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ESSAYS ON CORPORATE INVESTMENT DECISIONS

By

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ABSTRACT

ESSAYS ON CORPORATE INVESTMENT DECISIONS

By

Zhikun Li

It is well known that there should not be any link between financial market and corporate investment after controlling for Q variables. Thus, there should not be any link between the equity liquidity and corporate investment. However, once the assumptions of a perfect market and rational decisions of all market participants are violated or relaxed, the equity liquidity can actually affect the corporate investment in different ways. The first essay of this dissertation investigates how stock liquidity affects corporate investment. We find that corporate investment is significantly and negatively related to stock liquidity after controlling for Q and various variables, both at aggregate and individual firm level. Such a negative relationship holds even after extensive robustness checks. The negative relationship is consistent with the "market sentiment hypothesis" that managers interpret low stock returns following high liquidity as a consequence of investor sentiment, instead of cheap cost of financing. They thus reduce investment due to worse-than-expected business conditions and lack of knowledge about the fundamental value of the risky assets.

The second essay finds the evidence that primary seasoned equity offering (SEO) firms and seasoned debt offering (SDO) firms significantly underperform their stylized matches in investment growth after offering. We carefully examine five hypotheses and

find that the evidence is attributable to the market sentiment hypothesis documented in the first essay. That is, high liquidity followed by low stock returns signals investor sentiment as suggested in Baker and Stein (2003), then for the same reasons, managers also interpret low stock returns as a consequence of investor sentiment. Thus, both individual investors and managers tend to hold cash and reduce their investment due to worse-than-expected business conditions and lack of knowledge about the fundamental value of the risky assets. Extensive robustness checks and a regression analysis confirm our conclusions.

This dissertation contributes to the literature in the way that it establishes the direction and statistical significance of the relationship between equity liquidity and corporate investment, and explores the economic intuition behind it. This dissertation also makes an attempt to examine several potential explanations to "New Issues Puzzle". To the extent that a valid explanation should be able to explain both the underperformance in equity returns and the underperformance in investment growth together, the market sentiment hypothesis is at least the dominant explanation in this context.

For the long nights, and even longer weekends,
of solicitude while I worked on this dissertation,
I dedicate it to my loving wife, Songling,
my parents, and my son.

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INTRODUCTION

This dissertation contains two chapters that address issues in the areas of corporate investment and financial market. The first chapter examines the relationship between stock liquidity and corporate investment. The significant negative relationship is supported by the market sentiment hypothesis, that is, high liquidity followed by low stock returns signals investor sentiment, as a consequence, managers tend to reduce corporate investment and prefer to hold cash, due to worse-than-expected business conditions and uncertainty in fundamental value of risky assets.

Chapter 1 proposes a new puzzle because the financial constraint literature, on the contrary, predicts a positive link between market valuation and corporate investment. The possible explanation is that the stock liquidity is used primarily as a proxy for investor sentiment. It does not necessarily contain all relevant information of market valuation. Thus, our results show a relationship between investor sentiment, especially investor *optimism*, and corporate investment. On the other hand, the financial constraint literature matters especially when investors are *pessimistic* (e.g. Barberis and Thaler (2003)). In addition, there is still no direct empirical evidence showing a positive relationship between financial constraint and corporate investment, due to the lack of appropriate proxy for financial constraint.

The second chapter is an application of the first chapter. We find that primary seasoned equity offering (SEO) firms and seasoned debt offering (SDO) firms significantly underperform their stylized matches in investment growth after offering,

while secondary seasoned equity offering (SEO) firms do not. We carefully examine five hypotheses and find that the evidence is attributable to the market sentiment hypothesis documented in the first chapter.

Our results allow us to reconsider some of the possible solutions to "New Issues Puzzle". To the extent that a valid explanation should be able to explain both the underperformance in equity returns and the underperformance in investment growth *together*, the market sentiment hypothesis is the only one that can solve the puzzle.

Our extensive robustness checks confirm our conclusions in both chapters.

CHAPTER 1

LIQUIDITY, FINANCIAL MARKET SENTIMENT, AND CORPROATE INVESTMENT

1.1 Introduction

In a perfect world, the standard Q theory, pioneered by Tobin (1969) and Hayashi (1982), suggests that corporate investment opportunities are summarized by market valuation of firms' capital stock. Therefore, the theory predicts no link between financial market and corporate investment after controlling for Q variables. Having said this, stock liquidity is supposed to have no effect on corporate investment after controlling for Q variables.

However, a great deal of literature suggests that this may not be true. The key argument is that the conclusion of no relationship between stock liquidity and corporate investment relies heavily on the assumptions of a perfect market and rational decisions of all participants in economy. Thus, stock liquidity itself can actually represent different things and can affect corporate investment in different ways, when these assumptions are violated or relaxed. For example, stock liquidity is no longer a priced risk factor in equilibrium, instead it signals investor sentiment when some market participants become overconfident about the fundamental value of the risky assets (e.g. Baker and Stein (2003)).[1]

[1] Baker and Stein (2003) argue that irrational investors under-react to the information in the trading because they have different likelihood functions when updating probabilities. Thus, the differences in opinion become bigger, and the trading increases. This is the case especially in a hot market when more investors tend to be overconfident about the

The above brief discussion indicates that the relationship between stock liquidity and corporate investment is an open empirical issue. To the best of our knowledge, this is the first study that intends to establish the direction and statistical significance of this relationship, and explore the economic intuition behind it. Indeed, there does not appear to be a consensus in the literature regarding the impact of stock liquidity on corporate investment. We can summarize at least five hypotheses as follows, according to the different assumptions of the financial market and market participants' decisions.

"Rational pricing hypothesis": If the financial market is perfect and all market participants rationally make their decisions, then stock liquidity is simply a priced risk factor in equilibrium. And then, higher liquidity implies lower expected future return, hence lower cost of equity financing (e.g., Pastor and Stambaugh (2001), and Gibson and Mougeot (2001)). As the lower cost of capital facilitates equity financing, this hypothesis implies a positive relationship between stock liquidity and corporate investment.

Our next four hypotheses are all related to the market irregularities. After all, we are not living in a perfect world. The recent development of the imperfect capital market theory discovers a different meaning of stock liquidity. Baker and Stein (2003) show that stock liquidity is a signal of investor sentiment because trading increases when more investors disagree on the true value of the risky assets. What makes things worse is that more investors become overconfident about business conditions and their ability of selecting good stocks when the financial market becomes over-heated. The aggressive trading

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business conditions and their abilities to pick good stocks. Also see Shiller (1999), Barberis and Thaler (2003), and Hong and Stein (2003).

further boosts trading volume or stock liquidity. Odean (1998b) called this pattern "the most robust effect of overconfidence". The empirical findings are documented and confirmed by several studies. Glaser and Weber (2003), and Statman, Thorley, and Vorkink (2004) both find a strong positive link between trading volume and lagged stock returns. They all ascribe this evidence to the investor overconfidence. Baker and Stein (2003) regress equity returns on lagged liquidity and find a negative relationship. The interpretation is that there will be a negative equity adjustment after high market sentiment because investors realize that the business conditions are not as rosy as they were thought to be, and the fundamental value of the risky assets were not correctly understood.[2] Actually, in connection with the above results, the fact that high equity returns are followed by a negative equity adjustment is consistent with the nature of the business cycle at a general market level.

Despite the increasing interest shown by financial economists, relatively little effort has been spent on establishing the direct empirical link between financial market sentiment and corporate investment. This motivates us to study the relationship between stock liquidity and corporate investment. If stock liquidity is a signal of investor sentiment, and sentiment can affect corporate investment, then it is a meaningful strategy to investigate how stock liquidity, both at aggregate and firm level, affects corporate investment. Based on the above reasoning, our next four hypotheses are as follows.

[2] Business conditions in this situation include both economic conditions and firm fundamental conditions.

"Investor sentiment hypothesis": According to the empirical implication in Daniel, Hirshleifer and Subrahmanyan (1998)[3] and the empirical finding in Baker and Stein (2003), high liquidity tends to be followed by low equity returns as the financial market gradually corrects from investor sentiment. However, on the other hand, managers still interpret low equity returns as cheap cost of financing and raise corporate investment. Thus, one would observe that high liquidity leads to high investment. Although this hypothesis also predicts a positive relationship between liquidity and corporate investment, it is different from rational pricing hypothesis because, in this hypothesis, the low equity returns are caused *directly* by investor sentiment.

"Market sentiment hypothesis": As we mentioned above, the high liquidity followed by low equity returns signals market sentiment, as suggested by Baker and Stein (2003). For the similar reasons, managers can also interpret low stock returns as a consequence of investor sentiment. To the extent that managers themselves are also investors in real economy, it is thus natural to conjecture that they tend to reduce corporate investment due to worse-than-expected business conditions, and lack of certain knowledge about the fundamental value of the risky assets.[4] This hypothesis predicts a negative relationship between stock liquidity and corporate investment. This negative relationship can hold at aggregate as well as individual firm level.

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[3] They assume overconfident investors overreact to private information, and thus lead to lower stock returns.

[4] It would be helpful to think that both individual investors and managers are investors. The individual investors are those investors in financial markets, while managers are the investors in real economy. All of them can be affected by the similar things.

What is worth the whistle is the difference between this hypothesis and the investor sentiment hypothesis. In this hypothesis, managers and investors all treat low equity returns as a consequence of investor sentiment. In the investor sentiment hypothesis, investors treat low equity returns as a consequence of investor sentiment, while managers treat low equity returns as cheap cost of financing. The different treatment of the low equity returns following high liquidity distinguishes the predictions between the above two hypotheses.

"Agency hypothesis": When investor sentiment is high in the financial market, even if managers are rational, they may not necessarily choose to maximize firm value. Instead, agency theories argue that some managers may want to enhance their own prestige. Thus, they try to use investor exuberance as a cover for doing "empire building" investments otherwise they cannot do under other situations. This hypothesis predicts a positive relationship between liquidity and corporate investment.

"Managerial sentiment hypothesis": As Barberis and Thaler (2003) suggest, "investor sentiment can also affect investment if managers put some weight on investors' opinions, perhaps because they think investors know something they do not". Thus, it is likely that investor overconfidence can be transferred to managers. This is because managers may think their firms have reached a higher level in the life cycle, and accordingly expand investment to a higher level. This hypothesis predicts a positive relationship between stock liquidity and corporate investment.

The main findings of this article can be summarized as follows. The corporate investment is significantly and negatively related to the lagged stock liquidity, both at aggregate and

individual firm level. This is consistent with our "market sentiment hypothesis". The evidence indicates that managers actually interpret low stock returns following high liquidity as a consequence of investor sentiment, instead of cheap cost of financing. They reduce investment because they are not comfortable about the business conditions and the fundamental value of the risky assets following high investor sentiment. We do extensive robustness checks by trying different stock liquidity measures and splitting the sample into subsamples according to business cycle, relative liquidity, leverage, firm size, book-to-market (BE/ME) ratio, income performance, and financial constraint. We find that the negative relationship between stock liquidity and corporate investment is more significant during the recession periods, and for the firms with higher relative liquidity (liquidity that is higher than market level liquidity). The bigger firms or the firms with lower book-to-market (BE/ME) ratios have more significant relationship too. Also noteworthy is that the firms with lower leverage ratios exhibit more significant relationship. This is consistent with the theory in Stein (1996) - firms that are in need of external equity finance will have investment that is especially sensitive to non-fundamental components of stock valuation. A different approach (portfolio approach) with different benchmarks further confirms our results. Finally, to make sure our stock liquidity measures do not capture other things such as income performance, size, etc., we consider all relevant variables in one regression. The negative relationship between stock liquidity and corporate investment holds even when we control for different lagged Q variables, different lagged cash flow variables, financial slack, business cycle, income performance, leverage, size, BE/ME, and financial constraint. Once again, overall, our results support the "market sentiment hypothesis".

In the literature, it is not uncommon that the financial market valuation provides an impact on corporate investment even when Q variables are taken into account. Due to asymmetric information, corporate investment is financially constrained by the availability of internal funds, and the market valuation of firms as collateral value. Among the large body of financial constraint studies, Fazzari, Hubbard, and Petersen (1988a) provide evidence that corporate investment is sensitive to firm internal cash. Baker, Stein, and Wurgler (2003) show that more equity-dependent firms' investment is more sensitive to market valuation.[5]

While our new findings contribute to the debate that links the financial market to corporate investment, it is distinctively different from the financial constraint literature because the latter would naturally predict a positive relationship between stock liquidity and investment.[6] In sharp contrast, our evidence implies low corporate investment following high stock liquidity. This intuition, seemingly surprising, is consistent with Baker and Stein (2002): stock liquidity represents investor sentiment.

The conflicting results offer a new puzzle in the literature of corporate investment. Our explanation is based on the representation of stock liquidity. In our article, stock liquidity is used primarily as a proxy for investor sentiment. It does not necessarily contain all

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[5] The equity dependence channel is actually financial constraint channel, especially when investors are too pessimistic. Managers may have to forgo good investment opportunities because it is too costly to finance them with undervalued equity. Nevertheless, for firms with ample internal funds, there is no such problem.

[6] For example, Baker, Stein and Wurgler (2003) find a positive relationship between investment and stock valuation (proxied by Q), especially for those firms that are highly equity-dependent. Their proxy for equity-dependence is KZ index, which is also widely used as a proxy for financial constraints.

relevant information of market valuation. Thus, our results show a relationship between investor sentiment, especially investor *optimism*, and corporate investment. On the other hand, the financial constraint literature matters especially when investors are *pessimistic* (e.g. Barberis and Thaler (2003)). In addition, there is still no direct empirical evidence showing a positive relationship between financial constraint and corporate investment, due to the lack of appropriate proxy for financial constraint.[7] Although the overall relationship between financial market valuation and corporate investment remains unclear, our empirical evidence casts the first stone on the relationship between market *overvaluation* and corporate investment. We thus think this is the main contribution of our article to the literature.

The rest of the article is organized as follows. Section 2 briefly reviews previous research. Section 3 describes the data and Section 4 conducts regression analysis. We provide a conclusion in Section 5.

1.2 Previous Research

1.2.1 Financial Market is Important for Corporate Investment Decisions

Standard Q theory predicts that investment opportunities are summarized by market valuation of capital stock (marginal Q), and thus, there should be no link between the financial market and corporate investment when Q variables are controlled for. To see it, following the standard investment literature (e.g., Cochrane (1996) and Hubbard (1998)), we assume that a firm maximizes its present value,

[7] The use of KZ index looks like a way out but is still very controversial.

$$V(k_t,\theta_t) = \max E_t[\sum_{j=0}^{\infty} m_{t,t+j}(y_{t+j} - i_{t+j})] \tag{1}$$

subject to $$y_t = f(k_t,\theta_t) - c(i_t,k_t) \tag{2}$$

$$k_{t+1} = (1-\delta)(k_t + i_t) \tag{3}$$

where y_t is an output function of production $f(k_t,\theta_t)$ and adjustment cost function $c(i_t,k_t)$. k_t is capital stock, i_t is investment, θ_t is an exogenous shock to the production function, and δ is depreciation rate. m_t is the stochastic discount factor that prices asset return. We assume there is no exogenous shock to the cost adjustment function.

The first order condition is thus

$$E_t \sum_{j=1}^{\infty} m_{t,t+j}(1-\delta)^j [f_k(t+j) - c_k(t+j)] + (\frac{\partial y_t(k_t,\theta_t,i_t)}{\partial i_t} - 1) = 0 \tag{4}$$

this is equivalent to

$$1 + c_i(t) = q_t \tag{5}$$

where $$q_t = E_t \sum_{j=1}^{\infty} m_{t,t+j}(1-\delta)^j [f_k(t+j) - c_k(t+j)] \tag{6}$$

Similarly, for panel data, we have

$$1 + c_i(i_{it},k_{it}) = q_{it} \tag{7}$$

where $q_{it} = E_t \sum_{j=1}^{\infty} m_{i,t+j}(1-\delta)^j [f_k(k_{i,t+j}, \theta_{i,t+j}) - c_k(i_{i,t+j}, k_{i,t+j})]$

(8)

As Hubbard (1998) suggests, a conventional cost adjustment function in Q literature is given by

$$c(i_{it}, k_{it}) = (\frac{\alpha}{2})[\frac{i_{it}}{k_{it}} - a_i]^2 k_{it} \tag{9}$$

Substituting this cost adjustment function into the first order condition generates the following investment equation, where ε_{it} is optimization error.

$$(\frac{i}{k})_{it} = a_i + \frac{1}{\alpha} q_{it} + \varepsilon_{it} \tag{10}$$

Based on the above analysis, q_{it} is the marginal Q and defined as the present value of profits from new investments. Equation (10) says that investment can be completely predicted by marginal Q. In the empirical literature, average Q constructed from financial market can usually be used as a proxy for marginal Q under certain assumptions.[8]

Evidence supporting this view can be found in as early as Tobin (1969). Fama and Gibbons (1982), and Cochrane (1991, 1996) suggest corporate investment responds to changes in risk premia that the empirical finance literature has found to dominate changes in expected returns. Thus, the market valuation of the assets in the equity market can be used to predict corporate investment.

