Product market competition and going-private decision**

The going private decision is a momentous decision during a firm's lifecycle. Firms determine whether to remain public or go private based on the costs and benefits of being listed. To understand the factors driven voluntary delisting decisions, both literature on going private and theories on initial public offers need to be considered. On one hand, theories of IPOs shed light on the determinants of going private decisions by examining the costs as public firms. On the other hand, going private is not merely a reverse decision of being public. after firms go public while going private transactions are usually associated with a higher level of leverage. In this section, I summarize the costs and benefits as public firms, and motivations for firms to go private. The hypothesis is developed based on these theories. The predictions are not mutually exclusive, and the empirical proxies may represent more than one mechanism at the same time. A detailed discussion of the variables is included in Section 4. The source for these data and a full description are discussed in Appendix 1.

## **2.1 Agency considerations**

Agency problems arise because of the separation between a firm's ownership and control. The problems are more severe for public firms because of the dispersed ownership structure. Managers may behave in their own interests at the expense of firm value. Firms' free cash flows may be wasted on the value destroying activities rather than distributed to shareholders. Therefore, the ownership structure for public firms may result in overinvestment and inefficient allocation of resources.

In these circumstances, it may be in the interest of shareholders to take the companies private. Going private leads to efficiency gains by reducing the agency problem and realigning management and shareholders' incentives. Previous literature (Jensen 1991, Shleifer and Vishny 1991, Lehn and Poulsen 1989 Halpern, Kieschnick and Rotenberg, 1999) argue that the large number of going private decisions and leverage buyouts in the 1980s are mainly due to the incentive to reduce agency problems. Jensen (1986) suggest that going private transactions, especially leverage buyouts, reduce agency problems by decreasing the amount of excess capital management controls. Firms' free cash flows are used to repay the high level of debt associated with the transaction.

The product market competition affects agency problems through two channels. Firstly, product market competition reduces the amount of free cash flows firms possess. According to Katic and Petersen (1994), competition reduces profitability and the availability of firms' internal funds. When there is lack of internal resources, managers have limited ability to overinvest. Shareholders have less incentives to take the firms private since the agency costs are much less. Therefore, firms are less likely to go private in competitive industries for incentive realignment.

Secondly, agency problems are more severe in firms with ineffective corporate governance, where it is easier for managers to extract private benefits at the expense of firm value. Allen and Gale (2000) prove that governance mechanisms are less important for firms operating in changing environments in the product market. Firms operating in more competitive markets must operate more efficiently to survive. In such circumstances, the standard agency framework may not apply. Competition itself acts as an external mechanism to ensure resources are utilized efficiently. Chou et al. (2011) empirically prove their argument, showing that firms in competitive markets tend to

have weaker corporate governance. Therefore, there should be less agency problems in competitive industries, as managers are pushed to make efficient decisions.

Based on the above analysis, firms operating in more competitive markets are less likely to go private due to agency concerns. Free cash flows and institutional ownership will be used as proxies for agency problems.

## **2.2 Information disclosure**

Bhattacharya and Ritter (1983) and Maksimovic and Pichler (2001) argue that firms make decisions on whether to enter the public market based on the cost-benefit analysis. On one hand, firms are able to raise cheaper capital in the public market. On the other hand, firms need to bear the costs of information disclosure as public firms. The confidential information may be utilized by their competitors to compete more effectively against the public firm. As a flip side of this cost benefit analysis, firms may go private to avoid information disclosure. By doing so, they are able to keep their innovations and development strategies from their competitors.

Previous studies have shown that the value of confidential information is greater in more concentrated industries. Verrecchia (1983) argue that capital market investors provide more discretion for firms with high proprietary costs. High proprietary costs indicate that there is more potential for a firm's competitors to take advantage of the disclosed information to compete against the disclosing firm. Ali Klasa and Yeung (2014) find that firms in more concentrated industries disclose less, mainly due to proprietary costs of disclosure. In addition, Burks et. al (2016) show that the level of voluntary disclosure in the banking industry increases when there is an increase in competition due to the Interstate Banking and Branching Efficiency Act (IBBEA). Therefore, if information disclosure is the major concern, firms should be more likely to go private in concentrated industries. In addition, firms operating in industries where confidential information is highly valued (e.g. high tech industries or pharmaceutical industries) are more likely to become private.

In addition to avoid information disclosure to their competitors, firms operating in high concentrated industries may not want to disclose information on their operations to customers. These firms usually demonstrate higher price cost margins. As a public firm, they are required to disclose accounting information annually, which may prevent them from continuing to enjoy the high surplus extracted from consumers.

Based on the above arguments, I develop the hypothesis that firms operating in more competitive industries are less likely to go private. Firms choose to go private to alleviate agency problems and to avoid information disclosure to their competitors. In concentrated industries, there tend to be more agency problems. The value of confidential information is also higher. Therefore, firms are more likely to go private in less competitive industries.

### **2.3 Other considerations**

In addition to the above arguments, firms may decide to go private due to other considerations. For example, firms tend to go private when they are undervalued by investors. Empirically, Maupin et al. (1984), Opler and Titman (1993) and Halpern et. al (1999) show that delisted firms are undervalued in the United States. The peer firms within an industry provide a benchmark for the valuation of a company. Otchere and Ross (2002) find that share buyback announcements provide positive information on the value of both announcers and their rivals. They show that announcers receive cumulative abnormal returns of 1.25% on the announcement day, and their competitors experience significant abnormal returns of 0.39% on the next day. Therefore, the more competitive a market is, the more information investors could obtain from their competitors. In such circumstances, firms are less likely to go private because of the undervaluation problem.

In addition, investors are more likely come across serendipitous information when there are more public firms in the industry, or when the stocks are more liquid. Subrahmanyam and Titman (1999) discuss the trade-off between costs of duplicated information production and the benefits of serendipitous information. Even though serendipitous information could be noisy, it provides useful knowledge when information aggregates across investors.

