IPO Timing Determinants

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Abstract

Despite the extensive amount of IPO literature, many unknowns still exists about the inner workings of the IPO process. This paper seeks to extend upon the literature to first confirm whether the IPO market is an appropriate economic indicator. We enhance the approach taken by previous studies with the addition of excess reserves as a macroeconomic proxy to capture trends unique to the most recent recession. Our findings provide support for capital demand, investor sentiment and stock market condition as determinants of IPO fluctuations. The results also suggest that the uncertainty surrounding the latest financial crisis has caused the average amount of IPO proceeds to decrease. Secondly, the paper employs cross sectional data to examine the transition from private to public company at the firm specific level. The size of an offering seems to be dependent upon macroeconomic conditions as well as firm specific characteristics. However, we were unable to find statistically significant differences between firms who go public during a recession and those who wait for markets to improve.

JEL classification: G0; G3; G24

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Introduction

The Initial Public Offering is considered to be one of the most significant events in the life cycle of a company (Celikyurt, Selvilir, and Shivdasani, 2010; Latham and Braun, 2010). An IPO is the first sale of stock by a private company to the public and the consequential listing on a stock exchange. Going public allows firms to raise and access funds necessary to accelerate growth in order to achieve market leadership (Ernst and Young, 2010). In addition, the liquidity created by going public provides initial inventors, owners, founders and (or) shareholders with an opportunity to collect on their investment. Furthermore, an IPO can facilitate future acquisitions, higher valuations, debt reductions and public profile enhancement. However, according to Latham and Braun, there are substantial risk associated with the undertaking of an IPO for both managers and the firm. Making the transition from public to private can take anywhere from nine to eighteen months, requiring a huge commitment in terms of time, effort and resources on behalf on the organization. Not to mention, the financial costs tend to average approximately 7%-14% of the gross proceeds (Latham and Braun, 2010). And once senior executives make the decision to go forward with an IPO, there is no guarantee the firm will succeed. The US capital markets experience a 20% withdrawal rate of firms that previously announced an IPO, inflicting a multitude of additional losses (Latham and Bran, 2010). Thus, the decision-making process of whether or not to take a company public is burdened with the responsibility of properly assessing and weighting the sizeable benefits and costs of a successful IPO along with the devastating losses of a failure.

Economists devote a considerable amount of research in order to better understand the IPO process. The importance of IPOs extends beyond the implications for

the individual firm. The IPO market serves as an economic indicator in both practice and academia due to its proven pro-cyclical nature (Lowry, 2003). During an economic expansion, IPOs experience a "hot market" characterized by an increased number of firms going public and increased proceeds, while "cold markets", occurring during a recession, exhibit low levels of IPO activity. These fluctuations may be partially due to herding behavior but the current study focuses on the underlying economic conditions as well as firm specific qualities.

Although there is an extensive body of literature on IPOs, a relatively small amount of attention has been devoted to understanding IPO activity during a recession. Lowry (2003) and He (2007) recognize that variation in IPO volume cannot fully be explained by financing requirements and identify the economically significant factors contributing to aggregate IPO fluctuations. Specifically, the papers claim firms' demand for capital, investor sentiment and information asymmetries determine IPO volume. Consistent with these findings, Bugstallen (2008) suggest that firms issue equity following period of high stock market valuations to take advantage of the associated low cost of equity.

Alternatively, a survey conducted by Brau and Fawcett (2004) directly asks 336 CFOs to identify the most important factors taken into consideration during different aspects of the IPO process from the initial decision and timing to choosing an underwriter. Consistent with previous research, the CFOs reported overall market conditions to be the number one constituent when timing an IPO. Continuing to examine IPOs at the firm level, Rosen, Smart and Zutter (2005) conduct a comparative analysis on public and private companies in the banking industry to gain insight on the causes and consequences

of going public. But, once again the firms that go public during a recession are not differentiated from the rest of the sample. Latham and Braun (2010) begin to address this issue by exploring the influence of CEO ownership on the decision to proceed or withdraw from going public during deteriorating public equity markets. Their results indicate that the probability of continuing the IPO process decreases as CEOs hold too little or too much equity. Still, there is no indication on why these firms decided to initiate an IPO during a recession.

The current study fills a gap in the literature by investigating a 20-year time series, including three periods declared recessions by the National Bureau of Economic Research, of U.S. IPOs. First, we conduct a set of time-series regression to serve as a sanity check for our data sample and proxies. Additionally, we look at whether the current recession follows historical trends or creates unique consequences for the equity markets. The second set of regressions employs cross sectional data to examine the IPO process at the firm specific level, specifically how macro economic conditions and firm characteristics influence the amount of proceeds raised during an IPO. Lastly, we seek to reveal any differences that may occur in the IPO process as a result of economic downturn – identify the statistically significant differences between firms that perform IPOs during a recession and their counterparts that wait for the state of the economy to improve.