[8] The assumptions include perfect competition, linear homogeneity of technologies for production, and financing and investment decisions are independent.

The growing financial constraint literature, on the other hand, argues that corporate investment is affected by the availability of internal funds and market valuation. For example, Fazzari, Hubbard and Petersen (1988a) show that internal cash flow is another explanatory variable, in addition to Q, in determining corporate investment. Baker, Stein and Wurgler (2003) follow a model developed by Stein (1996), and show the equity-dependent firms or the firms that are more likely to be financially constrained, are more sensitive to stock valuation.

Another line of literature suggests financial market is an important factor for corporate investment decisions through the inefficiency of the market. Researchers conclude that stock prices contain an important element of misvaluation or sentiment. Thus, cost of capital can deviate from its expected value, this in turn affects corporate investment decisions. Using the above framework, in an imperfect market, since market valuation per se may be biased by the misvaluation, clearly Q is no longer sufficient to proxy for all available investment opportunities. In this case, it is possible that misvaluation can *directly* affect managers and thus corporate investment decisions. Evidence supporting this view can be found as early as in Keynes (1936). Chirinko and Schaller (2001) recently show that even if cash flow variables, such as corporate profits, are considered, the stock market variables retain significant predictive power for corporate investment. Stein (1996) claims, "those firms that are in need of external equity finance will have investment that is especially sensitive to the non-fundamental components of stock prices." Polk and Sapienza (2002) find the firms that are classified as overvalued seem to

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invest more than other firms.[9] Their evidence indicates a link between sentiment and corporate investment. Finally, Baker, Stein and Wurgler (2003) show empirical evidence that, "corporate investment will be sensitive to non-fundamental movements in stock prices, ..., stock prices (they use Q as a proxy) will have a stronger impact on the investment of firms that are 'equity dependent', which implies firms need more outside equity to finance investment."[10]

Like many authors in the behavioral finance literature, we relax the assumption of individual rationality in this article. However, note that an alternative departure from rational expectation equilibrium is to retain individual rationality but relax the consistent beliefs assumption. In this case, investors are rational but will not have *enough* information to figure out the correct distribution for the variables of interest. For example, Leahy and Whited (1996) show uncertainty, instead of sentiment, can negatively affect corporate investment mainly through Q. Other related research in this area also includes a decomposition of Q into fundamental and non-fundamental parts. For example, see Blanchard, Rhee and Summers (1993), Galeotti and Schiantarelli (1994), and Goyal and Yamada (2000). Our research is different because first, we investigate the impact of stock liquidity on corporate investment. Second, if stock liquidity signals investor sentiment, then we want to see whether there exists a *direct* link between

[9] They use accounting accruals and issuance of equity, which are both based on managers' decisions, as proxies for investor sentiment. Arguably, good proxies for investor sentiment should be more related to financial market or investors' decisions, instead of managers' decisions.

[10] Baker, Stein and Wurgler (2003) only show more equity dependent firms' investment is more sensitive to market valuation (proxied by Q). However, we know Q includes information about both fundamentals and non-fundamentals. Because misvaluation or sentiment is more related to non-fundamentals, the relationship between investment and Q is thus an *indirect* link between investment and sentiment.

financial market valuation and corporate investment through investor sentiment. Most importantly, we try to explore the economic intuition behind this link.

1.2.2 Liquidity is an Important Market Factor

We now turn to review some recent developments in liquidity literature. As we discussed above, the different representations of stock liquidity motivate us to investigate whether there is a link between stock liquidity and corporate investment. Stock liquidity gains a great deal of attention recently. First, it represents a priced risk factor in equilibrium. Pastor and Stambaugh (2001) document the links between liquidity and stock returns. Jones (2001) shows that liquidity and transaction cost variables have more predictive power than dividend yields for US stock returns. Chordia, Shivakumar and Subrahmanyam (2000) show that absolute stock returns and volatility are linked to stock liquidity. Amihud (2001) introduces a broadly-defined liquidity that can capture the combined effect of price and volume.

Second, stock liquidity signals investor sentiment. Odean (1998b) theoretically shows overconfidence boosts trading volume. Baker and Stein (2002) use a model featuring a class of irrational investors who under-react to the information contained in trading, and Baker and Stein claim high market liquidity is a mirror of investor sentiment. Empirically, Glaser and Weber (2003), and Statman, Thorley, and Vorkink (2004) both find there is a positive relationship between overconfidence and trading volume or stock turnover.

The newly found evidence seems to support that both market level stock liquidity and firm-level stock liquidity are related to stock returns and have meaningful information content. The evidence also suggests that liquidity may reflect investors' opinions toward firm specific information and could thus signal investor sentiment. Overall, stock liquidity should be an important aspect of the financial market. As we noted before, if there exists a link between financial market and corporate investment, then it is inevitable to investigate whether there is a link between stock liquidity and corporate investment, or whether stock liquidity can predict corporate investment.

1.2.3 Summary of Hypotheses

The main goal of this article is to directly test how stock liquidity affects corporate investment and explore the economic intuition behind it. We summarize five hypotheses about the effect of stock liquidity on corporate investment. The "rational pricing hypothesis" suggests that stock liquidity is a risk factor, and there exists a rational pricing model that can explain the relationships among returns, risk and investment. This hypothesis predicts a positive relationship between liquidity and corporate investment. The "investor sentiment hypothesis" suggests rational managers tend to increase investment according to the low cost of capital, which is however generated by investor sentiment. This hypothesis also predicts a positive relationship between liquidity and investment. The "market sentiment hypothesis" implies that, if high liquidity followed by low stock returns signals investor sentiment, then managers treat low stock returns as a consequence of investor sentiment. As a result, managers reduce investment due to lack of certain knowledge about business conditions and the true value of the risky assets.

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This hypothesis suggests a negative relationship between liquidity and corporate investment. The "agency hypothesis" assumes managers are rational, but they try to use investor sentiment as a cover to build their own "empires". This hypothesis also predicts a positive relationship between liquidity and corporate investment. Finally, the "managerial sentiment hypothesis" supports the idea that investor sentiment can be transferred to managers, and hence affects corporate investment positively. We list these hypotheses in the following table.

Table 1: Summary of Hypotheses

Hypotheses	Corporate Investment
Rational Pricing Hypothesis	+
Investor Sentiment Hypothesis	+
Market sentiment Hypothesis	—
Agency Hypothesis	+
Managerial Sentiment Hypothesis	+

1.3 Data

For the purpose of this analysis, two different datasets are utilized. We collect liquidity related data (e.g. returns and volume) from CRSP and firms' financial and accounting information from COMPUSTAT. The data from COMPUSTAT are based on the following criteria. First, we choose all firms that have valid financial and accounting numbers. We ignore those firms with negative accounting numbers for book assets, capital, or investment. We also drop firms with assets less than 0.5 million, and extreme observations. When considering investment, we include only firms with December as

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Second, because assets in utilities, financial institutions, investment funds and REITs have different trading characteristics from other ordinary equities, we exclude all of them from the sample by deleting observations with SIC code between 4911 and 4941 (utilities), between 6000 and 6081 (financial institutions), and 6722, 6726, 6792 (investment funds and REITs). Above procedures yield 105,016 observations over 42 years, average number of firms per year is 2,500.

Third, we extract data from CRSP by using the firms we obtain from COMPUSTAT. The data include daily returns, daily trading volume, capitalization, price, and total shares outstanding at each year end between 1962 and 2001. Daily variables are used to calculate annual variables. For example, annual stock liquidity is calculated by taking average of all daily stock liquidity during the year. This dataset has smaller number of observations than those in the dataset we obtain from COMPUSTAT, because some firms do not start trading in equity market until recent years, and some firms were delisted after being traded for a while. We also delete some observations with either missing or zero daily volume, because one of the stock liquidity measures is to divide dollar volume by absolute return. To avoid the effect of special stock events such as stock split or repurchase, daily returns greater than 100% or less than −100% are treated as outliers and deleted. The final sample contains 26,966 observations. The average number of firms used per year is 710.

Aggregate real investment data are obtained from Federal Reserve Economic Data (FRED) database. The data include quarterly real gross private domestic investment level between 1947 and 2001. All numbers are seasonally adjusted and scaled by 1996 dollar value. The business cycle data are obtained from National Bureau of Economic Research (NBER). Since NBER offers quarterly data, we treat one specific year as "recession" if at least two quarters are classified as "trough" by NBER. Otherwise, we treat the year as "normal" or "boom". There are 39 years in aggregate data, and nine of them are "recession" years. Alternatively, we identify recession years by using BAA-AAA bond default spread. If the spread in one year is higher than the average spread in past 40 years, then this year is classified as a recession year. This procedure generates very similar business cycle years as does the other approach.

1.4 Methodologies and Results

1.4.1 Dependent and Independent Variables

It is useful to define some basic variables first. The variables used in this article are calculated using merged data described above. We use three measures of corporate investment. Variable *INV1* is a firm's real investment (calculated by dividing capital expenditure (COMPUSTAT data 128) by year beginning total assets (lagged data 6)). Variable *RD* represents a firm's research and development investment (calculated by dividing a firm's research and development (R&D) expense (data 46) by year beginning total assets (lagged data 6)). Variable *INV2* is a firm's total investment (defined as ratio of the sum of capital expenditure and firm's research and development (R&D) expense

(data 46) over year beginning total assets (lagged data 6)). We use three investment variables because there is no consensus that gross investment or net investment is defined as corporate investment. We include net investment (*INV1*), gross investment (*INV2*) and their difference (R&D investment) to identify which one is the dominant variable in this context.

Two liquidity measures are used in this article: a broadly-defined liquidity measure (see the following for the reason why we want to use a broadly-defined measure) introduced by Amihud (2001), and stock turnover. Variable *DLIQ* is a measure of broadly-defined annual firm level stock liquidity. It is obtained by applying following procedures: we first find ratio of daily volume (dollar volume) to daily absolute return, and then average all ratios for each year and each firm.

$$DLIQ_i = \frac{1}{T}\sum_{t=1}^{T}\frac{DollarVolume_{it}}{|r_{it}|} \qquad (11)$$

According to Amihud (2001), if ratio of absolute return to volume is a measure of illiquidity, then the inverse should be a measure of liquidity. Dollar liquidity (*DLIQ*) represents how many dollars are needed if stock return is driven up or down by 1 percent.

Variable *TO* is stock turnover. Daily stock turnover is the ratio of the number of shares being traded per day to total shares outstanding on that day. Annual stock turnover is calculated by averaging all ratios for each year and each firm.

$$TO_i = \frac{1}{T}\sum_{t=1}^{T}\frac{ShareVolume_{it}}{Outstanding_{it}} \qquad (12)$$

Controversies abound over what variables can best proxy for stock liquidity. While stock turnover is a widely used measure of liquidity, there are two reasons why we want to use a broadly-defined liquidity measure. First, the broadly-defined liquidity is defined as ratio of "daily volume" to "absolute value of daily return". It combines both price effect and volume effect. In the literature, many authors often consider two important market factors: price effect (returns, transaction costs, bid-ask spread) *or* volume effect (trading volume, stock turnover) *separately*. Thus their methodologies may be flawed. Second, some traditionally-defined liquidity measures focus on intra-daily data, which is only available for less than one decade. As Gibson and Mougeot (2001) suggest, traditionally-defined liquidity is primarily suited to study the cross-sectional and time-series determinants of liquidity over short-term horizon. However, long-term features are ignored. Stock turnover is also considered in this article for two reasons. First, because stock turnover is a widely accepted measure of liquidity, we want to use it as a robustness check.[11] Second, although our different liquidity measures share similar aspects of liquidity, they might emphasize different things. According to their definitions, dollar liquidity may be more related to transaction cost feature of liquidity. Stock turnover represents more about level of trading activity. We demonstrate how these two liquidity measures respond differently to economic shocks in the Appendix.

Following the literature, we consider two more explanatory variables: Tobin's Q and cash flow (CF). Brainard and Tobin (1968), and Tobin (1969) argue that a firm should invest when Q value is equal to or above 1, where Q ratio is defined as the ratio between the

[11] Baker and Stein (2002) use stock turnover as a proxy for liquidity.

value of firm's assets in capital market and their replacement cost.[12] A firm's investment decision can also be sensitive to firm's cash flow. Cash flow should thus be controlled for. We define Q as the market value of equity plus assets minus book value of equity over assets, that is, market value of equity plus assets (data 6) minus the sum of common equity (data 60) and deferred taxes (data 74) over assets (data 6). Firm's cash flow (*CF*) equals the sum of earnings before extraordinary items (data 18) and depreciation (data 14) over year beginning assets (lagged data6). Moreover, firm's internal cash availability should have an effect on investment. For those firms that have high financial slack, they probably can invest more. We use two measures of financial slack, *SLACK1* is the ratio of cash and short-term investments (data 1) and sales (data 12); the *CASH* is the ratio of cash and short-term investments (data 1) and lagged assets (data 6).

As noted before, some authors have already documented a link between financial market and corporate investment through financial constraint. Thus, to make sure we are investigating a different link, we also control for financial constraint in this article.

1.4.2 Summary Statistics

Before going any further with the discussion, we summarize all independent and dependent variables in Table 2. Overall, firms with higher dollar liquidity usually have higher stock turnover. This confirms that dollar liquidity and stock turnover share similar aspects of liquidity, although they may emphasize different things. They have higher real investment, higher R&D investment, and thus higher total investment. They also have

[12] Some authors use Q as a measure of growth opportunity. For example, see recent works by Bae, Kang, and Lim (2001) and Graham (2000).

better income performance, lower leverage, bigger size, and lower book-market-ratio (BE/ME). Their much lower KZ index suggests they are less likely to be financially constrained.

Firms with higher stock turnover usually have higher dollar liquidity. They have higher real investment, higher R&D investment, and higher total investment. They also have higher leverage, lower book-market-ratio (BE/ME), and higher financial slack. It seems income performance and KZ index are not very sensitive to stock turnover.

1.4.3 Relationship between Liquidity and Corporate Investment at Aggregate Level

We first look at the relationship between liquidity and corporate investment at aggregate level. Because the aggregate investment data from the Federal Reserve only represent real investment, the relationship between liquidity and R&D investment, and the relationship between liquidity and total investment will not be studied at aggregate level. If liquidity does have explanatory power in corporate investment, we should observe such relationship at aggregate level throughout time.

Using average *DLIQ* as a measure of market liquidity, we find a negative link between aggregate real investment and variable *DLIQ*. This link is statistically significant at 10% significance level. The t-statistic is –1.78 and *R*_squared is 85 percent. Using stock turnover *TO* as measure of market liquidity yields same negative relationship but coefficient of liquidity is more statistically significant as t-statistic becomes –2.57. *R*_squared increases to 86 percent. This indicates a negative relationship between market

liquidity and corporate real investment. At aggregate level, the "market sentiment hypothesis" is supported because there is a negative investment adjustment after high liquidity.

To show it graphically, we plot the relationship between liquidity growth rates and investment growth rates. The pattern is illustrated in Figure 3. As liquidity growth increases, market level investment growth decreases. This confirms the story suggested at aggregate level. If liquidity is an indicator of investor sentiment as in the Baker and Stein (2002), when liquidity increases, managers tend to reduce investment. This suggests that evidence at aggregate level supports our market sentiment hypothesis. Namely, managers interpret low stock returns following high liquidity as a consequence of investor sentiment, and thus tend to reduce investment due to the worse-than-expected business conditions and lack of certain knowledge about the fundamental value of the risky assets.