Also, firms may go private to avoid the listing costs if they no longer need to raise capital in the public market. Firms operating in high concentrated industries have higher price cost margins. These firms usually own a larger amount of internal funds. On the other hand, firms may decide to remain in the public market if they have a larger need for capital. However, the inverted U relationship between product market competition and innovation provides an unclear relationship between competition and capital expenditure. In addition, firms that go private may have access to other financing alternatives. Thus, the prediction on the relationship between product market competition and going private decisions are ambiguous based on firms' need for capital. I use a dividend dummy which equals to 1 if a firm pays dividend at a given year to proxy



for the needs for capital. If a firm pays dividend, it is likely that they have excess equity at hand, indicating that they do not have a strong need for external capital.

In addition, firms may decide to go private if they would like to focus on the long run development. Black and Fraser (2002) show that US investors consistently underestimate the value of firms' long run cash flows. Therefore, firms may go private to avoid the pressure from the short-term oriented investors in the market. Previous literature shows that there is an inverted U relationship between product market competition and innovation. Therefore, the effect of product market competition on going private decisions due to short termism in the public market is also ambiguous.

### **3. Methodology**

A hazard model is used to examine the effects of product market competition on going private transactions. The hazard model investigates whether a firm will eventually go private, when will the transaction take place, and the factors that accelerate the going private decisions. To be more specific, the hazard model estimates the average duration for the going private event to happen. It also estimates how various variables affect this duration, conditional on the fact that a firm has not gone private and may do so at some later periods. The decision to go private should be examined in the context of the entire life cycle of a firm, and the survival analysis enables us to do so. For firms' going private decisions, not only the differences across firms, but also how the characteristics evolve over time within a firm matter. In the hazard analysis, we are interested in the conditional probability for a firm to go private, given that it has not done so before.

Following Mehran and Peristiani (2010) and Bharath and Dittmar (2010), I apply the Cox proportional hazard model:

$$h(t, X(t)) = h_0(t) \exp(\beta' X(t))$$

$h(t, X(t))$  represents the hazard rate to go private at time  $t$  for a firm with covariates  $X(t)$ . The vector  $X(t)$  represents all the explanatory variables included in the regression. It consists both firm level characteristics and industry level characteristic of the four firm concentration ratio. Year fixed effects are included in the model, and standard errors are clustered by 6-digit NAICS industries to correct autocorrelations. The explanatory variables may vary over time, and model

captures both the differences in variables among firms as well as the changes in variables within a firm over time. All variables are lagged by 1 period to reduce the endogeneity problem.  $h_0(t)$  is the baseline hazard model. Under the Cox proportional hazard model, its form does not need to be specified. The hazard ratio  $\exp(\beta)$  implies to what extent the probability to go private increase for a unit change in the explanatory variable. If the estimated coefficient on an independent variable is positive, it indicates that a higher  $x$  leads to a higher probability to go private and therefore a shorter expected duration as a public firm.

The Cox proportional hazard model has several advantages. Firstly, the model is able to handle censored data. When comparing the going private sample with the firms that remain public, we have to take into consideration that survival firms may go private at some later date after the sampling period. Therefore, we need a model to deal with the right censored data. Secondly, the Cox proportional hazard model does not impose any restriction on the baseline hazard function. While there exist some parametric hazard models which are simpler than the Cox model, the restrictions these models impose may distort the estimation results. Since the Cox proportional hazard model does not require any particular form on the baseline hazard, it results a better representation of the estimated hazard rate. Therefore, the Cox proportional hazard model is quite optimal under the current framework. It is commonly employed in the bankruptcy literature. To apply it to the going private context, the model is transferred for a positive outcome.

#### **4. Data and sample collection**

In this section, I describe the sample and variables used to test the hypothesis. A full description of how each variable is computed and the source of the variables are discussed in Appendix 1.

##### **4.1 Going private sample**

To investigate the determinants of voluntary delisting, I collect sample of firms that went private after 1990 in the United States. There seems no commonly agreed definition on the term “going private”. Some studies (Bharath and Dittmar 2010, Engel et. al 2007) rely on the legal definition provided by the SEC. Some (Mehran and Peristiani 2010) focus on the LBO and non-LBO targets provided by SDC M&A database. In this paper, the going private sample is determined based on the delisting code provided by CRSP. Delisting can take place as a consequence of mergers or takeovers. It may also occur as involuntary delisting when firms perform poorly or violate

exchange requirements. Based on delisting codes, firms are divided into 4 subgroups: firms that remain active at the end of the sample period, firms that delisted due to mergers, firms that went private on company request and firms that involuntarily delisted by exchange. Firms that went private on company request (with delisting code 570, 573 and 520) are the main research interest of the paper, and firms that remain public until the end of the sample period (with delisting code 100) are used as control firms.

There are 444 firms that went private from 1990 to 2015 in our sample. Firms that are cross listed and firms from financial and utility industries are excluded. For the control group, there are 3420 firms that remain public until the end of 2015, In total, there are 40799 firm-year observations. Table 1 represents the industries in which the going private firms operate, based on the 2-digit North American Industry Classification System (NAICS). Industries that experienced the largest number of going private transactions are manufacturing and information and cultural industries.

**Table 1 Industry distribution of the going private firms**

NAICS	Description	Number of going private firms
31-33	Manufacturing	199
41-42	Wholesale trade	25
44-45	Retail trade	20
48-49	Transportation and warehousing	14
51	Information and cultural industries	98
53	Real estate and rental and leasing	35
54	Professional, scientific and technical services	26
56	Administrative and support, waste management and remediation services	17
62	Health care and social assistance	4
71	Arts, entertainment and recreation	1
72	Accommodation and food services	4
81	Other services (except public administration)	2
	Total	444

## 4.2 Measurement for product market competition

The main variable I use to measure product market competition is the four firm concentration ratio provided by the Census Bureau. The four firm concentration ratio is calculated based on the market shares of the largest four firms in the industry. When the four firm concentration ratio is higher, there is less competition in the product market. A four-firm concentration ratio over 90 usually indicates oligopoly, showing that the four largest firms in the industry have significant market control.