Section 2 details the findings of previous IPO research followed an explanation of the theoretical framework for this paper in Section 3. Section 4 presents the empirical methodology and results. Lastly, section 5 discusses the limitations of the study along with possible extensions.

1. Literary Review

1.1 Aggregate IPO Fluctuations

The existing literature offers several theories supported by empirical evidence in an effort to unravel the underlying dynamics of the IPO market, specifically its highly volatile nature. In theory, the initial public offering is a financing mechanism used to facilitate the evolution of a firm. However, further analysis reveals a firms' capital expenditure is not an adequate explanatory variable for aggregate IPO volume. The volatility of IPOs is far in excess of the volatility of aggregate capital expenditure (He 2007). Lowry (2003) examines the validity of three hypothesized factors—capital demand, investor sentiment and information asymmetry— contributing to the fluctuations in IPO volume.

The basic intuition behind the capital demand hypothesis is that when firms expect higher economic growth, they tend to seek more financing in order to fund capital investments. Although going public is not the only source of financing, many times an IPO will provide the greatest net proceeds. Consistent with this hypothesis, Derrien and Kecskés (2009) report empirical evidence suggesting that 40% of the variation in equity issuance can be explained by economic fundamentals.

Secondly, the investor sentiment hypothesis asserts that firms time an IPO in order to take advantage of overly optimistic investors. During these times, the market has a tendency to overvalue the company, decreasing the relative cost of equity. Pangano, Panetta and Zingales (1998) find that Italian firms exploited overvaluation by timing the public offering or issuance to coincide with a surge in profitability. The market tended to

interpret the temporary increase in profitability as an indicator of the firm's long-term profitability.

Lastly, the information asymmetry hypothesis predicts that the firm will only go forward with a public offering when the present value of proceeds exceeds the direct issue costs plus any adverse-selection costs. Thus, as information asymmetry in the market increases, firms will have less incentive to perform an IPO. He (2007) based a theory upon the last hypothesis as a means to explain the different roles investment banks play during IPO waves.

Although Lowry's (2003) results suggest statistical significance for each of the hypothesis, only capital demand and investor sentiment proved to be economically significant determinants of IPO volume. The study's empirical methodology slightly differs from other papers. Rather than use the stock market as a proxy for investor sentiment, the regression controls for stock market conditions. For the purpose of this paper, this approach may not be appropriate due to the amount of research suggesting a strong correlation between the stock market and a firm's decision to go public.

In a survey conducted by Brau and Fawcett (2006), chief financial officers (CFOs) identified overall stock market conditions as the most influential factor in timing an IPO. Burgstaller (2008) confirms this notion in an analysis of Austrian equity issuance. One initial implication of this study is the fact that IPOs in Austria did not follow the business cycle. The results suggest that the decision to issue equity is primarily dependent on current stock prices. Companies are more likely to go public when stock prices are higher.

2.2 The IPO Decision

As discussed in the introduction, while the transition from private to public can be extremely lucrative in the case of a successful IPO, a firm experiences significant losses, both tangible and intangible, due to a withdrawal. And while the previous set of literature emphasizes the sensitivity of aggregate IPO activity to various economic conditions, there is a second set of research examining firm specific characteristics of companies that decide to perform an IPO.

Babich and Sobel (2004) claim the prospect of a future IPO affects the daily operational and financial decisions made by many owners of privately growing companies. Based on this notion, they model the behavior of an owner as making decisions to maximize the expected present value of IPO proceeds. Although exact values were not determined, the research proved the existence of optimal thresholds for the following variables: capacity level, previous period sales, previous period profit, risk free rate, and current demand. Rosen, Smart and Zutter (2005) provide empirical support through their analysis of the banking industry, finding that banks that go public tend to have higher profits and more leverage in addition to being greater in size than their counterparts that chose to remain private. In contrast, Gatchev, Spindt and Tarhan (2009) found the use of equity to be more pronounced with smaller firms as well as those with high growth or low profit levels when excluding financial firms. Although the two data samples suggest different relationships, these characteristics seem to be influential in the IPO decision.

Despite the uncertainty and risk associated with going public during an economic downturn, some firms still decide to proceed with the IPO. As mentioned earlier, Latham and Braun (2010) specifically look at the effect of ownership and leverage on the

decision to continue verse withdraw an IPO. First, the results indicate that the probability of going through with an IPO in poor public equity markets decreases as the CEO hold too little or too much ownership, implying inverse U-shape relationship. Secondly, firms with higher levels of debt tend to continue with an IPO despite the less than ideal conditions in order to raise the necessary proceeds to deleverage their balance sheets. The study specifically looked at the firms that filed to go public toward the end of the technology boom, limiting their sample to 124 firms. In addition, there is no indication of whether these factors are more or less important during poor equity markets.