Because different economic circumstances provide different investment opportunities, firms' investment decisions could be different throughout business cycles. Accordingly, we divide sample by business cycles. The results are reported in Table 3. During recession periods, the coefficients of two liquidity measures are both statistically insignificant. During boom periods, however, coefficients of liquidity measures are negative and statistically significant. For example, the t-statistics for coefficients of dollar liquidity and stock turnover are –2.14 and –2.50, respectively. This seems to imply the liquidity negatively affects real investment when economy is booming, but has no impact on real investment when economy is in recession. However, our aggregate results may be driven by sample bias. The reason is that we have only nine observations for recession

years but 30 observations for boom years. In addition, the effect of liquidity on real investment is currently studied at aggregate level. The true effect at firm level is still unclear. We will now turn to an examination of the relationship between liquidity and corporate investment at firm level.

1.4.4 Relationship between Firm Liquidity and Corporate Investment at Firm Level

Looking at relationship between stock liquidity and corporate investment at firm level, we first study the relationship between dollar liquidity and corporate investment. Later, we also consider stock turnover as a proxy for liquidity. As previously analyzed, although the main interest is the influence of liquidity on investment, other variables are also included in the regression analysis to make sure the link between liquidity and corporate investment is robust. The regression specification is the following:

$$INVESTMENT_{it} = c_t + f_i + b_0 LIQUIDITY_{it-1} + \sum_{n=1}^{3} b_n Q_{it-n} + \sum_{m=1}^{3} a_m CF_{it-m} + b_4 Slack_{it-1} + t + \varepsilon_{it} \quad (13)$$

Where *INVESTMENT* can be *INV1, RD* or *INV2. LIQUIDITY* can be *DLIQ* or *TO.* c_t is a time-varying intercept, f_i is an individual fixed effect. Because Q and cash flow *(CF)* may be persistent throughout time, we also include Q_{it-2}, Q_{it-3}, and CF_{it-2}, CF_{it-3}, although many other authors include only one lagged Q variable and one lagged cash flow variable in their regression models in the literature.

Table 4 shows the regression results. The results indicate that, as dollar liquidity increases, the real investment decreases. The relationship is negative and statistically significant at 1 percent significance level (t-statistic is –4.51). All *Q* variables and cash flow variables are significant, but *SLACK* variables are not. We also try another liquidity measure *TO* (stock turnover). The results are similar to the case when the variable *DLIQ* is used. Although the magnitude of the t-statistic on coefficient of *TO* drops, it is still very significant (t-statistic=-2.34). In all cases, the evidence suggests a negative relationship between stock liquidity and real investment. This is consistent with the market sentiment hypothesis. Firms with high *Q* values and cash flows tend to invest more controlling for liquidity. This is consistent with Hubbard (1998) that both *Q* and cash flow have explanatory power for corporate investment in an imperfect capital market. It seems that financial slack is not important for real investment when liquidity, *Q* and cash flow are all accounted for.

We also study the effect of liquidity on R&D investment. Many authors find firms' capital expenditure and R&D expense represent different characteristics of corporate investment decisions. Basically, real investment represents investment mostly in physical assets. R&D expense is the investment mostly in intangible assets, thus it is riskier. R&D investment also implies long-term commitment of a firm's growth. For example, see Griliches (1979), Chan, Martin and Kensinger (1990), Hall (1993). To test the link between R&D investment and liquidity, we use R&D expense as dependent variable and run above regression again. The results shown in Table 4A indicate the relationship between dollar liquidity and R&D is negative, although this relationship is marginally

significant (t-statistic is -1.68). However, the coefficient of stock turnover is statistically insignificant (t-statistic is 0.25, see Table 4B). This shows a weak link between R&D investment and liquidity. One possible explanation is that R&D investment is usually financed by internal funds, thus the link between R&D investment and market valuation is relatively weak. For example, see Himmelberg and Petersen (1994), and Hall (1992).[13] Therefore, the link between financial market and corporate investment should have no role of the R&D investment.

Replacing investment *INV1* with *INV2* generates very similar results. The relationship between liquidity and total investment is negative and the magnitude of t-statistic of liquidity increases. For example, the t-statistic of coefficient of *DLIQ* becomes –5.24, compared to –4.51 in the case of *INV1*. This shows that as liquidity increases, the total investment level will decrease. Once again, the market sentiment hypothesis is supported because managers interpret low stock returns following high liquidity as a consequence of investor sentiment rather than cheap cost of financing, and thus tend to reduce investment due to the worse-than-expected business conditions and lack of certain knowledge about the true value of the risky assets. Low-dividend manufacturing firms are of special interest for financial economists. We restrict to the subsample similar to the low-dividend manufacturing sample used by Kaplan and Zingales (1997). That is, we use manufacturing firms in SIC 2000 to 3999. The results in Table 5A and Table 5B show that using manufacturing firms does not change our results, and that the effect of

[13] Himmelberg and Petersen (1994) show firms' R&D spending changes are explained substantially by internal finance changes. Using a panel of R&D spending in U.S. manufacturing firms, Hall (1992) concludes that internal funds affect R&D.

sentiment is even stronger. For example, the coefficient of dollar liquidity is more statistically significant.

The well-known story of standard Q theory is clearly not supported by our analysis. Our results report that, in addition to Q, cash flow, and financial slack, misvaluation also has explanatory power for corporate investment. This precisely underlies the empirical findings in Ferderers (1993) that Q is not the only channel that has explanatory power for corporate investment decisions. The alternative hypotheses (rational pricing hypothesis, investor sentiment hypothesis, agency hypothesis and managerial sentiment hypothesis) are not supported because most of the coefficients of liquidity variables are not positive. Overall, our results show market valuation plays an important role in corporate investment, and thus there exists a direct link between financial market and corporate investment through investor sentiment. We also use *share* liquidity and trading volumes as robustness checks. Trying different liquidity proxies, however, does not quantitatively change our results, thus we do not report those results here.

1.4.5 Business Cycle

To investigate the effect of liquidity on investment under different economic circumstance, we group firms into two categories: recession and boom. Notice that we include only one lag for Q or cash flow (CF) because we do not have many consecutive recession years. The results are provided in Table 4A and Table 4B. We find that, during recession periods, the coefficient of dollar liquidity is statistically significant for real investment and the total investment. The coefficients of stock turnover for real

investment and total investment are also statistically significant (t=-3.01, -2.80, respectively). Our results suggest that firm level sentiment can emerge even during recession periods. To confirm this possibility, we use manufacturing firms again. We find that, although the sentiment effect is not significant for R&D investment, it is very significant for both real investment and total investment during recession period (t=-5.49, -3.22, respectively). This evidence is further confirmed by trying stock turnover as liquidity measure.

During boom periods, the relationship between liquidity and real investment is also negative and statistically significant. This is again consistent with our market sentiment hypothesis. The dollar liquidity has a significantly negative impact on real investment but the effect on R&D is not statistically significant. The t-statistics are –4.93 and -1.47, respectively. The negative coefficient of dollar liquidity for *INV2* (total investment, t=-4.23) confirms that managers want to reduce total investment when liquidity becomes high. When using stock turnover, the coefficient of liquidity for real investment becomes insignificant (t=-1.34). Using manufacturing subsample generates stronger results. The coefficients of two liquidity measures are more statistically significant (t=-5.70, -2.66, respectively) for real investment. Again, the coefficients of two liquidity measures are statistically insignificant for R&D investment. It is worth noting that the sentiment effect is stronger when the economy is poor than when it is good. It appears that market irregularity draws more concern from managers when the economy is bad. We propose a possible explanation for this. The firm level sentiment may be masked by whole market sentiment level when overall economy is hot. Nevertheless, the investor sentiment can gain more attention when economy is cold. This induces managers to believe investor

sentiment is more credible in this situation, the consumption and demand would soon decline to fundamental levels. Hence, managers reduce real investment.

However, we find weak evidence showing the relationship between liquidity and R&D investment is positive during recession period and no relationship between liquidity and R&D expense during boom period. This may be because managers try to use R&D investment as long-term commitment of growth during recession periods when they think the actual business conditions may be worse than expected. In addition, firms' R&D investment is usually financed by internal funds; this causes a weak link between R&D investment and market valuation. From Figure 2, we can observe that the growth of R&D investment behaves quite differently from that of real investment. This can explain why the pattern of R&D is different from the pattern of real investment.

The well-known story of standard Q theory is clearly not supported by our analysis. Our results report that, in addition to Q, cash flow, and financial slack, misvaluation also has explanatory power for corporate investment. This precisely underlies the empirical findings in Ferderers (1993) that Q is not the only channel that has explanatory power for corporate investment decisions. The alternative hypotheses (rational pricing hypothesis, investor sentiment hypothesis, agency hypothesis and managerial sentiment hypothesis) are not supported because most of the coefficients of liquidity variables are not positive. Overall, our results show market valuation plays an important role in corporate investment, and thus there exists a direct link between financial market and corporate investment through investor sentiment. We also use *share* liquidity and trading volumes

as robustness checks. Trying different liquidity proxies, however, does not quantitatively change our results, thus we do not report those results here.

1.4.6 Relationship between Firm Liquidity and Corporate Investment When Different Firm Characteristics Are Considered

We study how different characteristics of firms affect the investor sentiment effect on corporate investment. If the effect of market sentiment is particularly important for some firms, we would expect it to be more pronounced for the subsample that includes those firms. We add more flavors into this article by sorting our data into subsamples based on relative liquidity, financial constraint, leverage, firm size, BE/ME, and income performance. After sorting, then we run above regression analysis by using these subsamples accordingly.

1.4.6.1 Relative Liquidity

Firm level liquidity may be masked by market-level liquidity. If liquidity is a signal of investment sentiment, then investor sentiment should be stronger for firms that have liquidity higher than market-level liquidity. We thus expect that firms with relatively higher than market-level liquidity have stronger sentiment effect on corporate investment. To test this issue, we first make a *market liquidity index*. The market liquidity index is formed by taking value-weighted average of all firms in the sample for each year. The reason why we use value-weighted average is that big firms should provide more liquidity to the whole market. The *relative liquidity* is then computed by dividing each firm's liquidity by market liquidity index. The firms with a relative liquidity greater than

one are thus firms with high liquidity. We sort the firms by relative liquidity. That is, we split the sample into two subsamples, one has the top 50 percent relative liquidity, the other has the bottom 50 percent relative liquidity, and then we run above regressions again.

Using the top 50 percent relative liquidity, we find firms tend to reduce real investment as liquidity increases. Table 6 shows that all coefficients of liquidity measures for real investment (*INV1*) are negative and statistically significant. The market sentiment effect is not statistically significant for R&D expense regardless which liquidity measure is used as a proxy for liquidity. Using the bottom 50 percent relative liquidity (results shown in Table 6), the coefficient of dollar liquidity for real investment is no longer significant, but the coefficient of stock turnover is still significant. However, it is not as significant as in the top 50 percent relative liquidity subsample. The results suggest that firms with high relative liquidity have stronger sentiment effect. The t-statistic of dollar liquidity for real investment is –5.00 for firms with high relative liquidity, but only 0.82 for firms with low relative liquidity. The t-statistic of stock turnover for real investment is –3.24 for firms with high relative liquidity, and –2.13 for firms with low relative liquidity. Since some of the liquidity coefficients are still statistically significant for firms with low relative liquidity, even if a firm's liquidity is relatively lower, managers may want to take market sentiment into account when they make investment decisions. The evidence shown above verifies that individual *firm level* sentiment is important for corporate decisions.

1.4.6.2 Financial Constraint

As we discussed above, a link between financial market and corporate investment has been established through financial constraint. We control for this link to make sure the link we are investigating is a new one. Our proxy for financial constraint is KZ index based on Kaplan and Zingales (1997). They run a probit regression which models the probability of financial constraint as a function of a firm's cash flow, Q, leverage, dividend payout and cash balance. The firms with high KZ index are more likely to be financially constrained.[14] See Lamont et al. (2001), Baker, Stein and Wurgler (2003), Polk and Sapienza (2002), or Almeida, Campello and Weisbach (2002) for a similar approach. We split the sample into two subsamples according to this index (KZ index): the top 50 percent KZ firms and the bottom 50 percent KZ firms. Note that the top 50 percent KZ firms are more likely to be financially constrained.

The results are presented in Table 7. We find the coefficients of dollar liquidity or stock turnover are statistically significant for real investment regardless of financial constraint. The t-statistic of dollar liquidity is –3.80 for the subsample with bottom 50 percent KZ index, and it is –3.68 for the subsample with top 50 percent KZ index. The t-statistic of stock turnover is –3.95 for the subsample with bottom 50 percent KZ index, and it is –2.12 for the subsample with top 50 percent KZ index. Our results show investment-liquidity sensitivities are strong regardless of presence of financial constraints. However, the evidence on R&D investment is mixed for different liquidity proxies. Using dollar liquidity, we find no effect on R&D investment. Using stock turnover, for the low KZ

[14] The KZ index model and coefficients are as follows,

$$KZ = -1.002 \times CashFlow + 0.2826 \times Q + 3.14 \times Leverage - 39.37 \times Dividends - 1.315 \times CashBalance$$

index firms, there is evidence supporting sentiment effect; but for the high KZ index firms, we find the relationship between R&D investment and liquidity is positive. Actually, the question whether KZ index is a legitimate proxy for financial constraint itself is very controversial. Finally, trying total investment (*INV2*) also generates statistically significant sentiment effect. Our results confirm a new link between financial market and corporate investment through sentiment, especially when investors are too optimistic.

1.4.6.3 Leverage

How can a firm's leverage affect our results? Usually, firms with low leverage have relatively high portion of equity in the capital structure. Do firms with more equity care more about sentiment effect? We want to answer this question in this section. The total sample is split into two subsamples according to leverage ratio.

Consistent with Stein (1996) and Baker, Stein and Wurgler (2003) --- firms that are more dependent on external equity finance will have investment more sensitive to non-fundamental components of stock prices, evidence shown in Table 8 confirms that firms with low leverage will consider more about market sentiment effect. For the firms with low 50 percent leverage, managers tend to reduce real investment when liquidity is high. The coefficients of dollar liquidity and turnover are both statistically significant and negative (t=-3.90 and t=-2.95, respectively). The coefficients of all liquidity measures for total investment (*INV2*) are also statistically significant and negative. However, for the high 50 percent leverage firms, the coefficient of stock turnover for real investment is

insignificant, but the coefficient of dollar liquidity for real investment is still statistically significant. The results confirm that firms with high portion of equity (low leverage) will consider sentiment effect when making investment decisions. But there is weak evidence indicating even firms with low portion of equity will also consider sentiment in investment decisions. The evidence for R&D investment is mixed. Using dollar liquidity, we find sentiment effect only for high leverage firms (t=-3.44). Using stock turnover, we find no sentiment effect on R&D investment. Again, mixed evidence on R&D investment suggests real investment is the dominant investment variable that is affected by investor sentiment.

1.4.6.4 Income Performance

Does a firm's current income performance affect the effect of sentiment on corporate investment? Intuitively, if a firm's current performance is good, managers may think the current investment is good, and try to expand output and investment until, at the margin, earnings on investment return to competitive-equilibrium level. Or, at least, they do not want to reduce investment, even if the sentiment is high. On the other hand, managers themselves may not know when earnings on the investment return to competitive-equilibrium level. Since good performance has induced more investment in the past, they thus reduce investment whenever sentiment indicates worse-than-expected business conditions. We test these two views in this section. Our income performance is defined by dividing firms' net income by lagged total assets. We group the sample into two subsamples by income performance.

In Table 9, we find strong evidence showing firms with better income performance actually reduce real investment more significantly. The t-statistic of dollar liquidity for the high 50 percent income performance is –4.45, compared to –3.16 in the case of the low 50 income performance. The t-statistic of stock turnover is –2.25 for firms with high 50 percent income performance, compared to –0.79 in the case of the low 50 income performance. This may be explained by the second view that firms with better past income performance are easier to generate investor sentiment in the capital market. In addition, these firms have already had more investment in place. In this sense, only firms have been doing more investment can reduce investment when sentiment is high. However, we also find evidence that firms with better income performance are not willing to reduce R&D investment when sentiment is high. For example, only the coefficient of dollar liquidity for low performance firms is significantly negative. This suggests that firms, which have being doing well, are willing to keep R&D investment level for long-term growth commitment even sentiment is high.

1.4.6.5 Firm Size

Firm size may also play a role in this context. Big firms usually are able to do more real investment, but small firms usually have to do more R&D investment to gain market shares. This can be seen in our sample. Overall, big firms have average of 0.098 in real investment and 0.038 in R&D investment. Small firms have average of 0.083 in real investment but 0.042 in R&D investment. As a result, if market sentiment really matters for both types of investment, it would affect big firms more on real investment but small firms more on R&D investment.