The four firm concentration ratio provided by the Census Bureau is available every five years in 1992, 1997, 2002 and 2007. The industries are classified based on Standard Industry Classification (SIC) in 1992 and NAICS in 1997, 2002 and 2007. In order to cluster for the correct standard error, only one industry classification should be used. Therefore, the four firm concentration ratio for years from 1990 to 1996 are back filled by the data in 1997. The concentration ratios in 1997, 2002, 2007 are assumed to be valid for five years, from the year when they become available to one year before the next concentration ratio is available. By carrying on the concentration ratio to later periods, the measure also helps control the endogeneity problem. In addition, since data in 2012 are not available yet, the four firm concentration ratio at 2007 will be carried on until the end of the sample period.

Ideally, I would like to use the Herfindahl-Hirschman index provided by the Census Bureau to measure product market competition, as it is a more comprehensive measure which takes into consideration most firms within a industry. However, the Census HHI is only available for manufacturing industries, which represents only one third of the entire going private sample. Restricting to manufacturing industries would make the results less relevant. Therefore, the four firm concentration ratios provided by the Census Bureau are used as substitutes. The four firm concentration ratio has been commonly applied in industrial organization literature to measure product market competition in non-manufacturing industries.

### **4.3 Control variables**

Based on previous literature, I control for several factors that may have an effect on firms' going private decisions. Kim and Lyn (1991) argue that smaller firms are more likely to go private since they are less efficient at amortizing fixed costs. The size hypothesis has been proved by many studies later on (Kieschnick 1998, Engel et al. 2007, Becker and Pollet 2008, Weir et al. 2008, Bartlett 2009). In addition, Lehn and Poulsen (1989), Kim and Lyn (1991), Weir and Wright (2006) and Thomsen and Vinten (2014) show that firms are more likely to go private if they have lower growth prospects. These firms usually have large internally generated funds with limited investment opportunities, generating larger free cash flows and more severe agency problems. Therefore, they tend to go private to reduce agency problems. Furthermore, firms that went private tend to have poor performance compared to those that remain public (Pour and Lasfer (2013), and

Thomsen and Vinten (2014). In this article, market capitalization, market to book ratio and return on assets (ROA) are used as proxies for size, growth rate and performance respectively.

Another factor that drives firms' going private decisions is the default risks. Previous studies show mixed findings on the effects of default risks on going private transactions. On one hand, Opler and Titman (1993) find that high bankruptcy costs deter firms' going private decisions. Similarly, Mehran and Peristiani (2010) document that "firms with lower risks of financial distress are more likely to go private." On the other hand, some others find that costs of financial distress have a positive impact on the probability of going. For example, Bharath and Dittmar (2010) find that firms that went private pay a higher default risk premium for their corporate bonds. The leverage ratio and the level of intangible assets are used as proxies for bankruptcy risks and the cost of bankruptcy.

One of the largest advantages of being public is to obtain capital in the public market at lower costs. When firms are unable to obtain financial visibility in the public market, their benefits of remaining listed become limited. Using changes in institutional ownership and growth in the number of analysts as proxies, Mehran and Peristiani (2010) show that firms are more likely to go private when they experience a decrease in analyst coverage. The role of financial visibility on firms' going private decisions have also been confirmed by Bharath and Dittmar (2010) and Martines and Serve (2011). Stock liquidity is another benefit for listed firms, which affects firms' going private decisions. Using turnover as a proxy for liquidity, Bharat and Dittmar (2010), and Mehran and Peristiani (2010) find that firms are less likely to go private when stock turnover is high. The percentage of institutional ownership is used as a proxy for financial visibility, and monthly average trading volume for each firm is used as a proxy for liquidity. In addition, the close monitor of those institutional investors and analysts also decrease the potential conflicts of interests between shareholders and managers of the firm. Chung and Jo (1996) show that there is a positive relationship between a firm's value and its analyst coverage.

A detailed description of the variables and how the variables are calculated are included in Appendix A.

#### **4.4 Summary statistics**

Table 2 provides summary statistics for firms' characteristics and the four firm concentration ratio of the entire sample, including both the going private firms and the control group. As mentioned

above, there are 40799 firm-year observations in the sample. The average of the four firm concentration ratio is 36.45%, ranging from 1.4% to 99.3%. The standard deviation of the four firm concentration ratio is 17.08, indicating that the four firm concentration ratio is widely spread over the sample. The average of the log value of market capitalization is 6.69, with a standard deviation of 1.96. The market to book ratio varies significantly across the sample, ranging from 0.3 to 26.94, with an average of 2.46. The mean return on assets of the sample is 0.03, with a standard deviation of 0.11. Firms tend to have low leverage in the sample, with a mean of 0.15 and a median of 0.1. The average of intangible assets over total assets is 0.16 and the mean of free cash flows normalized by total assets is 0.06. Among the 40799 firm-year observations, firms pay out

**Table 2 Summary Statistics of the sample**

	N	Mean	Median	SD	Min	Max
<b>Product market characteristic</b>						
Four Firm Conc. Ratio	40799	36.45	33.1	17.08	1.4	99.3
<b>Firm characteristics</b>						
Log (Market Capitalization)	40799	6.69	6.66	1.96	1.80	11.64
Market to Book	40799	2.46	1.79	2.32	0.30	26.94
ROA	40799	0.03	0.04	0.11	-4.81	0.70
Leverage	40799	0.15	0.10	0.15	0	0.68
Intangible Assets	40799	0.16	0.08	0.18	0	0.91
Free Cash Flows	40799	0.06	0.06	0.08	-0.44	0.26
Dividend Dummy	40799	0.55	1	0.50	0	1
Inst. Ownership	40799	0.52	0.55	0.30	0	1
Excess Return	40799	-0.07	-0.06	0.34	-1.19	0.98
Volatility	40799	0.42	0.38	0.20	0.14	1.29
Log Volume	40799	3.57	3.65	1.35	-1.52	6.68