2. Theoretical Background

For many firms, the initial public offering can be the most advantageous mean of raising capital to facilitate future growth but it is also associated with a substantial amount of risk and uncertainty. According to Ernst and Young, the IPOs can result in a number of benefits in addition to the immediate influx of capital due to proceeds raised during the offering. Once publicly listed on a stock exchange, a firm gains access to the public equity market, a source of capital previously inaccessible to the private firm. Many investors, owners and previous shareholders view the offering as a time to liquidize and collect on their investment. Pangano, Panetta and Zingales (1998) find that firms perform IPOs in order to deleverage their balance sheets. Intangible benefits such as brand image, prestige and credibility can also result from an IPO. However, the IPO process requires a large commitment by the entire organization that must be balanced with daily operations. Additionally, equity is extremely expensive due to both initial and ongoing costs. Investment banks typically charge a fixed rate as well as a percentage of the IPO proceeds. Once a public entity, firms must abide by a set of regulations

requiring periodic reporting, investor relation maintenance, and payments to external advisors for regulatory compliance, etc. Often entire departments are created in order to handle these very tedious and time-consuming matters (Ernst and Young, 2010). Furthermore, the largest risk factor faced by a firm during the IPO concerns the external conditions, most likely because they are out of the control of senior executives (Latham and Braun, 2010). Thus, lack of adequate preparation or poor market timing can lead to IPO withdrawal or failure (Ernst and Young, 2010).

In fact, the pecking order hypothesis posited by Myers and Majluf (1984) predicts equity to be the least desirable source of financing due information asymmetry between managers and investors (Leary and Roberts, 2009). The theory states that a firm prioritizes their sources of financing—internal funds, debt, and equity—in an effort to minimize adverse selection costs. A firm will finance investments with liquid assets up to a point where it is no longer affordable according to a certain cash threshold dependent on the specific firm and industry. When the investment amount exceeds this threshold, firm will raise capital through external channels, debt and equity. A firm will continue to prefer debt until a second threshold at which point the firm may be too highly leverage. In theory, only at this point will a firm opt to use equity to fund investments. However, the pecking order provides no guidance on how to define these thresholds (Leary and Roberts, 2009).

Extensive research has been devoted to determining the validity of the pecking order theory in practice. The observed tendency of higher leveraged firms by Latham and Braun to proceed with an IPO despite poor market condition could be in part explained by the pecking order theory. If these firms have reached the second threshold, equity

would then be the only source of financing available to fund growth. On the contrary, Gatchev, Spindt and Tarhan (2009) findings suggest instances when asymmetric information does not cause equity to be used only as a last result. In particular, equity tended to be a predominant source in the case of profit shortfalls, investment in intangible assets and internally generated growth opportunities (Gatchev, Spindt and Tarhan, 2009).

Moreover, some of the literature treats the IPO as the ultimate event in a firm's life cycle. Babich and Sobel (2004), discussed in the previous section, model the behavior of owners as making decisions in order to maximize the present value of IPO proceeds. The theory asserts that the amount of IPO proceeds is affected by the firm's size, recent performance, and market sentiment—proxies include previous period's revenue, profits and demand respectively. In addition, current assets are integral to the IPO as a means to cover the high costs of the public offering. Ernst and Young claims that in practice about 60% of an investor's IPO investment decision is based on financial factors such as debt to equity ratios, return on equity, profitably and sales growth. Furthermore, investors hold firms to an even higher standard during economic downturns as market uncertainty increase the amount of risk assumed by the financier (Ernst and Young, 2010).

The current study seeks to determine the factors most influential in the choice to perform an IPO during an economic contraction. First, we look to confirm the aggregate trends existent in IPO market through time-series regressions. Then, cross sectional data allows us to address the question as to whether there are economically significant

differences between firms who go public at the trough of an IPO wave opposed to those who wait for improved equity market conditions.

3. Data

The data set used for this paper includes U.S. IPOs between the years of 1990-2010 collected from the Global New Issues Database provided by the Securities Data Company (SDC). As per previous literature, close-end funds, American depository receipts (ADRs), real estate investment trusts (REITs), units and mutual stock units are excluded, resulting in a total of 5,856 IPOs (Lowry 2003; Gao and Ritter 2010). The database includes information about the size of the offering, type of security, firm financials and previous financing. All monetary values have been adjusted for inflation and measured in 2005 U.S. dollars.