The results shown in Table 10 support above supposition. Regardless which liquidity measure we use, big firms try to reduce real investment but small firms try to reduce R&D investment when investor sentiment becomes high. For big firms, the coefficients of liquidity for real investment are all negative and statistically significant (t=-5.59, t=-2.55, dollar liquidity and turnover, respectively). For small firms, the coefficients of liquidity for R&D investment are all negative and statistically significant (t=-3.25, t=-2.28, dollar liquidity and turnover, respectively). Overall, the sentiment effect is stronger for firms with bigger size.

The statistically significant relationship between R&D investment and liquidity should not be surprising for small firms, although we usually document a weak link between R&D investment and market valuation in other cases. The reason for this is that small firms try to use R&D investment to gain market shares, since their internally generated fund (cash flow) is usually relatively small (in our sample, small firms' cash flow is 0.080, compared to big firms' 0.126), thus they need to rely on external funds to finance R&D investment. Therefore, the relationship between R&D investment and market valuation for small firms are relatively strong.

1.4.6.6 Book-to-Market (BE/ME) Ratio

Finally, we study how book-to-market (BE/ME) ratio affects our hypothesis. We find firms with low BE/ME are more significantly affected by sentiment effect (See Table 11). For low BE/ME firms, the t-statistic of dollar liquidity is –5.40, but it is only –1.34 for

high BE/ME firms. Using stock turnover confirms our conclusion. The t-statistic is –3.98 for low BE/ME firms but –0.71 for high BE/ME firms. This is because that low BE/ME firms usually have better growth opportunities and thus have been investing more. We find no evidence that sentiment effect affects firms' R&D investment for either high BE/ME firms or low BE/ME firms.

1.4.7 Tests of Joint Effects

From the above analysis, we know relative liquidity, leverage, income performance, firm size, and book-to-market ratio all play important roles. They may interact with each other. Some joint effects related to relative liquidity are analyzed a examples. We study how relative liquidity interacts with leverage, BE/ME, income performance and financial constraints on the market sentiment hypothesis. Then we briefly study joint effect of leverage and BE/ME, and joint effect of firm size and income performance. Other combinations of variables can also be tested. For simplicity, those results are not reported in the article.

For each joint effect, we split the sample into four subsamples based on variables of interest. For example, to test the joint effect of relative liquidity and leverage, we first split the sample into two subsamples according to relative liquidity (top 50 percent vs. bottom 50 percent), then for each subsample, we further split it into two subsamples according to leverage. Therefore, in total we use four subsamples: the bottom 50 percent relative liquidity and the bottom 50 percent leverage, the bottom 50 percent relative liquidity and the top 50 percent leverage, the top 50 percent relative liquidity and the

bottom 50 percent leverage, the top 50 percent relative liquidity and the top 50 percent leverage.

We find the firms with high relative liquidity and low leverage have strongest market sentiment effect. The results are reported in Table 12. The t-statistic of dollar liquidity is –3.75 and that of turnover is –3.39. This is consistent with our previous results. Because the coefficient of dollar liquidity is always statistically significant and negative for the firms with high relative liquidity regardless of the leverage, it seems firms consider relative liquidity more than leverage when sentiment is high. However, this result is not supported by stock turnover. We think this may be due to the difference in our liquidity measures. The results about R&D investment is mixed. The joint effect of relative liquidity and income performance is more interesting. For real investment, when we use dollar liquidity, there is strong sentiment effect for the firms with high relative liquidity regardless of income performance (t=-3.02, t=-5.09, low income performance and high income performance, respectively). But when we use stock turnover, we find strong sentiment effect for the firms with high income performance regardless of relative liquidity (t=-2.29, t=-2.38, low relative liquidity and high relative liquidity, respectively). It appears that managers who consider transaction cost feature of liquidity would consider relative liquidity more than income performance when sentiment is high. While managers who consider trading activity feature of liquidity would consider income performance more than relative liquidity. Our results also show managers try to consider relative liquidity more than financial constraint when sentiment is high. Because no matter which liquidity measure we use and no matter financial constraint is high or low, the coefficients of liquidity for real investment are always significantly negative for the firms

with high relative liquidity. Finally, we find strong market sentiment effect for the firms with high relative liquidity and low BE/ME. The evidence is supported by both dollar liquidity and stock turnover. See Table 13, Table 14 and Table 15 for the results.

Table 16 shows the relationship between liquidity and real investment is negative and statistically significant for subsample with low leverage and low BE/ME. Using dollar liquidity, the t-statistic of the coefficient is –3.72. Using stock turnover, the t-statistic is –4.35. We also find the joint effect of income performance and BE/ME is the most significant for subsample with high income performance and low BE/ME. When dollar liquidity is used, only firms with high income performance and high BE/ME will significantly reduce R&D investment when sentiment is high. Table 17 reports that the firms with better income performance and bigger firm size will significantly reduce the real investment when sentiment is high. However, for most of the joint effect regressions, the effect of investor sentiment on R&D investment is weak. Above results are all confirmed by both liquidity measures. Similarly, the other joint effects can also be analyzed. Overall, we find the evidence that is consistent with our previous results in subsamples. We confirm that different variables do offset with each other.

1.4.8 Portfolio Approach with Different Benchmark

We use a portfolio approach to further confirm that the market overvaluation does have effect on corporate investment decisions. We want to use the portfolio approach because it is less likely to be affected by outliers. For example, if only a few firms have very high liquidity and consequently reduce investment significantly, it is possible that our results

are mainly driven by those firms. In addition, we want to try different benchmarks for subsample selections. Previously, we simply split the whole sample into two subsamples (top 50 percent and bottom 50 percent). Now we form portfolios based on NYSE stocks. Like many other authors, we only consider the portfolio formed based on size and book-to-market (BE/ME) ratio in this article. The portfolios based on other variables should exhibit similar patterns. As we mentioned above, four portfolios (*S/L, S/H, B/L and B/H*) are formed yearly from a simple sort of firms into two group on market equity value (ME) and another sort into two groups on BE/ME. Two BE/ME groups are based on the breakpoints for the bottom 50 percent (low) and the top 50 percent (high). We regress investment variables on liquidity variables, *Q* variables, cash flow variables, and financial slack. Because there is no clear time trend in investment variables, we do not include a time variable in the time-series regressions using portfolios.

The results are presented in Table 18A and Table 18B. We find sentiment effect is not trivial because more than two portfolios (out of four portfolios) exhibit strong sentiment effect. Using dollar liquidity, we find three portfolios *S/L, B/L* and *B/H* have strong market sentiment effect but portfolio *B/L* has the strongest. For example, the coefficient of dollar liquidity for real investment is –6.04 for the portfolio *B/L*. This is consistent with our previous results. Namely, firms in the portfolio with big size and low BE/ME are most likely to reduce real investment when sentiment is high. Significant sentiment effect in portfolios *S/L* and *B/H* may be due to either big size or low BE/ME. Using stock turnover as liquidity measure, we also find the strongest market sentiment effect in big firms with low BE/ME. The t-statistic for real investment is –3.05 for the portfolio *B/L*.

Overall, our portfolio results support our market sentiment hypothesis for firms with big size and low BE/ME.

However, we do not find evidence showing there exists sentiment effect on firms' R&D investment. We find firms with small size and low BE/ME tend to increase R&D investment. This may be explained by the fact that most of the R&D investment is financed by internal funds, thus the relationship between R&D investment and valuation is relatively weak. We also use manufacturing firms to form portfolios based on firm size and BE/ME. Our results show even stronger sentiment effect for the portfolio with big firms and low BE/ME. For dollar liquidity, the t-statistic is –7.49, compared to –6.04 in previous case. For stock turnover, t-statistic is –5.03, compared to –3.05 in previous case. Again, we find no evidence supporting the existence of market sentiment effect on manufacturing firms' R&D investment. The results are not reported in this article.

1.4.9 Considering All Relevant Variables in One Regression

Finally, we consider all relevant variables in one regression specification. The purpose of doing this is to assure our stock liquidity measures do not capture other things such as income performance, size, etc. The dependent variables are three investment measures. The independent variables include lagged liquidity, Q variables, cash flow variables, lagged financial slack, lagged business cycle, lagged income performance, lagged leverage, lagged size, lagged BE/ME, lagged KZ index, and a time trend. The regression model is the following.

$$INVESTMENT_{it} = c_t + f_i + b_0 LIQUIDITY_{it-1} + \sum_{n=1}^{3} b_n Q_{it-n} + \sum_{m=1}^{3} a_m CF_{it-m} + b_4 Slack_{it-1} + d_1 CYC_{it-1} + d_2 INCPF_{it-1} + d_3 LEVR_{it-1} + d_4 SIZE_{it-1} + d_5 BEME_{it-1} + d_6 KZ_{it-1} + t + \varepsilon_{it} \quad (14)$$

Table 19 shows the results. Using dollar liquidity as a measure of liquidity, we find significant negative relationship (t=-6.16) between real investment and stock liquidity after controlling for business cycle, income performance, leverage, size, BE/ME, and KZ index. Using stock turnover yields identical results (t=-2.79 for the coefficient of stock turnover). The evidence suggests that liquidity measures do not capture other variables such as income performance, size, leverage, BE/ME, or KZ index. This implies that the link we documented in this article is the link between market sentiment and corporate investment.

1.5 Conclusions

In this article, we find a significant negative relationship between stock liquidity and corporate investment. The negative relationship is consistent with the "market sentiment hypothesis" that managers tend to interpret low stock returns following high liquidity as a consequence of investor sentiment, they thus reduce investment due to worse-than-expected business conditions and lack of certain knowledge about the fundamental value of the risky assets. Our results are consistent with the findings in Baker and Stein, Glaser and Weber (2003), and Statman, Thorley, and Vorkink (2004). All of them find a positive

link between sentiment and trading volume or stock liquidity. Other hypotheses that predict a positive relationship between stock liquidity and corporate investment are not supported by our data.

The evidence shown in this article indicates a direct link between financial market valuation and corporate investment through sentiment channel. However, this channel is different from the one documented in financial constraint literature (e.g. Baker, Stein, and Wurgler (2003)), in which the financial constraint positively links market valuation to corporate investment when managers have to forego some investments due to low valuation, otherwise it would be too costly for firms to raise funds in financial market. However, when market valuation improves, corporate investment also increases. Our results indicate misvaluation, especially optimistic investor sentiment, can negatively link market valuation to corporate investment.

Further, we split sample into subsamples according to business cycle, relative liquidity, firm size, book-to-market, income performance, financial constraint, and leverage. We find that the negative relationship between stock liquidity and corporate investment is more significant during the recession periods, and for the firms with higher relative liquidity (liquidity that is higher than market level liquidity). The bigger firms or the firms with lower book-to-market (BE/ME) ratios have more significant relationship too. Also noteworthy is that the firms with lower leverage ratios exhibit more significant relationship.

However, our results appear to suggest that the relationship between liquidity and R&D investment is not significant. This can be explained by the fact that most of the R&D

investment is usually financed by internal funds, thus the relationship between R&D investment and financial market valuation is relatively weak. In addition, because firms tend to use R&D investment to make long-term commitment of growth, this also makes the impact of sentiment on R&D investment small. Finally, Chordia, Shivakumar and Subrahmanyam (2000) find there exists a channel whereby stock returns are influenced by lagged information: through the influence of information on liquidity. We document the evidence of a similar channel whereby investment growth can also be affected by lagged information through the influence of information on liquidity.[15] This is consistent with the findings in Fama and Gibbons (1982), and Cochrane (1991) that equity returns and investment growth behave alike. Li (2004) confirms this argument by documenting a significant decline in investment growth following seasoned equity or debt offerings, which are usually associated with a significant liquidity run-up prior to offerings.

Even if it were possible to conclusively establish a link between stock liquidity and corporate investment, whether these two phenomena are causally linked would remain a matter of speculation. However, should the investors be incapable to identify the actual purpose of managers, or should the decisions be considered necessary by the managers in the name of investor interest, there exists evidence saying that managers tend to be cautious when market becomes hot, especially given the irreversible nature of most corporate investment.

[15] Our channel is different from the one in Chordia, Shivakumar and Subrahmanyam (2000). They focus on the compensation demanded by *investors* for illiquidity. We focus on the consequence of investor sentiment on *managers'* investment decisions. However, both channels are through stock liquidity.

Finally, our results are different from the evidence shown in Polk and Sapienza (2002). Often research opinion may be ambiguous or divided on issues, while differences in research opinions and empirical evidence may exist concerning the appropriate standards of testing methods and suitable proxies. Polk and Sapienza use three proxies of investor sentiment to show a positive relationship between sentiment and corporate investment. However, their two proxies -- discretionary accruals and new equity issues – are both based on managers' decisions instead of investors' decisions. Arguably, since investor sentiment is directly reflected in the capital market, good proxies should be the ones that are closely related to the market factors. In this sense, Polk and Sapienza might actually test the relationship between managerial sentiment and corporate investment. Their results could thus be interpreted to be consistent with our "managerial sentiment hypothesis". But, even though, it is still possible that they documented a link between corporate investment and other things, because there is no theory explaining discretionary accruals and new equity issues are the proxies for managerial sentiment, although they are both related to managers' decisions.

APPENDIX 1A Tables and Figures

Table 2: Summary statistics of variables

Q is defined as the market value of equity plus assets minus book value of equity over assets, that is, CRSP market value of equity plus COMPUSTAT data 6 minus the sum of data 60 and data 74 over data 6, where data 60 is common equity and data 74 is deferred taxes on balance sheet. Firm's cash flow (*CF*) equals the sum of earnings before extraordinary items (data 18) and depreciation (data 14) over year beginning assets (lagged data6). There are two measures of liquidity: *DLIQ* and *TO*. Variable *DLIQ* is obtained by taking average of ratio of daily volume (dollar volume) to daily absolute return for each year and each firm. *DLIQ* is scaled by 1,000,000. *TO* is stock turnover. There are three measures of corporate investment. Variable *INV1* is calculated by dividing capital expenditure (COMPUSTAT data 128) by year beginning total assets (lagged data 6). *INV2* is calculated by dividing sum of capital expenditure and firm's research and development expense (data 46) by year beginning total assets (lagged data 6). *RD* is research and development (data 46) divided by total assets (data 6). *ME* is the market value of equity. *BE/ME* is common equity (data 60) plus deferred taxes (data 74) and then divided by market value of equity. *SLACK1* (financial slack) is the ratio of cash and short-term investments (data 1) and sales (data 12). *INCPF* is a firm's income performance, which is defined as net income (data 13) divided by year beginning assets (data 6). *LEV* is a firm's leverage ratio, it is sum of a firm's debt (data 9 plus data 34) divided by sum of debt and shareholders' equity (data 216). KZ index is calculated by using following equation,

$$KZ = -1.002 \times CashFlow + 0.2826 \times Q + 3.14 \times Leverage - 39.37 \times Dividends - 1.315 \times CashBalance$$

ALL SAMPLE

Variable	Obs	Mean	Std. Dev.	Min	Max
inv1	26346	0.08797	0.10775	0	3.016742
rd	12529	0.040812	0.062897	0	1.776369
inv2	12327	0.11972	0.112322	0	3.215579
dliq	25846	646.4528	4949.075	0.001842	243964.8
to	25846	2.277863	3.324645	0.006217	304.0041
q	26966	1.379733	0.916868	0.156812	23.54966
cf	26966	0.09615	0.113317	-1.78163	5.742172
kz	26146	-2.49106	6.006054	-75.4523	8.479383
incpf	26963	0.153526	0.130414	-1.17572	3.373444
lev	26152	0.355987	0.248919	0	2.447893
me	26966	1761.49	10691.25	0.625446	519038.8
BE/ME	26106	0.964574	0.701311	0.000917	9.659767
slack1	26430	0.143673	0.322187	0	6.319299

Table 3: Aggregate level liquidity and aggregate level investment

Aggregate level investment is obtained from Federal Reserve Economic Data (FRED) database. The data include quarterly Real Gross Private Domestic Investment level between 1947 and 2001, all numbers are seasonally adjusted and scaled by 1996 dollar value. The business cycle data are obtained from National Bureau of Economic Research (NBER). Market liquidity is obtained by taking average of all firm's liquidity for each year. We consider two liquidity measures: dollar liquidity and stock turnover. See Table 1 for more variable definition. Robust T-statistic is in the parenthesis. *, **, and *** represent significance at the 1 percent, 5 percent and 10 percent levels respectively.