This table presents summary statistics of the entire sample, indicating the total number of observations, the sample mean, median, standard deviation, the minimum and the maximum. Four Firm Conc. Ratio is the sum of market share of the largest four companies in the 6-digit NAICS industry provided by the U.S. Census Bureau. Log(Market Capitalization) = Log value of market capitalization (\$millions). Market to Book = Market capitalization/(total assets – total liabilities). ROA = Net income/total assets. Leverage = Long term debt/Total assets. Intangible Assets = Intangible assets/total assets. Free Cash Flow = (Operating income before depreciation – Income taxes- Interest and related expense – Dividends)/ Total Assets. Dividend is a dummy that equals 1 if a firm pays dividend that year. Inst. Ownership = institutional ownership (percent). Volatility = annualized volatility using daily price. Excess Return = Annualized excess return over the index. Log(Volume) = Log value of the monthly average trading volume normalized by market capitalization. All variables are winsorized at the 1<sup>st</sup> and 99<sup>th</sup> percentile.

dividends almost half of the time. On average, 52% of the stocks of the sample firms are owned by institutional investors. On average, firms in the sample generate lower stock returns than the index, even though some of them perform extremely well in the stock market. The average annualized volatility of the stocks is 0.42. The mean of the log value of monthly average trading

volume normalized by market capitalization is 3.57. All variables are winsorized at the 1<sup>st</sup> and 99<sup>th</sup> percentile.

Table 3 provides results of the t-tests of the firms that going private and the firms that remaining public until the end of the sample period. Panel A includes all firm-year observations for the firms that went private while panel B includes all firm-year observations of the control group. The statistically significant t-statistics suggests that firms that went private have very different characteristics as the firms that remains public. Specifically, firms that go private are smaller in size with lower growth opportunities. They perform poorer than the control firms. In addition, the going private firms have lower leverage ratios and much lower levels of intangible assets, indicating that these firms have lower default risks and cheaper costs of bankruptcy. The result is consistent with the risk sharing hypothesis proposed by Chod and Lyandres (2010). They

**Table 3 Comparison of firm characteristics – going private sample vs. remaining public sample**

Measure	Firms going private (A)	Firms remaining public (B)	Difference (B-A)
<b>Product market characteristics</b>			
Four Firm Conc. Ratio	36.49	35.64	-0.85
<b>Firm characteristics</b>			
Log (Market Capitalization)	5.30	6.76	1.46***
Market to Book	2.03	2.48	0.45***
ROA	0.01	0.03	0.02***
Leverage	0.13	0.14	0.01***
Intangible Assets	0.11	0.16	0.05***
Free Cash Flows	0.04	0.06	0.02***
Dividend Dummy	0.41	0.56	0.13***
Inst. Ownership	0.18	0.53	0.35***
Excess Return	-0.19	-0.06	0.17***
Volatility	0.52	0.42	-0.10***
Log Volume	2.78	3.61	0.82***
Firm-year observations	2646	38153	

This table presents results of the t-tests for firm characteristics of the going-private sample (column A) and the peer firms that remain public (column B) during the period 1990-2015. For each column, it reports the mean value of the variable, and contains all firm-year observations for that group. \*\*\*, \*\*, and \* indicate significance at the 1%, 5%, and 10% levels, respectively. Four Firm Conc. Ratio is the sum of market share of the largest four companies in the 6-digit NAICS industry provided by the U.S. Census Bureau. Log(Market Capitalization) = Log value of market capitalization (\$millions). Market to Book = Market capitalization/(total assets – total liabilities). ROA = Net income/total assets. Leverage = Long term debt/Total assets. Intangible Assets = Intangible assets/total assets. Free Cash Flow = (Operating income before depreciation – Income taxes- Interest and related expense – Dividends)/ Total Assets. Dividend is a dummy that equals 1 if a firm pays dividend that year. Inst. Ownership = institutional ownership (percent). Volatility = annualized volatility using daily price. Excess Return = Annualized excess return over the index. Log(Volume) = Log value of the average monthly trading volume normalized by market capitalization.

argue that one benefit of going public is to share the idiosyncratic risks among shareholders. Unexpectedly, firms that remain public demonstrates a higher level of free cash flows, which is inconsistent with the free cash flow and agency hypothesis. Firms' dividend payout policy differs significantly between the two groups. In particular, firms that went private are 13% less likely to pay out dividends, indicating that they are more financially constrained. Firms that remaining public have significant higher level of institutional ownership. Mehran and Peristiani (2009) show that firms are more likely to go private if they fail to attract investor interests in the public market. The difference in institutional ownership is consistent with their findings. The stocks of firms that eventually went private are more volatile. They also demonstrate lower levels of excess returns. In addition, their stocks are less liquid, in terms of the average trading volume.

The concentration ratio of the firms that went private is slightly higher than that of the firms that remain public. However, the difference is not statistically significant. One possible explanation may be that it captures the effects of some other variables. For example, larger firms with higher growth opportunities tend to operate in more concentrated industries, offsetting the direct effect of product market competition on going private decisions.

Table 4 compares the characteristics of the two groups at the year of IPO. Bharath and Dittmar (2006) argue that some inherent differences in firms' characteristics at the time of IPO may actually reveal firms' going private decisions. Indeed, it may be the case that some of the going private firms should not have gone public at the first place. Similar as Table 3, the going private firms are smaller in size. However, their growth opportunities at the time of IPO are not significantly different from each other. Similar as Table 3, firms that remain public tend to perform better, with lower leverage and more intangible assets. However, the differences are less significant. The stocks of the firms that eventually went private are more volatile, yet with lower excess returns. The institutional ownership of the going private firms is much less than that of the control group, even at the time of IPO. Such differences at IPO indicate that the firms that eventually went private started to perform poorly in the stock market, as soon as they enter the market. Similar as before, the concentration ratios of the two groups are still statistically insignificant.