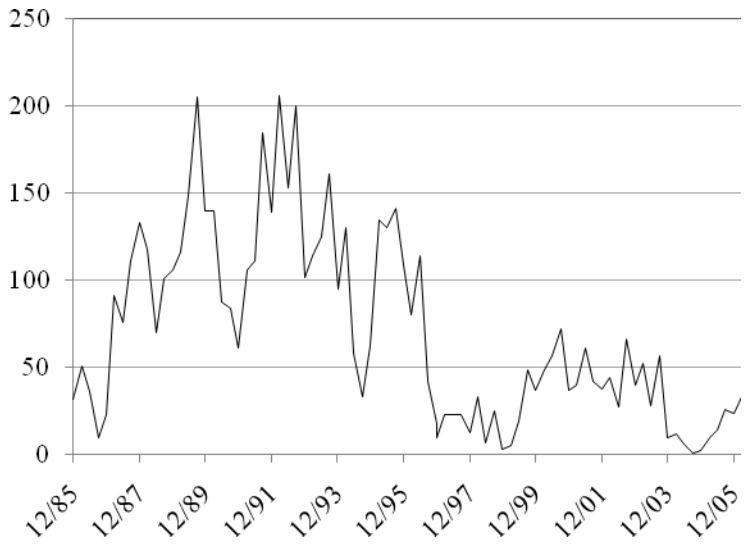

Figure 1: Times Series IPO Volume, 1990-2010. The Number of IPOs each quarter.

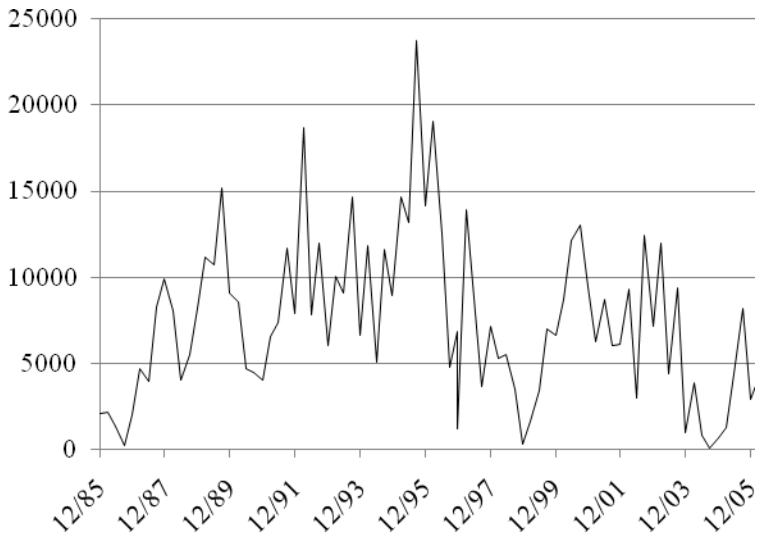

Figure 2: Time Series IPO volume, 1990-2010. The Aggregate IPO Proceeds each quarter measured in millions of 2005 U.S. dollars

3.1 IPO Volume

IPO volume is measure by the aggregate amount of proceeds as well as the number of companies going public in a specified time period. IPO volume is highly persistent, i.e. there is no tendency to revert towards some "normal" volume (Lowry 2003). Previous literature has controlled for nonstationarity by deflating volumes by the number of firms in existence at the end of the previous period. This study uses U.S. Population annual estimates as a proxy for total number of firms exhibiting correlation of .82 with domestic companies listed on the NYSE.

3.2 Capital Demand Proxy

Quarterly growth of real gross domestic product in the period leading up to the IPO is the capital demand proxy. In accordance with the capital demand theory, firms will require more financing during periods of high economic growth. Thus, we expect all IPO metrics to be positively correlated with GDP.

In addition, there is a dummy variable equal to 1 if the IPO was performed during a recession. The National Bureau of Economics defines a recession as the period between a peak and trough of economic growth. Our proxy follows this intuition by assigning a 1 to all quarters with negative GDP growth. The GDP data was collected from the Federal Reserve Economic Data (FRED).

3.3 Stock Market Conditions

The Chicago Board Options Exchange Market Volatility Index, VIX, is an implied measure of S&P 500 stock option volatility. Introduced by professor Robert Whaley in 1993, the index is considered the leading forecasting tool for market behavior. A high index value indicates the market expects increased volatility in the stock price throughout the next 30 days. Commonly referred to as the fear gauge, we expect a negative coefficient in our regressions.