Aggregate Real Investment

All		Recession		Boom	
dollar liquidity	-0.00018	dollar liquidity	0.00016	dollar liquidity	**-0.00029**
	(-1.78)*		(1.72)*		**(-2.14)****
t	**-0.062**	t	**-0.0978**	t	**-0.0563**
	(-7.78)		**(-8.22)**		**(-6.58)**
intercept	**6.694**	intercept	**9.57**	intercept	**6.217**
	(10.58)		**(9.84)**		**(9.48)**
Obs	39	Obs	9	Obs	30
R_sqrd	85%	R_sqrd	93%	R_sqrd	85%

Aggregate Real Investment

All		Recession		Boom	
stock turnover	**-0.256**	stock turnover	0.0996	stock turnover	**-0.285**
	(-2.57)**		(0.50)		**(-2.50)****
t	**-0.051**	t	**-0.096**	t	**-0.048**
	(-5.50)		**(-4.65)**		**(-5.12)**
intercept	**6.256**	intercept	**9.298**	intercept	**6.029**
	(10.29)		**(7.10)**		**(10.15)**
Obs	39	Obs	9	Obs	30
R_sqrd	86%	R_sqrd	92%	R_sqrd	85%

Table 4: The relationship between liquidity and investment at firm level

Q is defined as the market value of equity plus assets minus book value of equity over assets, that is, CRSP market value of equity plus COMPUSTAT data 6 minus the sum of data 60 and data 74 over data 6, where data 60 is common equity and data 74 is deferred taxes on balance sheet. Firm's cash flow (*CF*) equals the sum of earnings before extraordinary items (data 18) and depreciation (data 14) over year beginning assets (lagged data6). There are two measures of liquidity: *DLIQ* and *TO*. Variable *DLIQ* is obtained by taking average of ratio of daily volume (dollar volume) to daily absolute return for each year and each firm. *DLIQ* is scaled by 1,000,000. *TO* is stock turnover. There are three measures of corporate investment. Variable *INV1* is calculated by dividing capital expenditure (COMPUSTAT data 128) by year beginning total assets (lagged data 6). *INV2* is calculated by dividing sum of capital expenditure and firm's research and development expense (data 46) by year beginning total assets (lagged data 6). *RD* is research and development (data 46) divided by total assets (data 6). *SLACK1* (financial slack) is the ratio of cash and short-term investments (data 1) and sales (data 12); *CASH* (cash balance) is the ratio of cash and short-term investments (data 1) and assets (data 6). Following investment specification is estimated.

$$INVESTMENT_{it} = c_t + f_i + b_0 LIQUIDITY_{it-1} + \sum_{n=1}^{3} b_n Q_{it-n} + \sum_{m=1}^{3} a_m CF_{it-m} + b_4 Slack_{it-1} + t + \varepsilon_{it}$$

Where *INVESTMENT* can be *INV1*, *RD* or *INV2*. *LIQUIDITY* can be *DILQ* or *TO*. c_t is a time-varying intercept, f_i is an individual fixed effect. Because *Q* and *CF* may be persistent, we also include Q_{it-2}, Q_{it-3}, and CF_{it-2}, CF_{it-3}. *Slack* can be either *SLACK1* or *CASH*. We also test above investment specification for under different economic situations. Business cycle data are from NBER. We use two procedures to identify recession years. We treat one specific year as "recession" if at least two quarters are classified as "trough" by NBER. Otherwise, we treat the year as "normal or boom". Alternatively, we identify recession years by using BAA-AAA bond default spread. If the spread in one year is higher than the average spread in past 40 years, then this year is classified as a recession year. This procedure generates very similar recession years as the other approach does. Recession years are 1960, 1970, 1974, 1975, 1980, 1981, 1982, 1990, 1991, and 2001. Boom years are years between 1962 and 2001 but except recession years. Standard error robust T-statistic is in the parenthesis. *, **, and *** represent significance at the 1 percent, 5 percent and 10 percent levels respectively.

Table 4A: The relationship between liquidity and investment at firm level (dollar liquidity)

Fixed Effect Regression

	ALL				RECESSION				BOOM		
	inv1	rd	inv2		inv1	rd	inv2		inv1	rd	inv2
dliqlag	**-1.5e-6**	-3.6e-7	**-2.1e-6**	dliqlag	**-2.8e-6**	1.4e-7	**-2.3e-6**	dliqlag	**-2.0e-6**	-4.0e-7	**-2.1e-6**
	(-4.51)***	(-1.68)*	**(-5.24)*****		**(-5.25)*****	(0.71)	**(-4.57)*****		**(-4.93)*****	(-1.47)	**(-4.23)*****
qlag	**0.015**	**0.006**	**0.018**	qlag	**0.006**	**0.005**	**0.01**	qlag	**0.017**	**0.005**	**0.019**
	(12.01)***	**(5.91)*****	**(10.52)*****		**(2.34)****	**(5.97)*****	**(3.57)*****		**(11.03)*****	**(3.95)*****	**(8.49)*****
qlag2	**-0.007**	-0.0007	**-0.007**	qlag2				qlag2	**-0.009**	0.0001	**-0.008**
	(-5.30)***	(-0.68)	**(-3.76)*****						**(-5.40)*****	(0.10)	**(-3.13)*****
qlag3	**-0.005**	-0.001	-0.003	qlag3				qlag3	**-0.004**	**-0.003**	**-0.004**
	(-4.11)***	(-1.19)	(-1.87)*						**(-2.72)*****	**(-2.28)****	**(-2.09)****
cflag	**0.123**	**0.034**	**0.124**	cflag	**0.199**	0.02	**0.215**	cflag	**0.104**	**0.040**	**0.139**
	(17.67)***	**(6.95)*****	**(13.73)*****		**(10.74)*****	(0.27)	**(7.43)*****		**(12.86)*****	**(7.22)*****	**(13.21)*****
cflag2	**0.054**	**0.012**	**0.051**	cflag2				cflag2	**0.057**	**0.013**	**0.061**
	(9.21)***	**(2.44)****	**(5.54)*****						**(8.65)*****	**(2.16)****	**(5.72)*****
cflag3	**0.033**	-0.007	**0.025**	cflag3				cflag3	**0.050**	-0.008	**0.039**
	(5.54)***	(-1.32)	**(2.62)*****						**(7.05)*****	(-1.23)	**(3.44)*****
slack1lag	-0.00002	**-0.0004**	**-0.0005**	slack1lag	0.0002	**0.0005**	**0.002**	slack1lag	0.00007	**-0.0005**	**-0.0005**
	(-0.11)	**(-5.22)*****	**(-3.15)*****		(0.38)	**(8.91)*****	**(4.85)*****		(0.40)	**(-4.46)*****	**(-2.27)****
t	**-0.0004**	**0.0003**	0.0001	t	**0.0007**	**0.0003**	**0.0008**	t	0.00004	**0.0003**	**0.0005**
	(-4.28)***	**(4.55)*****	(1.18)		**(8.95)*****	**(7.58)*****	**(9.17)*****		(0.68)	**(6.04)*****	**(5.18)*****
intercept	**0.089**	0.0023	**0.07**	intercept	**-0.009**	**0.009**	0.003	intercept	**0.054**	0.002	**0.043**
	(16.93)***	(0.81)	**(10.20)*****		**(-2.52)****	**(14.67)*****	(0.96)		**(15.62)*****	(0.45)	**(8.72)*****
Obs	18019	9207	9056	Obs	4633	2392	2357	Obs	13386	6815	6699
R_sqrd	10%	4%	6%	R_sqrd	9%	15%	8%	R_sqrd	8%	2%	4%

Table 4B: The relationship between liquidity and investment at firm level (stock turnover)

Fixed Effect Regression

	ALL				RECESSION				BOOM		
	inv1	rd	inv2		inv1	rd	inv2		inv1	rd	inv2
tolag	**-0.0009**	0.00007	**-0.001**	tolag	**-0.003**	0.0004	**-0.003**	tolag	-0.0006	0.0004	-0.001
	(-2.34)**	(0.25)	**(-3.03)*****		**(-3.01)*****	(1.39)	**(-2.80)*****		(-1.34)	(1.07)	(-1.51)
qlag	**0.015**	**0.007**	**0.018**	qlag	0.003	**0.006**	**0.008**	qlag	**0.015**	**0.006**	**0.018**
	(11.20)***	**(7.24)*****	**(10.40)*****		(1.10)	**(6.72)*****	**(2.78)*****		**(9.94)*****	**(4.67)*****	**(8.02)*****
qlag2	**-0.008**	**-0.002**	**-0.010**	qlag2				qlag2	**-0.010**	-0.001	**-0.011**
	(-5.62)***	**(-2.06)****	**(-5.29)*****						**(-6.01)*****	(-0.92)	**(-4.60)*****
qlag3	**-0.004**	-0.0010	-0.002	qlag3				qlag3	-0.002	-0.002	-0.002
	(-2.98)***	(-1.07)	(-1.02)						(-1.41)	(-1.56)	(-0.98)
cflag	**0.121**	**0.030**	**0.126**	cflag	**0.184**	0.004	**0.179**	cflag	**0.101**	**0.036**	**0.134**
	(17.55)***	**(6.25)*****	**(14.42)*****		**(10.09)*****	(0.53)	**(6.46)*****		**(12.87)*****	**(5.98)*****	**(13.32)*****
cflag2	**0.056**	0.008	**0.051**	cflag2				cflag2	**0.057**	0.009	**0.060**
	(9.62)***	(1.60)	**(5.74)*****						**(8.72)*****	(1.49)	**(5.92)*****
cflag3	**0.032**	-0.010	**0.023**	cflag3				cflag3	**0.046**	-0.012	**0.036**
	(5.54)***	(-1.94)*	**(2.57)****						**(6.67)*****	(-1.83)*	**(3.35)*****
slack1lag	-0.00004	**-0.0004**	**-0.0005**	slack1lag	0.0002	**0.0005**	**0.002**	slack1lag	0.00002	**-0.0006**	**-0.0005**
	(-0.29)	**(-5.54)*****	**(-3.27)*****		(0.43)	**(7.92)*****	**(4.88)*****		(0.09)	**(-4.71)*****	**(-2.57)****
t	**-0.0002**	**0.0002**	0.00007	t	**0.0008**	**0.0002**	**0.001**	t	0.00009	**0.0003**	**0.0004**
	(-2.38)**	**(2.89)*****	(0.58)		**(8.83)*****	**(5.82)*****	**(9.39)*****		(1.42)	**(4.10)*****	**(4.85)*****
intercept	**0.075**	**0.013**	**0.080**	intercept	-0.007	**0.013**	0.0003	intercept	**0.055**	**0.010**	**0.0429**
	(15.19)***	**(3.33)*****	**(12.20)*****		(-1.87)*	**(20.04)*****	(0.09)		**(14.81)*****	**(2.30)****	**(9.80)*****
Obs	17921	9213	9064	R_sqrd	4601	2392	2356	R_sqrd	13320	6821	6708
R_sqrd	10%	6%	5%	R_sqrd	8%	18%	7%	R_sqrd	8%	5%	4%

Table 5A: The relationship between liquidity and investment at firm level (manufacturing firms and dollar liquidity)

Manufacturing firms are firms with SIC 2000 to 3999. See Table 4 for other definitions.

Fixed Effect Regression

	ALL				RECESSION				BOOM		
	inv1	rd	inv2		inv1	rd	inv2		inv1	rd	inv2
dliqlag	**-1.5e-6**	-3.1e-7	**-2.1e-6**	dliqlag	**-2.6e-6**	3.4e-7	**-1.8e-6**	dliqlag	**-1.9e-6**	-3.9e-7	**-2.2e-6**
	(-5.57)* **	(-1.31)	**(-5.28)*** **		**(-5.49)*** **	(1.85)*	**(-3.22)*** **		**(-5.70)*** **	(-1.30)	**(-4.25)*** **
qlag	**0.013**	**0.004**	**0.016**	qlag	0.003	**0.004**	0.006	qlag	**0.013**	**0.005**	**0.017**
	(10.33)* **	**(3.83)*** **	**(8.49)*** **		(1.30)	**(4.42)*** **	(1.94)		**(9.52)*** **	**(3.20)*** **	**(7.35)*** **
qlag2	**-0.006**	0.0005	**-0.006**	qlag2				qlag2	**-0.008**	0.001	**-0.007**
	(-4.58)* **	(0.40)	**(-2.80)*** **						**(-5.17)*** **	(0.54)	**(-2.72)*** **
qlag3	**-0.005**	-0.001	-0.003	qlag3				qlag3	**-0.003**	-0.003	-0.004
	(-4.33)* **	(-0.99)	(-1.79)*						**(-2.55)** **	(-1.89)*	(-1.75)*
cflag	**0.102**	**0.039**	**0.128**	cflag	**0.252**	0.011	**0.226**	cflag	**0.089**	**0.052**	**0.149**
	(15.29)* **	**(6.57)*** **	**(13.17)*** **		**(10.94)*** **	(1.32)	**(7.34)*** **		**(12.01)*** **	**(6.93)*** **	**(12.85)*** **
cflag2	**0.042**	**0.012**	**0.045**	cflag2				cflag2	**0.040**	0.013	**0.051**
	(6.16)* **	**(2.04)** **	**(4.54)*** **						**(5.36)*** **	(1.79)*	**(4.41)*** **
cflag3	**0.035**	**-0.016**	**0.020**	cflag3				cflag3	**0.038**	-0.014	**0.027**
	(4.98)* **	**(-2.62)*** **	**(2.00)** **						**(4.98)*** **	(-1.74)*	**(2.22)** **
slack1lag	-0.00004	**-0.0004**	**-0.0005**	slack1lag	0.0002	**0.0007**	**0.001**	slack1lag	-0.00002	**-0.0006**	**-0.0005**
	(-0.38)	**(-5.08)*** **	**(-3.29)*** **		(0.49)	**(11.1)*** **	**(4.86)*** **		(-0.13)	**(-4.20)*** **	**(-2.36)** **
t	**-0.0004**	**0.0003**	**0.0003**	t	**0.0005**	**0.0003**	**0.0009**	t	**0.0001**	**0.0004**	**0.0005**
	(-5.08)* **	**(4.30)**	**(2.18)** **		**(7.26)*** **	**(8.58)*** **	**(8.64)*** **		**(2.18)** **	**(5.53)*** **	**(5.64)*** **
intercept	**0.087**	0.005	**0.062**	intercept	**-0.006**	**0.01**	0.001	intercept	**0.047**	0.002	**0.039**
	(18.93)* **	(1.11)	**(8.84)*** **		**(-2.18)** **	**(15.14)*** **	(0.26)		**(16.99)*** **	(0.35)	**(7.36)*** **
Obs	11377	7403	7283	Obs	2922	1924	1895	Obs	8455	5479	5388
R_sqrd	12%	4%	5%	R_sqrd	11%	10%	7%	R_sqrd	10%	2%	4%

Table 5B: The relationship between liquidity and investment at firm level (manufacturing firms and stock turnover)

Manufacturing firms are firms with SIC 2000 to 3999. See Table 4 for other definitions.