**Table 4 Comparison of firm characteristics – going private sample vs. remaining public sample at IPO year**

Measure	Firms going private (A)	Firms remaining public (B)	Difference (B-A)
<b>Product market characteristic</b>			
Four Firm Conc. Ratio	36.35	35.61	-0.75
<b>Firm characteristics</b>			
Log (Market Capitalization)	5.11	6.21	1.10***
Market to Book	2.59	2.83	0.24
ROA	0.002	0.016	0.014*
Leverage	0.12	0.14	0.02*
Intangible Assets	0.10	0.14	0.03**
Free Cash Flows	0.03	0.0	0.01
Dividend Dummy	0.37	0.41	0.06*
Inst. Ownership	0.13	0.41	0.28***
Excess Return	-0.1	-0.08	0.12***
Volatility	0.58	0.49	-0.09***
Log Volume	3.01	3.71	0.70***
Number of firms	444	3420	

This table presents results of the t-tests for firm characteristics at the IPO year for the going-private sample (column A) and the peer firms that remain public (column B). The values in column(A) and (B) are the means of the variables for firms within the group. \*\*\*, \*\*, and \* indicate significance at the 1%, 5%, and 10% levels, respectively. Four Firm Conc. Ratio is the sum of market share of the largest four companies in the 6-digit NAICS industry provided by the U.S. Census Bureau. Log(Market Capitalization) = Log value of market capitalization (\$millions). Market to Book = Log value of market capitalization/(total assets – total liabilities). ROA = Net income/total assets. Leverage = Long term debt/Total assets. Intangible Assets = Intangible assets/total assets. Free Cash Flow = (Operating income before depreciation – Income taxes- Interest and related expense – Dividends)/ Total Assets. Dividend is a dummy that equals 1 if a firm pays dividend that year. Inst. Ownership = institutional ownership (percent). Volatility = annualized volatility using daily price. Excess Return = Annualized excess return over the index. Log(Volume) = Log value of the average monthly volume normalized by market capitalization.

## 5. Hazard model analysis

The results of the hazard model estimation are presented in Table 5. All specifications include the year fixed effects, and the standard errors are clustered by 6-digit NAICS. A positive coefficient on a variable indicates that the hazard rate is increasing in that variable. Therefore, the expected time to go private decreases with a positive estimate coefficient. Column 1 show the effects of product market competition on the going private decisions, without controlling any other variables (except the year fixed effects). The positive coefficient indicates that firms have a higher hazard rate of going private if they operate in a concentrated industry, consistent with the hypothesis discussed in Section 2.

**Table 5 Cox proportional hazard models for time to go private**

	(1)	(2)	(3)
Four Firm Conc. Ratio	0.008** (0.004)		0.015*** (0.005)
Log (Market Capitalization)		-0.175*** (0.064)	-0.214*** (0.069)
Market to Book		0.008 (0.045)	0.010 (0.044)
ROA		-2.458** (1.205)	-2.388** (1.208)
Leverage		-0.477 (0.710)	-0.582 (0.695)
Intangible Assets		-0.160 (0.490)	-0.247 (0.468)
Free Cash Flows		1.543 (1.488)	1.337 (1.449)
Dividend Dummy		-0.635 (0.406)	-0.636 (0.388)
Inst. Ownership		-3.830*** (0.552)	-3.731*** (0.555)
Excess Return		-0.598** (0.250)	-0.531** (0.245)
Volatility		0.427 (0.632)	0.279 (0.631)
Log Volume		-0.380*** (0.081)	-0.389*** (0.080)
Firms going private	444	444	444
Control firms	3420	3420	3420
Firm-Year observations	40799	40799	40799

This table compares going-private firms with the control sample of surviving firms over the period of 1990-2015. The table reports the results of Cox proportional hazard models with time-varying covariates based on all variables. The dependent variable is time to private. All specifications include year fixed effects and the standard errors are clustered at 6 digit NAICS industries. The table reports the coefficients and, the standard errors are in parentheses. \*\*\*, \*\*, and \* indicate significance at the 1%, 5%, and 10% levels, respectively. Four Firm Conc. Ratio is the sum of market share of the largest four companies in the 6-digit NAICS industry provided by the U.S. Census Bureau. Log(Market Capitalization) = Log value of market capitalization (\$millions). Market to Book = Market capitalization/(total assets – total liabilities). ROA = Net income/total assets. Leverage = Long term debt/Total assets. Intangible Assets = Intangible assets/total assets. Free Cash Flow = (Operating income before depreciation – Income taxes- Interest and related expense – Dividends)/ Total Assets. Dividend is a dummy that equals 1 if a firm pays dividend that year. Inst. Ownership = institutional ownership (percent). Volatility = annualized volatility using daily price. Excess Return = Annualized excess return over the index. Log(Volume) = Log value of the average monthly trading volume normalized by market capitalization.

Column 2 investigates the effects of firm specific characteristics on the hazard rate to go private. Consistent with previous studies, firms have a higher hazard rate of going private if they are smaller in size. In addition, firms that perform poorly are more likely to go private. The effect

of market to book ratio is insignificant for the going private decisions. Firms with shares that are more volatile and demonstrate lower excess returns are more likely to go private. The negative coefficient on excess return may be due to the undervaluation hypothesis. Firms with lower excess returns are likely to be undervalued. Managers take advantage of this fact and take the firm private to extract value from shareholders. In addition, firms with lower level of institutional ownership are more likely to go private, consist with the financial visibility hypothesis proposed by Mehran and Peristiani (2009). Firms are more likely to go private if they fail to attract interests from investors. Firms with less trading volume are also likely to go private.

Unexpectedly, free cash flows do not demonstrate a significant estimate on the hazard probability of going private. In Bharath and Dittmar (2010)'s analysis of the determinants of going private transactions, they show that the effects of free cash flow on going private decisions are different pre and post 1990s. In the 1980s, firms with higher free cash flows have a greater hazard rate of going private. However, the effect becomes insignificant for the period after 1990, indicating that agency hypothesis become less important during this period. They explain that the change is mainly due to "the increasing importance of operational restructuring relative to governance restructuring in private equity". A firm's dividend payout policy, measured by the dividend dummy, do not affect the hazard probability of going private significantly. The results indicate that whether a firm is financially constraint is not a main determinant of going private decisions. For these firms, it is likely that they have some other sources of financing.