3.4 Investor Sentiment

Robert J. Shiller, Yale School of Management, publishes multiple stock market confidence indexes. The current study employs the Valuation Confidence Index and Crash Confidence Index. The former measures the percentage of respondents who do not think that stock market prices in the United States are too high when compared with true fundamental value or sensible investment value. While we expect a significant correlation with this metric, the direction is still unknown. The latter is the percent of the population who attach a small probability to a stock market crashing within the next six months (Shiller). In both cases, we chose the institutional index over the individual index as institutional investors are said to be the true driver of stock prices, typically receiving 70-80% of IPO stock allocation (Ernst and Young, 2010).

Excess Reserves is the last investor sentiment proxy. We include this variable to capture the fear and uncertainty associated with the latest financial crisis. Historically, excess reserves remained fairly constant around the required amount. However, since 2007, the U.S banking system has seen a dramatic increase in the amount of excess reserves in response to the current financial environment. Thus, any correlation with this metric implies trends unexplained by the other variables and unique to this last recession.

3.5 Market Risk Free Rate

The interest rate of the 10-year constant maturity bill represents the risk free rate in the market or the discount rate.

3.6 Firm Specific Characteristics

The IPO decision and investor reception is unique for every firm. We include a number of variables to account for these differences. From the previous literature, the following variables have proven to be significant indicators of the size of an offering and the IPO decision made by the firm: size, current assets, profitability and leverage. We use the firm's revenues as a proxy for firm size (Babich and Sobel 2004). The SDC basic financials provide information about the firm's current assets before offering and net income for many of companies in the sample. Since size has been controlled for in the regression, the amount of total debt outstanding is our proxy for leverage.

4. Empirical Methodology and Results

4.1 Time-Series Aggregate IPO Activity

This first section investigates the timing of IPOs using proxies for capital demand, stock market conditions and investor sentiment. The time series regressions include various explanatory variables identified as determinants of IPO fluctuations along with

excess reserves to capture the current phenomenon associated with the latest financial crisis. First, we use the number of IPOs performed in the quarter and then repeat the same regression with total proceeds raised as the dependent variable. The results allow us to verify our data set is consistent with previous literature and reveal information about the overall activity of the IPO market in relation to our proxies.

Table 1: Time-Series Regression- IPO Volume

	No. of IPOS	Aggregate Proceeds (MM)
Constant	192.93 ***	23005.38 ***
	(53.20)	(4584.53)
GDP growth	21.57 ***	2792.58 ***
	(7.60)	(654.83)
VIX	-3.14 ***	-141.81 **
	(0.81)	(69.40)
Valuation Confidence	-1.39 ***	-191.3531 ***
	(0.44)	(38.05)
Crash Confidence	-0.53	58.35
	(0.72)	(62.78)
Excess Reserves	0.04	2.57
	(0.03)	(2.88)
Interest Rate	5.21	-836.45 **
	(3.90)	(335.84)
US Population	1.67E-07	-2.16E-05 **
	1.07E-07	9.24E-06
Adj. *R*- sqrd	49.61%	51.90%
No. of Observations	84	84

***,**,* Singificant at the 1%, 5% and 10% levels in two sided significance test

Table 1 shows the time time-series regressions at the quarterly interval. The first column of Table 1 shows the number of IPOs regressed on the various proxies for economic and market conditions controlling for the risk-free rate.[1] The results confirm

[1]Lowry chooses to use a quarter dummy to control for "decreased activity in the firm period due to Wall Street practice of effectively shutting down between Christmas and New Year's lowering the number of IPO registrations in the first quarter". However, when this variable was included it was neither significant nor changed the results in my regression and thus excluded. Additionally, these same regressions were run.

the findings in the previous literature and the validity of our proxies. The percentage growth of GDP in the period leading up to the IPO is positively correlated with number of IPO firms at the .01 level. Following periods of higher economic growth, firms demonstrate a need to finance future investment. Furthermore, the results provide evidence supporting the stock market condition and investor sentiment hypotheses. The VIX and Valuation Confidence Index exhibit negative correlations at the .01 level. Fewer firms seem to make the transition into the public market when the market is expecting high volatility over the next thirty days. The uncertainty associated with increased volatility places higher risk on management and investors. At the same time, the results suggest that firms do not prefer to perform an IPO when stock prices have been deemed sensible compared to the fundamentals. When a larger percentage of institutional investors feel that the stock market is overpriced, the number of firms going public increases. Firms enter the market in order to take advantage of the decreased cost of equity due to overpriced stocks.