Fixed Effect Regression

	ALL				RECESSION				BOOM		
	inv1	rd	inv2		inv1	rd	inv2		inv1	rd	inv2
tolag	**-0.001**	0.0001	**-0.001**	tolag	**-0.003**	0.0001	**-0.003**	tolag	**-0.001**	0.0004	-0.001
	(-3.30)***	(0.49)	**(-2.81)*****		**(-3.27)*****	(0.41)	**(-2.42)****		**(-2.66)*****	(1.10)	(-1.36)
qlag	**0.012**	**0.006**	**0.017**	qlag	-0.0001	**0.005**	0.004	qlag	**0.012**	**0.006**	**0.017**
	(9.42)***	**(5.34)*****	**(9.01)*****		(-0.03)	**(5.87)*****	(1.21)		**(8.05)*****	**(3.97)*****	**(7.07)*****
qlag2	**-0.007**	-0.001	**-0.009**	qlag2				qlag2	**-0.010**	-0.001	**-0.010**
	(-5.08)***	(-0.88)	**(-4.27)*****						**(-6.05)*****	(-0.39)	**(-3.91)*****
qlag3	**-0.004**	-0.001	-0.003	qlag3				qlag3	-0.002	-0.002	-0.002
	(-3.46)***	(-0.84)	(-1.50)						(-1.77)*	(-1.09)	(-0.81)
cflag	**0.102**	**0.032**	**0.125**	cflag	**0.185**	0.011	**0.188**	cflag	**0.086**	**0.039**	**0.140**
	(15.23)***	**(5.29)*****	**(12.86)*****		**(8.81)*****	(1.38)	**(6.39)*****		**(11.78)*****	**(5.22)*****	**(12.15)*****
cflag2	**0.046**	0.007	**0.044**	cflag2				cflag2	**0.043**	0.008	**0.053**
	(6.67)***	(1.09)	**(4.44)*****						**(5.75)*****	(1.04)	**(4.56)*****
cflag3	**0.039**	**-0.021**	0.017	cflag3				cflag3	**0.039**	**-0.020**	0.024
	(5.59)***	**(-3.42)*****	(1.65)*						**(5.01)*****	**(-2.51)****	(1.94)*
slack1lag	-0.00005	**-0.0005**	**-0.0005**	slack1lag	0.0003	**0.0006**	**0.001**	slack1lag	-0.00005	**-0.0006**	**-0.0005**
	(-0.45)	**(-5.32)*****	**(-3.40)*****		(0.86)	**(9.51)*****	**(5.01)*****		(-0.31)	**(-4.40)*****	**(-2.57)****
t	**-0.0002**	**0.0002**	0.0001	t	**0.001**	**0.0003**	**0.001**	t	**0.0002**	**0.0003**	**0.0005**
	(-3.16)***	**(2.66)*****	(0.79)		**(8.97)*****	**(7.08)*****	**(9.44)*****		**(3.08)*****	**(3.46)*****	**(4.56)*****
intercept	**0.076**	**0.017**	**0.081**	intercept	**-0.011**	**0.011**	**-0.007**	intercept	**0.046**	**0.012**	**0.050**
	(17.32)***	**(3.43)*****	**(11.33)*****		**(-3.59)*****	**(16.22)*****	**(-2.18)****		**(16.48)*****	**(2.30)****	**(8.74)*****
Obs	11315	7345	7228	Obs	2902	1906	1879	Obs	8413	5439	5349
R_sqrd	13%	8%	5%	R_sqrd	9%	15%	6%	R_sqrd	10%	7%	4%

Table 6: Relationship between liquidity and investment (Relative Liquidity)

We split sample into two subsamples, one has all firms with top 50 percent relative liquidity; the other one has all firms with bottom 50 percent relative liquidity. Relative liquidity is calculated by dividing each firm's liquidity by market liquidity. The market liquidity is formed by taking value-weighted average of all firms in the sample for each year. Variable *DLIQ* is obtained by taking average of ratio of daily volume (dollar) to daily absolute return for each year and each firm. *DLIQ* is scaled by 1,000,000. Variable *TO* is stock turnover. There are three measures of corporate investment. Variable *INV1* is calculated by dividing capital expenditure (COMPUSTAT data 128) by year beginning total assets (lagged data 6). *INV2* is calculated by dividing sum of capital expenditure and firm's research and development expense (data 46) by year beginning total assets (lagged data 6). *RD* is research and development (data 46) divided by total assets (data 6). Other independent variables are *Q, CF, SLACK* (Coefficients and t-statistics are not reported for simplicity). Standard error robust T-statistic is in the parenthesis. *, **, and *** represent significance at the 1 percent, 5 percent and 10 percent levels respectively.

Panel A: Dollar Liquidity

Bottom 50% Relative Liquidity

	inv1	rd	inv2
dliqlag	0.0001	**-0.0002**	-0.0002
	(0.82)	**(-2.55)****	(-1.19)
Obs	7896	3711	3655
R_sqrd	6%	8%	8%

TOP 50% Relative Liquidity

	inv1	rd	inv2
dliqlag	**-1.6e-6**	-1.4e-7	**-1.9e-6**
	(-5.00)***	(-0.67)	**(-4.79)*****
Obs	10123	5496	5401
R_sqrd	11%	1%	4%

Panel B: Stock Turnover

Bottom 50% Relative Liquidity

	inv1	rd	inv2
tolag	**-0.004**	0.0008	-0.002
	(-2.13)**	(1.28)	(-0.86)
Obs	8333	4125	4046
R_sqrd	9%	14%	17%

TOP 50% Relative Liquidity

	inv1	rd	inv2
tolag	**-0.002**	-0.00003	**-0.002**
	(-3.24)***	(-0.07)	**(-3.12)*****
Obs	9588	5088	5018
R_sqrd	8%	4%	2%

Table 7: Relationship between liquidity and investment (Financial Constraint: KZ index)

We construct an index of firm financial constraints based on Kaplan and Zingales (1997) and sort firms according to this index (KZ index). KZ index is a measure of financial constraints based on five variables: Tobin's *Q*, leverage, cash flow, cash balance and dividends. Then we compare the effect of liquidity on investment. Variable *DLIQ* is obtained by taking average of ratio of daily volume (dollar) to daily absolute return for each year and each firm. *DLIQ* is scaled by 1,000,000. Variable *TO* is stock turnover. There are three measures of corporate investment. Variable *INV1* is calculated by dividing capital expenditure (COMPUSTAT data 128) by year beginning total assets (lagged data 6). *INV2* is calculated by dividing sum of capital expenditure and firm's research and development expense (data 46) by year beginning total assets (lagged data 6). *RD* is research and development (data 46) divided by total assets (data 6). Other independent variables are *Q, CF, SLACK* (Coefficients and t-statistics are not reported for simplicity). Standard error robust T-statistic is in the parenthesis. *, **, and *** represent significance at the 1 percent, 5 percent and 10 percent levels respectively.

Panel A: Dollar Liquidity

	Bottom 50% KZ				Top 50% KZ		
	inv1	rd	inv2		inv1	rd	inv2
dliqlag	**-1.1e-6**	-2.4e-7	**-1.3e-6**	dliqlag	**-3.0e-6**	-9.7e-7	**-4.1e-6**
	(-3.80)* **	(-1.36)	**(-3.34)*** **		**(-3.68)*** **	(-1.51)	**(-3.67)*** **
Obs	8649	3971	3894	Obs	9259	5194	5120
R_sqrd	12%	18%	10%	R_sqrd	16%	9%	1%

Panel B: Stock Turnover

	Bottom 50% KZ				Top 50% KZ		
	inv1	rd	inv2		inv1	rd	inv2
tolag	**-0.002**	**-0.001**	**-0.003**	tolag	**-0.001**	**0.002**	-0.00002
	(-3.95)* **	**(-5.06)*** **	**(-5.98)*** **		**(-2.12)** **	**(3.13)*** **	(-0.02)
Obs	9079	4165	4088	Obs	8737	5008	4936
R_sqrd	13%	12%	5%	R_sqrd	15%	2%	2%

Table 8: Relationship between liquidity and investment (Leverage)

The leverage is defined as the sum of long-term debt (data 9) and debt in current liabilities (data 34) divided by the sum of long-term debt (data 9), debt in current liabilities (data 34) and total stockholders' equity (data 216). Variable *DLIQ* is obtained by taking average of ratio of daily volume (dollar) to daily absolute return for each year and each firm. *DLIQ* is scaled by 1,000,000. Variable *TO* is stock turnover. There are three measures of corporate investment. Variable *INV1* is calculated by dividing capital expenditure (COMPUSTAT data 128) by year beginning total assets (lagged data 6). *INV2* is calculated by dividing sum of capital expenditure and firm's research and development expense (data 46) by year beginning total assets (lagged data 6). *RD* is research and development (data 46) divided by total assets (data 6). Other independent variables are *Q, CF, SLACK* (Coefficients and t-statistics are not reported for simplicity). Standard error robust T-statistic is in the parenthesis. *, **, and *** represent significance at the 1 percent, 5 percent and 10 percent levels respectively.

Panel A: Dollar Liquidity

Bottom 50% leverage				Top 50% leverage			
	inv1	rd	inv2		inv1	rd	inv2
dliqlag	**-1.6e-6**	2.1e-7	**-1.1e-6**	dliqlag	**-3.0e-6**	**-1.4e-6**	**-5.0e-6**
	(-3.90)* **	(0.78)	**(-2.32)** **		**(-5.45)*** **	**(-3.44)*** **	**(-6.25)*** **
Obs	9280	5213	5142	Obs	8635	3955	3875
R_sqrd	8%	2%	2%	R_sqrd	12%	5%	7%

Panel B: Stock Turnover

Bottom 50% leverage				Top 50% leverage			
	inv1	rd	inv2		inv1	rd	inv2
tolag	**-0.001**	-0.0001	**-0.002**	tolag	-0.0009	0.0003	-0.0008
	(-2.95)* **	(-0.30)	**(-3.24)*** **		(-1.45)	(0.68)	(-1.04)
Obs	8957	5138	5068	Obs	8865	4037	3958
R_sqrd	9%	3%	1%	R_sqrd	10%	4%	6%

Table 9: Relationship between liquidity and investment (Income Performance)

Income Performance *(INCPF)* is a firm's income performance, which is defined as net income (data 13) divided by year beginning assets (data 6). Variable *DLIQ* is obtained by taking average of ratio of daily volume (dollar) to daily absolute return for each year and each firm. *DLIQ* is scaled by 1,000,000. Variable *TO* is stock turnover. There are three measures of corporate investment. Variable *INV1* is calculated by dividing capital expenditure (COMPUSTAT data 128) by year beginning total assets (lagged data 6). *INV2* is calculated by dividing sum of capital expenditure and firm's research and development expense (data 46) by year beginning total assets (lagged data 6). *RD* is research and development (data 46) divided by total assets (data 6). Other independent variables are *Q, CF, SLACK* (Coefficients and t-statistics are not reported for simplicity). Standard error robust T-statistic is in the parenthesis. *, **, and *** represent significance at the 1 percent, 5 percent and 10 percent levels respectively.

Panel A: Dollar Liquidity

Bottom 50% income performance				Top 50% income performance			
	inv1	rd	inv2		inv1	rd	inv2
dliqlag	**-1.9e-6**	**-1.9e-6**	**-4.6e-6**	dliqlag	**-1.9e-6**	3.5e-8	**-1.7e-6**
	(-3.16)* **	**(-2.94)*** **	**(-4.76)*** **		**(-4.45)*** **	(0.20)	**(-3.92)*** **
Obs	8601	4173	4088	Obs	9416	5032	4966
R_sqrd	4%	0.3%	0.3%	R_sqrd	4%	9%	6%

Panel B: Stock Turnover

Bottom 50% income performance				Top 50% income performance			
	inv1	rd	inv2		inv1	rd	inv2
tolag	-0.0004	0.0005	-0.001	tolag	**-0.001**	0.0004	-0.001
	(-0.79)	(1.10)	(-1.41)		**(-2.27)** **	(1.44)	(-1.79)*
Obs	8887	4321	4237	Obs	9031	4889	4824
R_sqrd	5%	3%	1%	R_sqrd	3%	12%	6%

Table 10: Relationship between liquidity and investment (Firm Size)

Firm size is measured by a firm's market equity. Variable *DLIQ* is obtained by taking average of ratio of daily volume (dollar) to daily absolute return for each year and each firm. *DLIQ* is scaled by 1,000,000. Variable *TO* is stock turnover. There are three measures of corporate investment. Variable *INV1* is calculated by dividing capital expenditure (COMPUSTAT data 128) by year beginning total assets (lagged data 6). *INV2* is calculated by dividing sum of capital expenditure and firm's research and development expense (data 46) by year beginning total assets (lagged data 6). *RD* is research and development (data 46) divided by total assets (data 6). Other independent variables are *Q, CF, SLACK* (Coefficients and t-statistics are not reported for simplicity). Standard error robust T-statistic is in the parenthesis. *, **, and *** represent significance at the 1 percent, 5 percent and 10 percent levels respectively.

Panel A: Dollar Liquidity

	Bottom 50% firm size				Top 50% firm size		
	inv1	rd	inv2		inv1	rd	inv2
dliqlag	**-0.00002**	**-0.00001**	**-0.00003**	dliqlag	**-1.7e-6**	5.2e-8	**-1.9e-6**
	(-2.55)**	**(-3.25)*****	**(-3.22)*****		**(-5.59)*****	(0.17)	**(-4.54)*****
Obs	10477	5047	4972	Obs	7542	4160	4084
R_sqrd	6%	18%	9%	R_sqrd	14%	6%	5%

Panel B: Stock Turnover

	Bottom 50% firm size				Top 50% firm size		
	inv1	rd	inv2		inv1	rd	inv2
tolag	-0.0007	**-0.0008**	**-0.0016**	tolag	**-0.0015**	**0.002**	0.0007
	(-1.30)	**(-2.28)****	**(-2.44)****		**(-2.55)****	**(5.81)*****	(1.02)
Obs	10975	5264	5185	Obs	6946	3949	3879
R_sqrd	6%	18%	9%	R_sqrd	13%	1%	5%

Table 11: Relationship between liquidity and investment (BE/ME)

Book-to-market ratio (BE/ME) is common equity (data 60) plus deferred taxes (data 74) and then divided by market value of equity. Variable *DLIQ* is obtained by taking average of ratio of daily volume (dollar) to daily absolute return for each year and each firm. *DLIQ* is scaled by 1,000,000. Variable *TO* is stock turnover. There are three measures of corporate investment. Variable *INV1* is calculated by dividing capital expenditure (COMPUSTAT data 128) by year beginning total assets (lagged data 6). *INV2* is calculated by dividing sum of capital expenditure and firm's research and development expense (data 46) by year beginning total assets (lagged data 6). *RD* is research and development (data 46) divided by total assets (data 6). Other independent variables are *Q, CF, SLACK* (Coefficients and t-statistics are not reported for simplicity). Standard error robust T-statistic is in the parenthesis. *, **, and *** represent significance at the 1 percent, 5 percent and 10 percent levels respectively.

Panel A: Dollar Liquidity

	Bottom 50% BE/ME				Top 50% BE/ME		
	inv1	rd	inv2		inv1	rd	inv2
dliqlag	**-2.2e-6**	-3.0e-7	**-2.4e-6**	dliqlag	-1.3e-6	-4.6e-7	-1.4e-6
	(-5.40)* **	(-0.97)	**(-4.67)*** **		(-1.34)	(-1.70)*	(-1.55)
Obs	8785	4798	4741	Obs	9234	4409	4315
R_sqrd	6%	4%	2%	R_sqrd	14%	6%	13%

Panel B: Stock Turnover

	Bottom 50% BE/ME				Top 50% BE/ME		
	inv1	rd	inv2		inv1	rd	inv2
tolag	**-0.0022**	0.0006	**-0.003**	tolag	-0.0004	-0.0001	-0.0008
	(-3.98)* **	(1.30)	**(-3.39)*** **		(-0.71)	(-0.48)	(-1.10)
Obs	8537	4719	4658	Obs	9384	4494	4406
R_sqrd	6%	10%	1%	R_sqrd	12%	6%	11%

Table 12: Joint effect of relative liquidity and leverage

Relative liquidity is calculated by dividing each firm's liquidity by market liquidity. The market liquidity is formed by taking value-weighted average of all firms in the sample for each year. The leverage is defined as the sum of long-term debt (data 9) and debt in current liabilities (data 34) divided by the sum of long-term debt (data 9), debt in current liabilities (data 34) and total stockholders' equity (data 216). There are four subsamples based on relative liquidity and leverage. Variable *DLIQ* is obtained by taking average of ratio of daily volume (dollar) to daily absolute return for each year and each firm. *DLIQ* is scaled by 1,000,000. Variable *TO* is stock turnover. There are three measures of corporate investment. Variable *INV1* is calculated by dividing capital expenditure (COMPUSTAT data 128) by year beginning total assets (lagged data 6). *INV2* is calculated by dividing sum of capital expenditure and firm's research and development expense (data 46) by year beginning total assets (lagged data 6). *RD* is research and development (data 46) divided by total assets (data 6). Other independent variables are *Q, CF, SLACK* (Coefficients and t-statistics are not reported for simplicity). Standard error robust T-statistic is in the parenthesis. *, **, and *** represent significance at the 1 percent, 5 percent and 10 percent levels respectively.