Column 3 studies the effect of product market competition on the hazard rate of going private controlling for firm characteristics. The results again indicate that firms operating in high concentrated industries have a greater hazard rate of going private, consistent with the hypothesis. After control for other variables, the effect of product market competition on the hazard rate of going private becomes stronger. Larger firms with higher levels of ROA are more likely to operate in concentrated industries. Therefore, the positive effect of concentration on the likelihood to go private is to some extent offset by the effect of size on the probability to go private. After controlling for other variables, the expected time for firms operating in concentrated industries to go private becomes even shorter.

## 6. Robustness test

As discussed in section 4, firms in the two groups are significantly different from each other. Thus, there may be some unobserved characteristics affecting product market competition and firms' decision to go private at the same time, resulting biased estimates. In addition, the positive causality relationship between concentration and the hazard rate to go private may be reverse: product market competition decreases after firms go private. 2 methods are employed below to solve the endogeneity problem.

### 6.1 Matching

**Table 6 Comparison of firm characteristics – going private sample vs. remaining public sample at IPO year** – matched on Market Capitalization, Market to Book, ROA, Leverage, Intangible Assets, Free Cash Flows, Dividend, Inst. Ownership, Excess Return, Volatility and Volume at the time of IPO

Measure	Private firms (A)	Comparison sample (B)	Difference (B-A)
<b>Product market characteristics</b>			
Four Firm Conc. Ratio	35.13	34.56	-0.57
<b>Firm characteristics</b>			
Log (Market Capitalization)	5.25	5.41	0.16
Market to Book	2.84	2.62	-0.22
ROA	0.004	0.006	0.002
Leverage	0.120	0.116	-0.003
Intangible Assets	0.12	0.13	0.01
Free Cash Flows	0.04	0.03	-0.01
Dividend Dummy	0.35	0.38	0.03
Inst. Ownership	0.15	0.19	0.04**
Excess Return	-0.14	-0.11	0.03
Volatility	0.57	0.54	-0.03
Log Volume	3.23	3.37	0.14
Firm-year observations	2271	18549	

This table presents results of the t-tests for firm characteristics at the IPO year for the going-private sample (column A) and the peer firms that remain public (column B) after matching. Firms are matched on market capitalization, market to book, ROA, leverage, intangible assets, free cash flows, dividend, institutional ownership, excess return, volatility and trading volume at the time of IPO. The values in column(A) and (B) are the means of the variables for firms within the group. \*\*\*, \*\*, and \* indicate significance at the 1%, 5%, and 10% levels, respectively. Four Firm Conc. Ratio is the sum of market share of the largest four companies in the 6-digit NAICS industry provided by the U.S. Census Bureau. Log(Market Capitalization) = Log value of market capitalization (\$millions). Market to Book = Log value of market capitalization/(total assets – total liabilities). ROA = Net income/total assets. Leverage = Long term debt/Total assets. Intangible Assets = Intangible assets/total assets. Free Cash Flow = (Operating income before depreciation – Income taxes- Interest and related expense – Dividends)/ Total Assets. Dividend is a dummy that equals 1 if a firm pays dividend that year. Inst. Ownership = institutional ownership (percent). Volatility = annualized volatility using daily price. Excess Return = Annualized excess return over the index. Log(Volume) = Log value of the average monthly trading volume normalized by market capitalization.

According to Table 4, the going private firms and firms that remain public are significantly different from each other. To solve the potential omitted variable bias, firms are matched by propensity score at the time of IPO. Given the key variable is at industry level, firms are matched on the broader 2-digit NAICS level. The covariates include market capitalization, market to book ratio, ROA, leverage, intangible assets, free cash flows, dividend, institutional ownership, excess returns, volatility and trading volume. Firms in the going private sample are matched with the five nearest neighbor or the total available number of matches, whichever is larger, with no replacement. Table 6 presents the results of the t-tests for firms' characteristics at the IPO year after matching. As can be seen from Table 6, firms that remaining public are still larger in size, with better performance and higher dividends. However, none of the differences are statistically significant any more except for institutional ownership. The gap for institutional ownership between the two group also becomes much smaller compared to Table 4.

Table 7 reports the results of Cox proportional hazard models after matching. Similar as before, concentration level has a positive effect on the hazard rate of going private. However, the effect of product market competition becomes smaller after matching. Not surprisingly, the effects of market capitalization and institutional become weaker after matching on initial conditions. Surprisingly, market to book ratio demonstrates a negative effect the firms' probability to go private after matching. The negative coefficient on market to book ratio indicates that firms with lower growth opportunities are more likely to go private, which is consistent with the agency hypothesis. There may not be enough investment opportunities for firms with lower growth prospects. Therefore, the agency problem becomes more severe if managers do not allocate resources efficiently. The market to book ratio may also represent a firm' relative valuation to its fundamentals. A lower market to book ratio indicates the firm is undervalued by investors. In such circumstances, managers will be more likely to take the firm private.

## **6.2 A quasi-natural experiment: tariff reduction in 1990 -2005**

To further address the endogeneity problem, I exploit a quasi-natural experiment to examine the relationship between product market competition and voluntary delisting decisions. Specifically, I investigate the changes in firms' going private decisions in response to unexpected import tariff reductions in the industry. When there is a sudden decrease in tariff, firms face more competition abroad. Therefore, they may adjust their going private decisions according.