The second regression uses the total number of proceeds raised in each quarter as the dependent variable and the second column of Table 1 reports these results. IPO proceeds exhibit an extremely strong correlation with the percent growth of real GDP in the previous quarter. Not only is this variable statistically significant but also demonstrates evidence of economic significance. For instance, real GDP grew by 0.8 in the third quarter of 2010 compared to 0.6 in the second quarter, with all other variables held constant the model predicts a $556 million increase in IPO proceeds. In addition, the VIX

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using the number of firms in the NYSE as the proxy for market size. Unfortunately, the facts and figures webpage for the NYSE only disclosed this information up until 2003 decreasing the amount of observations to 54. The decrease in sample size caused some of the variables to lose their explanatory power and thus we opted to use US population to maintain the full sample in our regression

and Valuation Confidence Index exhibit statistically significant explanatory power in a negative direction. Again, this is consistent with the stock market and investor sentiment hypotheses; firms are able to raise more capital when stock prices are inflated. However if the market is experiencing stock price volatility there is no guarantee that valuation will remain high post-IPO.

Aggregate proceeds will inevitably increase as more firms decide to go public. However, the effects of many macroeconomic factors may be amplified if they influence the individual offerings as well. To further investigate the relative volatilities of the number of IPOs to aggregate proceeds, the second regression examines how the average size of an offering differs throughout our sample time period. Average size is defined as aggregate proceeds divided by the number of firms going public in each quarter. The resulting regression is displayed in the Table 2.

Uncharacteristic of the previous IPO volume measures, average proceeds does not seem to fluctuate according to the business cycle. In other words, economic growth affects the total proceeds and the number of IPO firms equivalently. Moreover, average proceeds demonstrate a positive correlation with expected market volatility, opposing previous literature. As seen in the first regressions, an increase in the VIX index decreased the number of IPOs and aggregate proceeds. Thus, the positive correlation implies that the decreasing number of firms performing IPOs, present in the denominator, outweighs the decreasing amount of proceeds, present in the numerator. Expected stock price volatility seems to be more deterministic for a firm's decision to go public than the proceeds raised through the process. The following section uses firm specific to investigate the effects of these same economic factors on the individual offer sizes.

Table 2: Time-Series Regression- Average Proceeds

	Average Proceeds (MM)
Constant	134.69
	(151.64)
GDP growth	14.98
	(21.66)
VIX	6.54 ***
	(2.30)
Valuation Confidence	-0.95
	(1.26)
Crash Confidence	3.45
	2.08
Excess Reserves	-0.007 *
	(0.10)
Interest Rate	-32.16 ***
	(11.11)
US Population	4.03E-07
	3.06E-07
Adj. *R*- sqrd	27.85%
No. of Observations	84

***,**,* Singificant at the 1%, 5% and 10% levels in two sided significance test

Interest rate demonstrates negative effects on the dependent variable indicative of investor preference for less risky investments when interest rates are high.

Perhaps the most noteworthy result of the regression, average proceeds and excess reserves exhibit a statistically significant negative relationship.[2] As previously discussed, this explanatory variable captures trends unique to the past couple years. The economic implication is that the uncertainty surrounding the latest financial is affecting the equity markets differently than past recessions. Specifically, the amount of aggregate proceeds has decreased at an increased rate relative to the number of IPOs. The need for financing

[2] This result is not observed when the U.S. population proxy is included in the regression due to high correlation. Since the other results are robust and remain unchanged, we decided to drop the market size proxy to demonstrate the uniqueness of the average proceed trend in response to the financial crisis. For additional clarification, excess reserves had not previously shown significance in the other regression even without the control.

has not subsisted in the current market and yet financing requirements have become more stringent. In lack of funding alternatives, firms may be forced to perform public offerings to sustain company growth even with expectations of lower proceeds due to investors' mistrust in equity markets or lack of preparation by the firm.

4.2 Cross-Sectional Regressions

This section investigates the individual offerings as an additional means of gaining insights on the effects of economic conditions on IPOs. Unlike the aggregate time-series recession, this analysis has the advantage of looking at firm specific characteristics. Previous literature has identified a number of qualities to be determinants for the initial decision to go public and size of the offering. Specifically we look at the effects of firm size, current assets, profitably and leverage. The proxies include revenues, assets before the offering, net income, outstanding debt and dummy variable equal to one if the firm is ventured backed (Babich and Sobel, 2004). Consequently, our sample decreases substantially due to missing data to include a total of 2,480 IPOs from 1990-2010.