Panel A: Dollar Liquidity

Bottom 50% relative liquidity and Bottom 50% leverage

	inv1	rd	inv2
dliqlag	0.0001	-0.0002	-0.0001
	(0.79)	(-1.73)*	(-0.65)
Obs	4033	2053	2022
R_sqrd	3%	16%	11%

Bottom 50% relative liquidity and Top 50% leverage

	inv1	rd	inv2
dliqlag	-0.0002	**-0.0003**	**-0.0006**
	(-0.95)	**(-2.35)****	**(-2.19)****
Obs	3797	1635	1610
R_sqrd	7%	3%	5%

Top 50% relative liquidity and Bottom 50% leverage

	inv1	rd	inv2
dliqlag	**-1.5e-6**	**6.4e-7**	-7.6e-7
	(-3.75)***	**(2.15)****	(-1.56)
Obs	5247	3160	3120
R_sqrd	9%	3%	0.4%

Top 50% relative liquidity and Top 50% leverage

	inv1	rd	inv2
dliqlag	**-2.9e-6**	**-1.2e-6**	**-4.4e-6**
	(-5.39)***	**(-5.07)*****	**(-6.39)*****
Obs	4838	2320	2265
R_sqrd	15%	11%	9%

Panel B: Stock Turnover

Bottom 50% relative liquidity and Bottom 50% leverage

	inv1	rd	inv2
tolag	-0.0016	**0.0025**	-0.0008
	(-0.71)	**(2.95)*****	(-0.29)
Obs	4524	2421	2379
R_sqrd	11%	16%	16%

Bottom 50% relative liquidity and Top 50% leverage

	inv1	rd	inv2
tolag	**-0.0094**	0.0002	-0.0026
	(-2.92)***	(0.17)	(-0.71)
Obs	3772	1693	1656
R_sqrd	7%	8%	11%

Top 50% relative liquidity and Bottom 50% leverage

	inv1	rd	inv2
tolag	**-0.0021**	**-0.0017**	**-0.0037**
	(-3.39)***	**(-4.41)*****	**(-4.78)*****
Obs	4433	2717	2689
R_sqrd	8%	13%	0.4%

Top 50% relative liquidity and Top 50% leverage

	inv1	rd	inv2
tolag	-0.001	0.0003	-0.0007
	(-1.23)	(0.42)	(-0.67)
Obs	5093	2344	2302
R_sqrd	11%	5%	7%

Table 13: Joint effect of relative liquidity and BE/ME

Relative liquidity is calculated by dividing each firm's liquidity by market liquidity. The market liquidity is formed by taking value-weighted average of all firms in the sample for each year. Book-to-market ratio (BE/ME) is common equity (data 60) plus deferred taxes (data 74) and then divided by market value of equity. There are four subsamples based on relative liquidity and BE/ME. Variable *DLIQ* is obtained by taking average of ratio of daily volume (dollar) to daily absolute return for each year and each firm. *DLIQ* is scaled by 1,000,000. Variable *TO* is stock turnover. There are three measures of corporate investment. Variable *INV1* is calculated by dividing capital expenditure (data 128) by year beginning total assets (lagged data 6). *INV2* is calculated by dividing sum of capital expenditure and firm's research and development expense (data 46) by year beginning total assets (lagged data 6). *RD* is research and development (data 46) divided by total assets (data 6). Other independent variables are *Q, CF, SLACK* (Coefficients and t-statistics are not reported for simplicity). Standard error robust T-statistic is in the parenthesis. *, **, and *** represent significance at the 1 percent, 5 percent and 10 percent levels respectively.

Panel A: Dollar Liquidity

Bottom 50% relative liquidity and Bottom 50% BE/ME

	inv1	rd	inv2
dliqlag	0.0002	**-0.0006**	**-0.0008**
	(1.02)	**(-2.54)****	**(-2.02)****
Obs	2790	1421	1410
R_sqrd	2%	3%	2%

Bottom 50% relative liquidity and Top 50% BE/ME

	inv1	rd	inv2
dliqlag	-0.0001	-0.00001	-0.0001
	(-1.00)	(-0.21)	(-0.46)
Obs	5106	2290	2245
R_sqrd	9%	6%	7%

Top 50% relative liquidity and Bottom 50% BE/ME

	inv1	rd	inv2
dliqlag	**-2.0e-6**	3.8e-8	**-2.0e-6**
	(-5.42)***	(0.13)	**(-4.28)*****
Obs	5995	3337	3331
R_sqrd	9%	0.1%	1%

Top 50% relative liquidity and Top 50% BE/ME

	inv1	rd	inv2
dliqlag	-1.5e-6	**-4.4e-7**	**-2.0e-6**
	(-1.82)	**(-2.16)****	**(-2.84)*****
Obs	4128	2119	2070
R_sqrd	19%	5%	21%

Panel B: Stock Turnover

Bottom 50% relative liquidity and Bottom 50% BE/ME

	inv1	rd	inv2
tolag	**-0.008**	**0.002**	-0.0025
	(-2.78)***	**(2.70)*****	(-0.78)
Obs	3822	2001	1965
R_sqrd	7%	15%	12%

Bottom 50% relative liquidity and Top 50% BE/ME

	inv1	rd	inv2
Tolag	0.0006	-0.0005	-0.00001
	(0.20)	(-0.47)	(-0.00)
Obs	4511	2124	2081
R_sqrd	10%	2%	9%

Top 50% relative liquidity and Bottom 50% BE/ME

	inv1	rd	inv2
tolag	**-0.002**	0.0002	**-0.002**
	(-3.06)***	(0.29)	**(-2.49)****
Obs	4715	2718	2693
R_sqrd	6%	4%	0.6%

Top 50% relative liquidity and Top 50% BE/ME

	inv1	rd	inv2
tolag	-0.0008	0.0002	-0.0006
	(-0.96)	(0.88)	(-0.71)
Obs	4873	2370	2325
R_sqrd	12%	8%	13%

Table 14: Joint effect of relative liquidity and income performance

Income Performance *(INCPF)* is a firm's income performance, which is defined as net income (data 13) divided by year beginning assets (data 6). There are four subsamples based on relative liquidity and income performance. Variable *DLIQ* is obtained by taking average of ratio of daily volume (dollar) to daily absolute return for each year and each firm. *DLIQ* is scaled by 1,000,000. Variable *TO* is stock turnover. There are three measures of corporate investment. Variable *INV1* is calculated by dividing capital expenditure (COMPUSTAT data 128) by year beginning total assets (lagged data 6). *INV2* is calculated by dividing sum of capital expenditure and firm's research and development expense (data 46) by year beginning total assets (lagged data 6). *RD* is research and development (data 46) divided by total assets (data 6). Other independent variables are *Q, CF, SLACK* (Coefficients and t-statistics are not reported for simplicity). Standard error robust T-statistic is in the parenthesis. *, **, and *** represent significance at the 1 percent, 5 percent and 10 percent levels respectively.

Panel A: Dollar Liquidity

Bottom 50% relative liquidity and Bottom 50% income performance

	inv1	rd	inv2
dliqlag	-5.3e-6	**-0.0003**	**-0.0006**
	(-0.04)	**(-2.19)****	**(-2.60)*****
Obs	4483	2111	2068
R_sqrd	4%	11%	11%

Bottom 50% relative liquidity and Top 50% income performance

	inv1	rd	inv2
dliqlag	0.0001	**-0.0002**	0.00002
	(0.26)	**(-2.54)****	(0.07)
Obs	3411	1598	1585
R_sqrd	0.1%	3%	0.4%

Top 50% relative liquidity and Bottom 50% income performance

	inv1	rd	inv2
dliqlag	**-1.8e-6**	-1.2e-6	**-3.6e-6**
	(-3.02)***	(-1.58)	**(-3.55)*****
Obs	4118	2062	2020
R_sqrd	4%	17%	7%

Top 50% relative liquidity and Top 50% income performance

	inv1	rd	inv2
dliqlag	**-1.8e-6**	7.6e-8	**-1.4e-6**
	(-5.09)***	(0.54)	**(-3.95)*****
Obs	6005	3434	3381
R_sqrd	7%	11%	9%

Panel B: Stock Turnover

Bottom 50% relative liquidity and Bottom 50% income performance

	inv1	rd	inv2
tolag	0.001	0.0004	-0.0001
	(0.56)	(0.44)	(-0.04)
Obs	3965	1846	1812
R_sqrd	5%	2%	2%

Bottom 50% relative liquidity and Top 50% income performance

	inv1	rd	inv2
tolag	**-0.007**	0.001	-0.003
	(-2.29)**	(1.18)	(-1.06)
Obs	4366	2277	2232
R_sqrd	2%	15%	9%

Top 50% relative liquidity and Bottom 50% income performance

	inv1	rd	inv2
tolag	-0.0006	0.0005	-0.001
	(-1.15)	(0.66)	(-1.07)
Obs	4922	2475	2425
R_sqrd	4%	1%	1%

Top 50% relative liquidity and Top 50% income performance

	inv1	rd	inv2
tolag	**-0.002**	0.001	-0.0006
	(-2.38)**	(1.45)	(-0.64)
Obs	4665	2612	2592
R_sqrd	3%	11%	6%

Table 15: Joint effect of relative liquidity and financial constraint

Relative liquidity is calculated by dividing each firm's liquidity by market liquidity. The market liquidity is formed by taking value-weighted average of all firms in the sample for each year. KZ index is a measure of financial constraints based on five variables: Tobin's *Q*, leverage, cash flow, cash balance and dividends. There are four subsamples based on relative liquidity and financial constraint. Variable *DLIQ* is obtained by taking average of ratio of daily volume (dollar) to daily absolute return for each year and each firm. *DLIQ* is scaled by 1,000,000. Variable *TO* is stock turnover. There are three measures of corporate investment. Variable *INV1* is calculated by dividing capital expenditure (COMPUSTAT data 128) by year beginning total assets (lagged data 6). *INV2* is calculated by dividing sum of capital expenditure and firm's research and development expense (data 46) by year beginning total assets (lagged data 6). *RD* is research and development (data 46) divided by total assets (data 6). Other independent variables are *Q, CF, SLACK* (Coefficients and t-statistics are not reported for simplicity). Standard error robust T-statistic is in the parenthesis. *, **, and *** represent significance at the 1 percent, 5 percent and 10 percent levels respectively.

Panel A: Dollar Liquidity

Bottom 50% relative liquidity and Bottom 50% KZ

	inv1	rd	inv2
dliqlag	-0.0003	-0.00006	-0.0002
	(-1.92)*	(-1.27)	(-0.99)
Obs	4695	2045	2009
R_sqrd	8%	9%	6%

Bottom 50% relative liquidity and Top 50% KZ

	inv1	rd	inv2
dliqlag	-0.00002	**-0.0006**	-0.0005
	(-0.08)	**(-3.04)*** **	(-1.42)
Obs	3130	1640	1620
R_sqrd	1%	4%	3%

Top 50% relative liquidity and Bottom 50% KZ

	inv1	rd	inv2
dliqlag	**-2.1e-6**	**-9.4e-7**	**-3.7e-6**
	(-3.01)* **	**(-5.26)*** **	**(-6.08)*** **
Obs	3954	1926	1885
R_sqrd	18%	3%	15%

Top 50% relative liquidity and Top 50% KZ

	inv1	rd	inv2
dliqlag	**-2.0e-6**	4.5e-8	**-1.8e-6**
	(-5.45)* **	(0.16)	**(-3.79)*** **
Obs	6129	3554	3500
R_sqrd	7%	0.6%	0.8%

Panel B: Stock Turnover

Bottom 50% relative liquidity and Bottom 50% KZ

	inv1	rd	inv2
tolag	-0.0016	-0.0001	0.0008
	(-0.53)	(-0.17)	(0.25)
Obs	4187	1909	1877
R_sqrd	8%	5%	12%

Bottom 50% relative liquidity and Top 50% KZ

	inv1	rd	inv2
tolag	-0.0055	**0.0024**	-0.0028
	(-1.89)*	**(2.79)*** **	(-0.96)
Obs	4106	2204	2157
R_sqrd	5%	12%	9%

Top 50% relative liquidity and Bottom 50% KZ

	inv1	rd	inv2
tolag	**-0.0024**	0.0002	-0.0015
	(-3.00)* **	(0.58)	(-1.88)*
Obs	4892	2256	2211
R_sqrd	11%	4%	10%

Top 50% relative liquidity and Top 50% KZ

	inv1	rd	inv2
tolag	**-0.0027**	**-0.0024**	**-0.0051**
	(-3.97)* **	**(-4.81)*** **	**(-6.05)*** **
Obs	4631	2804	2779
R_sqrd	5%	8%	0.1%

Table 16: Joint effect of BE/ME and leverage

The leverage is defined as the sum of long-term debt (data 9) and debt in current liabilities (data 34) divided by the sum of long-term debt (data 9), debt in current liabilities (data 34) and total stockholders' equity (data 216). Book-to-market ratio (BE/ME) is common equity (data 60) plus deferred taxes (data 74) and then divided by market value of equity. There are four subsamples based on BE/ME and leverage. Variable *DLIQ* is obtained by taking average of ratio of daily volume (dollar) to daily absolute return for each year and each firm. *DLIQ* is scaled by 1,000,000. Variable *TO* is stock turnover. There are three measures of corporate investment. Variable *INV1* is calculated by dividing capital expenditure (COMPUSTAT data 128) by year beginning total assets (lagged data 6). *INV2* is calculated by dividing sum of capital expenditure and firm's research and development expense (data 46) by year beginning total assets (lagged data 6). *RD* is research and development (data 46) divided by total assets (data 6). Other independent variables are *Q, CF, SLACK* (Coefficients and t-statistics are not reported for simplicity). Standard error robust T-statistic is in the parenthesis. *, **, and *** represent significance at the 1 percent, 5 percent and 10 percent levels respectively.

Panel A: Dollar Liquidity

Bottom 50% BE/ME and Bottom 50% leverage

	inv1	rd	inv2
dliqlag	**-1.8e-6**	4.0e-7	**-1.2e-6**
	(-3.72)* **	(1.08)	**(-2.12)** **
Obs	5017	2952	2923
R_sqrd	5%	1%	0.1%

Bottom 50% BE/ME and Top 50% leverage

	inv1	rd	inv2
dliqlag	**-3.1e-6**	**-2.1e-6**	**-6.5e-6**
	(-4.34)* **	**(-2.56)** **	**(-4.78)*** **
Obs	3755	1844	1816
R_sqrd	9%	1%	4%

Top 50% BE/ME and Bottom 50% leverage

	inv1	rd	inv2
dliqlag	-1.1e-6	-1.8e-7	-1.8e-6
	(-0.79)	(-0.34)	(-1.22)
Obs	4263	2261	2219
R_sqrd	9%	8%	10%

Top 50% BE/ME and Top 50% leverage

	inv1	rd	inv2
dliqlag	-2.4e-6	**-7.2e-7**	**-2.8e-6**
	(-1.69)*	**(-2.86)*** **	**(-2.59)*** **
Obs	4880	2111	2059
R_sqrd	17%	2%	16%

Panel B: Stock Turnover

Bottom 50% BE/ME and Bottom 50% leverage

	inv1	rd	inv2
tolag	**-0.003**	-0.0003	**-0.004**
	(-4.35)* **	(-0.39)	**(-4.06)*** **
Obs	4734	2842	2814
R_sqrd	5%	1%	3%

Bottom 50% BE/ME and Top 50% leverage

	inv1	rd	inv2
tolag	-0.001	0.0016	-0.0004
	(-0.99)	(1.85)*	(-0.30)
Obs	3792	1876	1843
R_sqrd	6%	2%	5%

Top 50% BE/ME and Bottom 50% leverage

	inv1	rd	inv2
tolag	7.0e-6	0.0001	0.00005
	(0.01)	(0.55)	(0.06)
Obs	4223	2296	2254
R_sqrd	11%	9%	12%

Top 50% BE/ME and Top 50% leverage

	inv1	rd	inv2
tolag	-0.0008	-0.0002	-0.0003
	(-0.85)	(-1.16)	(-0.28)
Obs	5073	2161	2115
R_sqrd	13%	1%	13%

Table 17: Joint effect of firm size and income performance

Income Performance *(INCPF)* is a firm's income performance, which is defined as net income (data 13) divided by year beginning assets (data 6). Firm size is measured by a firm's market equity. There are four subsamples based on firm size and income performance. Variable *DLIQ* is obtained by taking average of ratio of daily volume (dollar) to daily absolute return for each year and each firm. *DLIQ* is scaled by 1,000,000. Variable *TO* is stock turnover. There are three measures of corporate investment. Variable *INV1* is calculated by dividing capital expenditure (COMPUSTAT data 128) by year beginning total assets (lagged data 6). *INV2* is calculated by dividing sum of capital expenditure and firm's research and development expense (data 46) by year beginning total assets (lagged data 6). *RD* is research and development (data 46) divided by total assets (data 6). Other independent variables are *Q, CF, SLACK* (Coefficients and t-statistics are not reported for simplicity). Standard error robust T-statistic is in the parenthesis. *, **, and *** represent significance at the 1 percent, 5 percent and 10 percent levels respectively.