**Table 7 Cox proportional hazard models for time to go private** – – matched on Market Capitalization, Market to Book, ROA, Leverage, Intangible Assets, Free Cash Flows, Dividend, Inst. Ownership, Excess Return, Volatility and Volume at the time of IPO

	(1)	(2)	(3)
Four Firm Conc. Ratio	0.008** (0.003)		0.009** (0.004)
Log (Market Capitalization)		-0.114*	-0.126**
Market to Book		(0.063) -0.010***	(0.064) -0.010***
ROA		(0.004) -0.763	(0.004) -0.780
Leverage		(0.478) 1.064**	(0.474) 1.053**
Intangible Assets		(0.524) -0.427	(0.524) -0.432
Free Cash Flows		(0.464) 0.976	(0.461) 0.959
Dividend Dummy		(0.708) -0.369	(0.692) -0.383
Inst. Ownership		(0.355) -1.894***	(0.353) -1.844***
Excess Return		(0.477) -0.703***	(0.481) -0.695**
Volatility		(0.270) 0.343	(0.270) 0.323
Log Volume		(0.454) -0.151*	(0.453) -0.157**
		(0.078)	(0.078)
Firms going private	308	308	308
Control firms	829	829	829
Firm-Year observations	11603	11603	11603

This table compares going-private firms with the control sample of surviving firms after matching over the period of 1990-2015. The table reports the results of Cox proportional hazard models with time-varying covariates based on all variables. The dependent variable is time to private. All specifications include year fixed effects and the standard errors are clustered at 6 digit NAICS industries. The table reports the coefficients and, the standard errors are in parentheses. \*\*\*, \*\*, and \* indicate significance at the 1%, 5%, and 10% levels, respectively. Four Firm Conc. Ratio is the sum of market share of the largest four companies in the 6-digit NAICS industry provided by the U.S. Census Bureau. Log(Market Capitalization) = Log value of market capitalization (\$millions). Market to Book = Log value of market capitalization/(total assets – total liabilities). ROA = Net income/total assets. Leverage = Long term debt/Total assets. Intangible Assets = Intangible assets/total assets. Free Cash Flow = (Operating income before depreciation – Income taxes- Interest and related expense – Dividends)/ Total Assets. Dividend is a dummy that equals 1 if a firm pays dividend that year. Inst. Ownership = institutional ownership (percent). Volatility = annualized volatility using daily price. Excess Return = Annualized excess return over the index. Log(Volume) = Log value of the monthly average trading volume normalized by market capitalization.

I obtain the data on tariff from Fresard (2010). The tariff data are compiled by Feenstra (1996), Feenstra, Romalis, and Schott (2002) and Schott (2010) from the U.S. International Trade Commission’s databases. Tariff data are based on 4-digit SIC and are available for manufacturing industries only. For each industry-year, the ad valorem tariff rate is computed as the duties

collected by U.S. Customs divided by Free-on-Board value of imports. Tariff reductions are calculated by the differences in tariff data between the two years. A tariff cut for a given year is identified if the negative change in tariff is more than three times larger than the median change in that industry.  $TariffCut\_Before(-2)$  and  $TariffCut\_Before(-1)$  are dummies that equal 1 if the industry experienced a tariff cut 2 (or 1) years after the observation year. Similarly,  $TariffCut\_After(1)$  ( $TariffCut\_After(2)$ ) equals 1 if the industry experienced a tariff cut 1 (or 2) years prior to the observation year. To make sure tariff cuts truly reflect changes in product market competition, tariff cuts that are followed by equivalent large increases in tariffs over the next two years are excluded from the sample.

Table 8 reports the results of Cox proportional hazard models using the quasi-natural experiment with tariff cut in 1990-2005. The estimated coefficients of firm characteristics on the hazard rate of going private are similar as before. Firms that are larger in size, and that have higher level of institutional ownerships are less likely to go private. In addition, firms with stocks that perform poorer, more volatile and less liquid are more likely to go private. Surprisingly, firms that have higher return on assets are more likely to go private in the sample. Also, firms with higher intangible assets are less likely to go private, which may be consistent with the risk sharing argument for public firms.

The results in table 8 indicate that tariff reduction demonstrates a negative effect on the hazard ratio of going private. When there is a tariff cut, imports increase and the product market competition intensifies. The estimated coefficients on the dummies which indicate that tariff cuts are in later years are insignificant. The results confirm the fact that the decrease in the probability to go private is due to the alleviation of competition, rather than some unobserved reasons. The positive coefficients on  $TariffCut\_After(1)$  and  $TariffCut\_After(2)$  indicate that tariff cuts continue to affect firms' decision to go private 2 years after the reduction. However, the effects become smaller as time goes by, as the estimated coefficients are decreasing from the year of tariff cut.

## **7. Conclusion**

The paper investigates the determinants of going private decisions using a sample of firms that went private between 1990 to 2015 in the United States. The results show that firms are more likely to go private in highly concentrated industries. The results are robust to specifications after matching the two groups on initial conditions at the time of IPO. The results are also robust using

Table 8 Cox proportional hazard models for time to go private – Quasi-natural experiment with tariff cut

	(1)	(2)	(3)	(4)	(5)
TariffCut_Before(-2)			-0.053 (0.554)	0.518 (0.483)	-0.053 (0.554)
TariffCut_Before(-1)			0.592 (0.650)	0.934 (0.628)	0.592 (0.650)
TariffCut	-0.946** (0.369)		-1.176** (0.465)	-1.289** (0.533)	-1.621*** (0.615)
TariffCut_After(1)			-1.014** (0.441)	-1.094*** (0.421)	-1.014** (0.441)
TariffCut_After(2)			-0.943*** (0.356)	-1.085*** (0.361)	-0.943*** (0.356)
Log (Market Capitalization)		-0.278*** (0.097)	-0.276*** (0.098)		-0.526*** (0.138)
Market to Book		0.001 (0.004)	0.001 (0.003)		0.021 (0.018)
ROA		0.788** (0.395)	0.882** (0.392)		0.408 (0.547)
Leverage		-0.126 (0.985)	-0.336 (1.010)		-0.854 (1.310)
Intangible Assets		-1.072** (0.519)	-1.197** (0.553)		-0.313 (0.859)
Free Cash Flows		0.635 (0.669)	0.617 (0.681)		1.315 (1.227)
Dividend Dummy		-0.417 (0.379)	-0.439 (0.364)		-0.382 (0.383)
Inst. Ownership		-1.829** (0.801)	-1.867** (0.793)		-1.945** (0.853)
Excess Return		-0.644*** (0.18)	-0.621*** (0.185)		-0.821*** (0.249)
Volatility		0.611* (0.344)	0.617* (0.336)		0.745** (0.337)
Log Volume		-0.310*** (0.086)	-0.316*** (0.086)		-0.438*** (0.099)
Firms going private	109	109	109	109	109
Control firms	540	540	540	540	540
Firm-Year observations	5961	5961	5961	5961	5961