The first regression looks at the effects of the macroeconomic factors and firm specific qualities on the amount of IPO proceeds raised by an individual firm. The results are displayed in Table 3. All of the firm specific proxies along with the macro-variables GDP growth, VIX, Valuation Confidence and interest rate proved to be statistically significant. There was no statistically significant relationship between the individual offer size and excess reserves. However, in accordance with the capital demand and investor sentiment hypotheses, the offer size was smaller during low levels of economic growth and high levels uncertainty. The negative relationship with the risk free interest rate can

Table 3: Cross Sectional Regression- Offer Size

	Offer Size: Amount of Proceeds (MM)
Constant	136.47
	(44.10)
GDP growth	17.44
	(7.88)
VIX	2.62
	(0.75)
Valuation Confidence	0.89
	(0.39)
Crash Confidence	0.082
	(0.51)
Excess Reserves	-0.02
	(0.03)
Interest Rate	-28.9
	(3.43)
Revenues (MM)	0.065
	(0.00)
Debt (MM)	0.031
	(0.00)
VC	-17.98
	(7.05)
Assets Before Offering (MM)	0.01
	(0.00)
Net Income (MM)	-0.30
	(0.02)
Adj. R-sqrd	46.53%
No. of Observations	2480

***,**,* Singificant at the 1%, 5% and 10% levels in two sided significance test

be explained as a measure of opportunity cost for the investor. Equity is an extremely risky endeavor especially during economic downturn. Thus, when interest rates are high, the rational risk-adverse investor will opt to invest in low risk bonds.

The level of significance associated with each of the firm specific variables verifies the importance of conducting cross-sectional analysis. We control for the firm's size with revenues received in the period prior to the IPO. Larger firms tend to require more capital to finance their growth and also have the capacity to issue more equity. Current assets are also positively correlated to proceeds but not economically significant. Although a firm's assets are necessary to cover the cost of IPO, most likely the effects of assets are already captured by the revenue variable. The two variables have a correlation value of 0.5484 and assets can often be used as alternative size proxy. The negative relationship between outstanding debt and offer size indicates that future investors view debt as a signal of quality rather than a cautionary indicator of a highly leveraged firm. Firms have to demonstrate a level of financial stability to qualify for bank loans. Equivalent to when a "tombstone" or financial transaction advertisement is printed in the newspaper, debt speaks to a firm's credibility. Investor willingness to pay increases with security of the firm and consequently these firms raise more proceeds in the IPO process. Contrary to research proposing value-add of a venture capital partnership, on average the venture-backed firms in our sample performed smaller offerings. There are two possible explanations for this outcome. First, venture capitalists seek out smaller start-ups with high growth that often have not established themselves in the market. While these firms can produce extremely high return, there is a large amount of risk associated with this type of investments. Thus, underlying firm qualities may be causing a downward bias on

the VC dummy variable. The second possible explanation is in line with findings of Latham and Braun (2010). If venture capitalists behave similarly to highly invested CEOs, the classic agency problem may be at play while timing an IPO. In the self-interest of liquidizing their investments, venture capitalist may urge a firm to perform an IPO prematurely, rather than timing according to proceed maximization. The last firm specific variable net income was intentioned to be a proxy for profitability but the negative sign implies otherwise as there is no reasonable explanation for higher profit firms to receive less proceeds on average. Net income is a function of revenue calculated by subtracting costs, taxes and interest. The inclusion of revenue in the regression essentially causes the net income variable to become representative of costs justifying the sign of the coefficient.[3]

The last regression examines how the relative importance of firm specific qualities might change when going public during a recession compared with doing so during a more thriving economy. The size of the offer remains to be the dependent variable in the regression but we remove all macroeconomic variables. Instead, the regression uses a binary variable equal to 1 if the IPO was performed during a recession and 0 otherwise. We have defined a recession according to the NBER definition of a recession as the period between the peak and tough of economic growth. Thus, we assign a 1 to binary variable if quarterly GDP growth is negative and 0 otherwise. The regression includes interaction terms between the binary variable and each of the firm specific qualities to reveal whether there are statistically or economically significant differences between the firms who proceed with an IPO during a recession and those that

[3] The inclusion of both net income and revenues does not cause collinearity in the model. The correlation between the two variables is only 0.20.

go public during improved equity market conditions. Table 5 reports these results but first table 4 displays descriptive statistics for each of the variables separated by economic state.

Table 4: Variable Descriptive Statistics

	Recession IPOs				Other IPOs			
	Mean	St. Dev	Min	Max	Mean	St. Dev	Min	Max
Offer Size	61.77	107.26	2.87	657.63	98.07	228.91	1.16	4984.61
Revenue	194.16	466.43	0.14	2626.31	363.71	1468.52	0.10	28083.84
Debt	76.28	256.84	0.14	1650.47	197.31	1357.65	0.09	46328.30
VC	0.46	0.50	0.00	1.00	0.36	0.48	0.00	1.00
Assets Before Offering	1323.77	244.95	1.09	1241.64	592.13	3915.40	0.26	97659.59
Net Income	6.60	63.91	-235.72	335.03	0.69	170.12	-6595.40	1692.23
No. of Observations	43				2437			