This table compares going-private firms with the control sample of surviving firms over the period of 1990-2005. The table reports the results of Cox proportional hazard models with time-varying covariates based on all variables. The dependent variable is time to private. All specifications include year fixed effects and the standard errors are clustered at 4 digit SIC industries. The table reports the coefficients and, the standard errors are in parentheses. \*\*\*, \*\*, and \* indicate significance at the 1%, 5%, and 10% levels, respectively. TariffCut is an indicator that equals one if the industry experienced a reduction in tariff during that year. TariffCut\_Before(-2) equals 1 if the industry experienced a tariff cut 2 years after the observation year. TariffCut\_Before(-1) equals 1 if the industry experienced a tariff cut 1 year after the observation year. TariffCut\_After(1) equals 1 if the industry experienced a tariff cut 1 years prior to the observation year. TariffCut\_After(2) equals 1 if the industry experienced a tariff cut 2 years prior to the observation year. Log(Market Capitalization) = Log value of market capitalization (\$millions). Market to Book = Log value of market capitalization/(total assets – total liabilities). ROA = Net income/total assets. Leverage = Long term debt/Total assets. Intangible Assets = Intangible assets/total assets. Free Cash Flow = (Operating income before depreciation – Income taxes- Interest and related expense – Dividends)/ Total Assets. Dividend is a dummy that equals 1 if a firm pays dividend that year. Inst. Ownership = institutional ownership (percent). Volatility = annualized volatility using daily price. Excess Return = Annualized excess return over the index. Log(Volume) = Log value of the monthly average volume normalized by market capitalization.

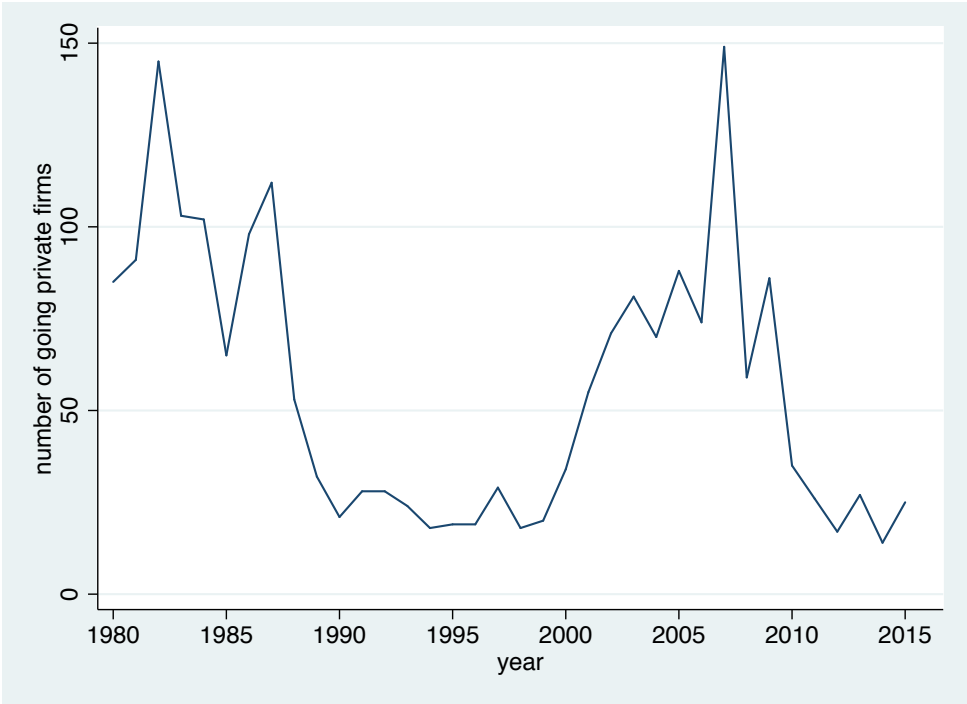


tariff reduction in 1990 to 2005 as a quasi-natural experiment. The effects of other variables on going private decisions are consistent with previous studies. Smaller firms with lower growth opportunities and poorer performance are more likely to go private. Firms are less likely to go private if they receive enough financial visibility in the market. In addition, firms with stocks that are less liquid and more volatile are more likely to go private. Furthermore, the results indicate that the going private firms and the firms that remain public have significantly different characteristics at the time of IPO. Further research will be conducted to examine the channels through which competition affects going private decisions.

## Appendix 1 Description of variables

Variable name	Description	Source
Four Firm Conc. Ratio	Sum of market share of the largest four companies in the 6-digit NAICS industry	the Census Bureau
Log (Market Capitalization)	Log of market capitalization $Csho * prcc\_f$	CRSP/Compustat Merged
Market to book	Market Cap/(Total assets-Total liabilities) $Mkvalt/(at-lt)$	CRSP/Compustat Merged
ROA	Net Income/Total assets $ni/at$	CRSP/Compustat Merged
Leverage	Long term debt/Total assets $dltt/at$	CRSP/Compustat Merged
Intangible Assets	Intangible assets/Total assets $intan/at$	CRSP/Compustat Merged
Free Cash Flows	(Operating income before depreciation – Income taxes- Interest and related expense – Dividends )/ Total Assets $oibdp-txt-xint-dvc-dvp/at$	CRSP/Compustat Merged
Dividend Dummy	Dummy equals 1 if a firm pays dividend that year $dvc$	CRSP/Compustat Merged
Inst. Ownership	Institutional ownership per number of shares	Thomas Reuters
Excess Return	Annualized excess return over the index	CRSP
Volatility	Annualized volatility using daily price	CRSP
Log Volume	Log (End of year volume /Market capitalization)	CRSP

**Figure 1 Total Number of going private firms from 1980 to 2015**



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