Contrary to initial hypotheses, the regression did not provide any indications that firms performing IPOs during a recession differ economically or statistically from other IPO firms.[4] The amount of proceeds raised during an IPO seems to be dependent on the same firm specific characteristics whether or not the market is experiencing a downturn. However, Ernst and Young (2010) report that investors tend to be highly sensitive to financial indicators during periods of market uncertainty. For this reason, we believe the lack of evidence is due to the limitations of the regression. Regressions require that the noise in the data be small enough to distinguish between the means. The current data set covers a 20-year time period inclusive of 2,480 IPO firms ranging from small start-ups to companies producing billions of dollars in annual revenue. The large standard deviations

[4] We also performed a logistic regression for the binary variable equal to 1 if quarterly GDP growth is negative and 0 otherwise on the firm specific characteristics. The results also indicated that there were not statistically significant differences between the two sets of firms as none of the firm specific variable held any explanatory power.

Table 5: Cross Sectional Regression with Interaction Terms

	Offer Size: Amount of Proceeds (MM)
Constant	71.42
	(4.45)
Revenues (MM)	0.07
	(0.00)
Revenues x Recession Dummy	-0.16
	(0.13)
Debt (MM)	0.03
	(0.00)
Debt x Recession Dummy	0.45
	(0.29)
VC	-21.58
	(7.23)
VC x Recession Dummy	-21.27
	(43.68)
Assets Before Offering (MM)	0.01
	(0.00)
Assets x Recession Dummy	0.09
	0.21
Net Income (MM)	-0.31
	(0.02)
Net Income x Recession Dummy	0.02
	(0.67)
No. of Observations	2480

***,**,* Singificant at the 1%, 5% and 10% levels in two sided significance test

reported for each firm variable strengthen the argument for the high level of noise contained in the data. Additionally, the descriptive statistics reveal the range of each variable is smaller for the recession IPO firms than the counter set suggesting a trend not captured in the regressions. For instance, it could still be the case that investors require companies to meet a higher set of standards during poor equity markets, preventing many firms from making to the transition into public market. But if at the same time the most equipped organizations are able to survive the recession and postpone the offering, the mean may remain fairly unaffected as the opposing effects offset one another. Nonetheless, further extensions, to be discussed in the conclusion, would need to be performed to make a more conclusive argument.

5. Conclusion

Despite the extensive amount of IPO literature, many unknowns still exist about the inner working of the IPO process. This paper seeks to extend upon the literature to first confirm whether the IPO market is an appropriate economic indicator. We enhance the approach taken by previous studies with the addition of excess reserves as a macroeconomic proxy to capture trends unique to the latest financial crisis. Our findings provide support for the capital demand, investor sentiment and stock market condition as determinants of IPO fluctuations. Both the number of companies going public and aggregate proceeds followed the historical trends indicated in research, specially the procyclical nature of the public equity market. One noteworthy result of the aggregate time-series regressions is the statistically significant explanatory power of excess reserves for average proceeds. The results suggests that over the past couple years, the equity markets have been experiencing a lower average amount of proceeds unique to

the most recent recession. We believe given the current state of the financial world, the lack of funding alternative forces more companies to go public at an otherwise non-optimal time when investors are extremely wary about the future state of economy and consequentially potential investments.

Furthermore, this paper utilizes cross sectional data to examine the IPO the firm level. The results suggest in order to maximize proceeds firms must time an IPO in accordance to the business cycle as well as overvaluation and low volatility in the stock market. Additionally, the results suggest investors to be highly sensitive to basic financials, but contrary to prior beliefs, seem to view debt overall as a quality indicator rather than a warning of high leverage. The banking failure may have caused investors to weight the importance of leverage ratios more heavily. However, our regressions were unable to capture these trends due to the amount of noise existent in our data set. Thus, a more extensive yet specific data set would be necessary to approach differentiating the IPO process during a recession.

The IPO market has evolved substantially in the last decade nonetheless the twenty-year span covered by our data set. The changes occurring are often unquantifiable and not apparent through the disclosed information included in the standard databases. The decision to make the transformation from private realm to public market is not straightforward with substantial and varying potential benefits and costs. Although regressions are extremely powerful tools in the field of financial economics, unconventional techniques may be necessary to overcome the constraints inherent in the current data sets. Consistent with this assessment, Brau and Fawcett (2006) sought to provide additional data by directly asking CFOs why they conduct an IPO. However, the

study only once surveyed companies considering going public between 2000 and 2002. We propose a longitudinal study of firms similar to observational studies conducted in the fields of psychology and sociology. Applying the same logic used for human subjects, a longitudinal study would track a firm throughout its life cycle. This would allow for the researcher to distinguish short from long-term phenomena, extremely relevant to the IPO market that undergoes both short-term fluctuations and long-term transformations.

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