Panel A: Dollar Liquidity

Bottom 50% size and Bottom 50% income performance

	inv1	rd	inv2
dliqlag	-9.3e-6	-4.7e-7	-6.2e-6
	(-0.66)	(-0.06)	(-0.38)
Obs	5828	2765	2707
R_sqrd	4%	23%	17%

Bottom 50% size and Top 50% income performance

	inv1	rd	inv2
dliqlag	-0.0001	**-0.00004**	**-0.0001**
	(-1.93)*	**(-2.05)****	**(-2.54)****
Obs	4647	2280	2263
R_sqrd	0.3%	5%	3%

Top 50% size and Bottom 50% income performance

	inv1	rd	inv2
dliqlag	**-1.6e-6**	5.1e-8	**-2.5e-6**
	(-3.03)***	(0.04)	**(-2.11)****
Obs	2773	1408	1381
R_sqrd	9%	14%	14%

Top 50% size and Top 50% income performance

	inv1	rd	inv2
dliqlag	**-1.9e-6**	8.4e-8	**-1.4e-6**
	(-4.96)***	(0.62)	**(-3.83)*****
Obs	4769	2752	2703
R_sqrd	9%	12%	12%

Panel B: Stock Turnover

Bottom 50% income performance and Bottom 50% size

	inv1	rd	inv2
tolag	-0.00002	**-0.001**	**-0.002**
	(-0.04)	**(-2.43)****	**(-2.30)****
Obs	6393	3031	2970
R_sqrd	4%	25%	17%

Bottom 50% size and Top 50% income performance

	inv1	rd	inv2
tolag	-0.001	0.001	-0.0002
	(-1.25)	(1.71)*	(-0.13)
Obs	4579	2230	2212
R_sqrd	0.1%	10%	3%

Top 50% size and Bottom 50% income performance

	inv1	rd	inv2
tolag	-0.001	**0.011**	**0.007**
	(-1.33)	**(8.01)*****	**(4.81)*****
Obs	2494	1290	1267
R_sqrd	9%	5%	9%

Top 50% size and Top 50% income performance

	inv1	rd	inv2
tolag	**-0.002**	-0.0002	**-0.0017**
	(-2.41)**	(-0.93)	**(-2.23)****
Obs	4452	2659	2612
R_sqrd	9%	10%	12%

Table 18: A portfolio approach

Four portfolios (*S/L, S/M, S/H, B/L, B/M, B/H*) are formed yearly (1963 to 2001) from a simple sort of firms into two group on market equity value (ME) and another sort into two groups on BEME. Two BEME groups are based on the breakpoints for the bottom 50 percent (low), and top 50 percent (high). The data are collected mainly from COMPUSTAT and CRSP. We only use four portfolios (*S/L, S/H, B/L, B/H*) in our tests.

Q is defined as the market value of equity plus assets minus book value of equity over assets, that is, CRSP market value of equity plus COMPUSTAT data 6 minus the sum of data 60 and data 74 over data 6, where data 60 is common equity and data 74 is deferred taxes on balance sheet. Firm's cash flow (*CF*) equals the sum of earnings before extraordinary items (data 18) and depreciation (data 14) over year beginning assets (lagged data6). There are two measures of liquidity: *DLIQ* and *TO*. Variable *DLIQ* is obtained by taking average of ratio of daily volume (dollar volume) to daily absolute return for each year and each firm. *TO* is stock turnover. There are three measures of corporate investment. Variable *INV1* is calculated by dividing capital expenditure (COMPUSTAT data 128) by year beginning total assets (lagged data 6). *INV2* is calculated by dividing sum of capital expenditure and firm's research and development expense (data 46) by year beginning total assets (lagged data 6). *RD* is research and development (data 46) divided by total assets (data 6). *SLACK1* (financial slack) is the ratio of cash and short-term investments (data 1) and sales (data 12); *CASH* (cash balance) is the ratio of cash and short-term investments (data 1) and assets (data 6). Following investment specification is estimated for each portfolio.

$$INVESTMENT_t = c + b_0 LIQUIDITY_{t-1} + \sum_{n=1}^{3} b_n Q_{t-n} + \sum_{m=1}^{3} a_m CF_{t-m} + b_4 Slack_{t-1} + \varepsilon_t$$

Where *INVESTMENT* can be *INV1*, *RD* or *INV2*. *LIQUIDITY* can be *DILQ* or *TO*. c is an intercept. Because Q and CF may be persistent, we also include Q_{t-2}, Q_{t-3}, and CF_{t-2}, CF_{t-3}. *Slack* can be either *SLACK1* or *CASH*. Because there is no clear time trend in investment variables, we do not include a time variable in the regressions using portfolios. Standard error robust T-statistic is in the parenthesis. *, **, and *** represent significance at the 1 percent, 5 percent and 10 percent levels respectively.

Table 18A: A portfolio approach with different benchmark (dollar liquidity)

	S/L			*S/H*			*B/L*			*B/H*		
	inv1	rd	inv2	inv1	rd	inv2	inv1	rd	inv2	inv1	rd	inv2
dliqlag	**-0.001**	0.0001	-0.00003	-0.0001	0.0001	-0.0002	**-4.02e-6**	7.1e-7	-3.6e-6	**-4.1e-6**	-2.5e-8	-7.7e-6
	(-2.11)**	(1.03)	(-0.35)	(-1.18)	(0.60)	(-1.19)	**(-6.04)*****	(0.78)	(-2.84)***	**(-1.99)****	(-0.03)	(-2.48)**
qlag	0.00001	0.00003	6.1e-6	0.0001	0.0001	0.0001	9.42e-6	0.00002	0.00002	0.00002	0.00002	0.0001
	(0.84)	(1.49)	(0.22)	(3.64)***	(3.31)***	(3.70)***	(0.87)	(2.24)**	(1.62)	(0.91)	(1.76)*	(2.27)**
qlag2	-4.22e-6	-0.00003	-8.1e-6	-0.00002	-0.00003	-0.0001	-7.6e-6	4.4e-6	0.00001	0.00003	-0.00001	0.00002
	(-0.19)	(-1.02)	(-0.21)	(-1.15)	(-0.86)	(-1.83)*	(-0.61)	(0.48)	(1.00)	(1.39)	(0.46)	(0.48)
qlag3	-6.88e-6	-3.1e-6	0.00002	-0.00003	-4.9e-6	2.7e-6	-6.5e-6	-0.00003	-0.00003	-0.0001	-0.00001	-0.0001
	(-0.55)	(-0.19)	(0.47)	(-2.07)**	(-0.23)	(0.11)	(-0.78)	(-2.92)***	(-2.53)**	(-2.63)***	(-0.60)	(-2.77)***
cflag	0.528	-0.198	2.1e-6	0.425	0.094	0.621	0.841	-0.200	0.440	0.556	0.008	0.348
	(4.00)***	(-1.37)	(1.43)	(4.42)***	(0.58)	(3.24)***	(4.26)***	(-1.63)	(2.77)**	(5.05)***	(0.16)	(2.27)**
cflag2	0.176	0.382	-1.604	0.245	0.177	0.459	0.170	0.342	0.527	-0.013	0.064	0.315
	(0.86)	(1.04)	(-1.16)	(1.45)	(0.85)	(1.64)	(0.66)	(1.30)	(1.69)*	(-0.08)	(0.72)	(1.30)
cflag3	-0.251	-0.652	-0.480	-0.187	-0.357	-0.488	-0.143	-0.093	-0.202	0.059	0.156	0.064
	(-1.22)	(-1.87)*	(-1.30)	(-1.32)	(-1.78)*	(-1.84)*	(-0.76)	(-0.55)	(-0.75)	(0.42)	(2.39)**	(0.41)
slack1lag	-0.0005	0.011	-0.002	-0.0003	0.001	-0.004	-0.056	0.064	0.080	-0.017	0.050	0.068
	(-0.10)	(3.01)***	(-0.30)	(-0.19)	(0.44)	(-0.63)	(-0.72)	(1.05)	(1.30)	(-1.01)	(2.78)***	(1.85)*
intercept	0.047	0.101	0.124	0.033	0.015	0.023	-0.007	0.032	0.022	0.043	-0.005	0.039
	(2.96)***	(1.22)	(3.06)***	(4.60)***	(1.01)	(1.06)	(-0.33)	(1.25)	(0.85)	(3.51)***	(-0.65)	(2.00)**
Obs	37	37	37	37	37	37	37	37	37	37	37	37
R_squrd	66%	62%	34%	79%	51%	68%	83%	45%	77%	69%	41%	66%

Table 18B: A portfolio approach with different benchmark (stock turnover)

	S/L			*S/H*			*B/L*			*B/H*		
	inv1	rd	inv2	inv1	rd	inv2	inv1	rd	inv2	inv1	rd	inv2
tolag	-0.006	0.008	0.002	**-0.005**	0.0005	-0.006	**-0.009**	0.004	-0.005	-0.002	0.0002	-0.005
	(-1.18)	(1.07)	(0.25)	**(-2.47)****	(0.08)	(-1.68)*	**(-3.50)*****	(1.55)	(-1.07)	(-1.23)	(0.29)	(-1.87)*
qlag	0.00002	0.00002	0.00002	0.0001	0.0001	0.0001	0.00001	0.00001	0.00002	0.00001	0.00002	0.0001
	(0.96)	(0.53)	(1.08)	(5.49)***	(2.50)**	(6.03)***	(0.92)	(2.11)**	(1.63)	(0.48)	(1.37)	(1.74)*
qlag2	-1.5e-6	-0.00002	-0.00002	-0.00003	-0.00001	-0.0001	-0.00001	-1.4e-6	-2.2e-6	0.00003	-0.00002	8.2e-6
	(-0.07)	(-0.64)	(-0.75)	(-1.78)*	(-0.56)	(-2.95)***	(-1.01)	(-0.18)	(-0.20)	(1.09)	(-0.60)	(0.15)
qlag3	-0.00001	-2.9e-6	8.9e-6	-0.00004	-1.8e-6	-1.1e-6	-8.7e-6	-0.00001	-0.00002	-0.00006	-8.2e-6	-0.0001
	(-1.12)	(-0.24)	(0.27)	(-2.93)**	(-0.10)	(-0.29)	(-0.88)	(-1.50)	(-1.45)	(-2.33)**	(-0.39)	(-2.41)**
cflag	0.403	-0.032	1.171	0.294	-0.016	0.370	0.777	-0.063	0.533	0.490	-0.015	0.257
	(2.31)**	(-0.16)	(1.36)	(2.76)***	(-0.16)	(3.48)***	(3.43)***	(-0.53)	(3.40)***	(5.07)***	(-0.20)	(1.10)
cflag2	0.088	0.267	-0.632	0.291	0.079	0.238	0.374	0.360	0.647	0.037	0.081	0.435
	(0.40)	(0.60)	(-0.82)	(1.84)*	(0.45)	(1.49)	(1.09)	(2.29)**	(2.21)**	(0.25)	(0.75)	(1.47)
cflag3	-0.219	-0.606	-0.426	-0.164	-0.253	-0.353	-0.174	-0.040	-0.070	0.049	0.169	0.140
	(-1.19)	(-1.48)	(-1.83)*	(-1.31)	(-1.88)*	(-2.07)**	(-0.62)	(-0.30)	(-0.24)	(0.38)	(1.96)**	(0.64)
slack1lag	-0.005	0.012	-0.001	0.0005	0.001	-0.004	0.033	0.053	0.162	-0.002	0.061	0.137
	(-1.04)	(4.29)***	(-0.24)	(0.33)	(0.52)	(-0.92)	(0.40)	(1.14)	(2.23)**	(-0.06)	(2.00)**	(2.10)**
intercept	0.078	0.074	0.117	0.039	0.020	0.056	-0.014	-0.009	-0.029	0.047	-0.004	0.039
	(4.14)***	(2.65)***	(3.56)***	(5.30)***	(1.55)	(4.52)***	(-0.58)	(-0.49)	(-0.89)	(2.85)***	(-0.42)	(1.43)
Obs	37	37	37	37	37	37	37	37	37	37	37	37
R_squrd	64%	68%	27%	84%	53%	78%	80%	57%	77%	56%	31%	51%

Table 19: The regression with all relevant variables

Following investment specification is estimated.

$$INVESTMENT_{it} = c_t + f_i + b_0 LIQUIDITY_{it-1} + \sum_{n=1}^{3} b_n Q_{it-n} + \sum_{m=1}^{3} a_m CF_{it-m} + b_4 Slack_{it-1} + d_1 CYC_{it-1} +$$
$$d_2 INCPF_{it-1} + d_3 LEVR_{it-1} + d_4 SIZE_{it-1} + d_5 BEME_{it-1} + d_6 KZ_{it-1} + t + \varepsilon_{it}$$

See Table 4 for other definitions. Standard error robust T-statistic is in the parenthesis. *, **, and *** represent significance at the 1 percent, 5 percent and 10 percent levels respectively. We only report coefficients of liquidity, slack, INCPF, LEVR, SIZE, BEME and KZ for simplicity.

Panel A: Dollar Liquidity

	dliqlag	slacklag	cyclag	incpflag	levlag	sizelag	bemelag	kzlag	Obs	R_sqrd
inv1	**-1.8e-6**	0.0002	-0.004	0.125	-0.041	-0.011	-0.001	-0.0001	13259	12%
	(-6.16)* **	(1.00)	(-5.36)***	(13.47)***	(-10.27)***	(-8.81)***	(-0.95)	(-0.16)		
rd	**-5.7e-7**	-0.0001	0.0002	-0.059	-0.019	-0.006	0.0001	0.00004	7047	8%
	(-3.43)* **	(-0.57)	(0.35)	(-8.96)***	(-6.32)***	(-6.86)***	(0.11)	(0.13)		
inv2	**-2.3e-6**	-0.0002	-0.004	0.053	-0.085	-0.020	-0.001	-0.0001	6918	13%
	(-5.60)* **	(-0.38)	(-2.59)***	(3.29)***	(-11.55)***	(-8.94)***	(-0.67)	(-0.07)		

Panel B: Stock Turnover

	tolag	slacklag	cyclag	incpflag	levlag	sizelag	bemelag	kzlag	Obs	R_sqrd
inv1	**-0.001**	0.0003	-0.004	0.131	-0.039	-0.013	-0.0003	0.0001	12938	12%
	(-2.79)* **	(1.22)	(-4.80)***	(14.34)***	(-10.43)***	(-10.24)***	(-0.44)	(0.26)		
rd	0.0003	-0.0001	0.0004	-0.045	-0.018	-0.007	-0.0002	-0.0001	6979	6%
	(1.46)	(-0.55)	(0.64)	(-7.13)***	(-6.23)***	(-7.15)***	(-0.41)	(-0.20)		
inv2	**-0.002**	-0.0001	-0.003	0.079	-0.084	-0.022	-0.002	-0.0002	6855	13%
	(-3.31)* **	(-0.34)	(-2.12)**	(5.00)***	(-11.86)***	(-9.38)***	(-1.50)	(-0.30)		

Figure 1: The difference between dollar liquidity and stock turnover for four portfolios

Six portfolios are formed yearly from a simple sort of firms into two group on market equity value (ME) and another sort into three groups on BE/ME. Three BE/ME groups are based on the breakpoints for the bottom 30 percent (low), middle 40 percent (medium) and top 30 percent (high). We focus on four of these portfolios: *S/L*, *S/H*, *B/L* and *B/H*. For example, the *S/L* portfolios contains the stocks in small ME group that are also in the low BE/ME group. For each portfolio formation year (from 1966 to 1997), the dollar liquidity and stock turnover are calculated for year $t+i$, i=-5, -4, ..., 4, 5. The liquidity measures for year $t+i$ are then averaged across portfolio formation years, respectively.

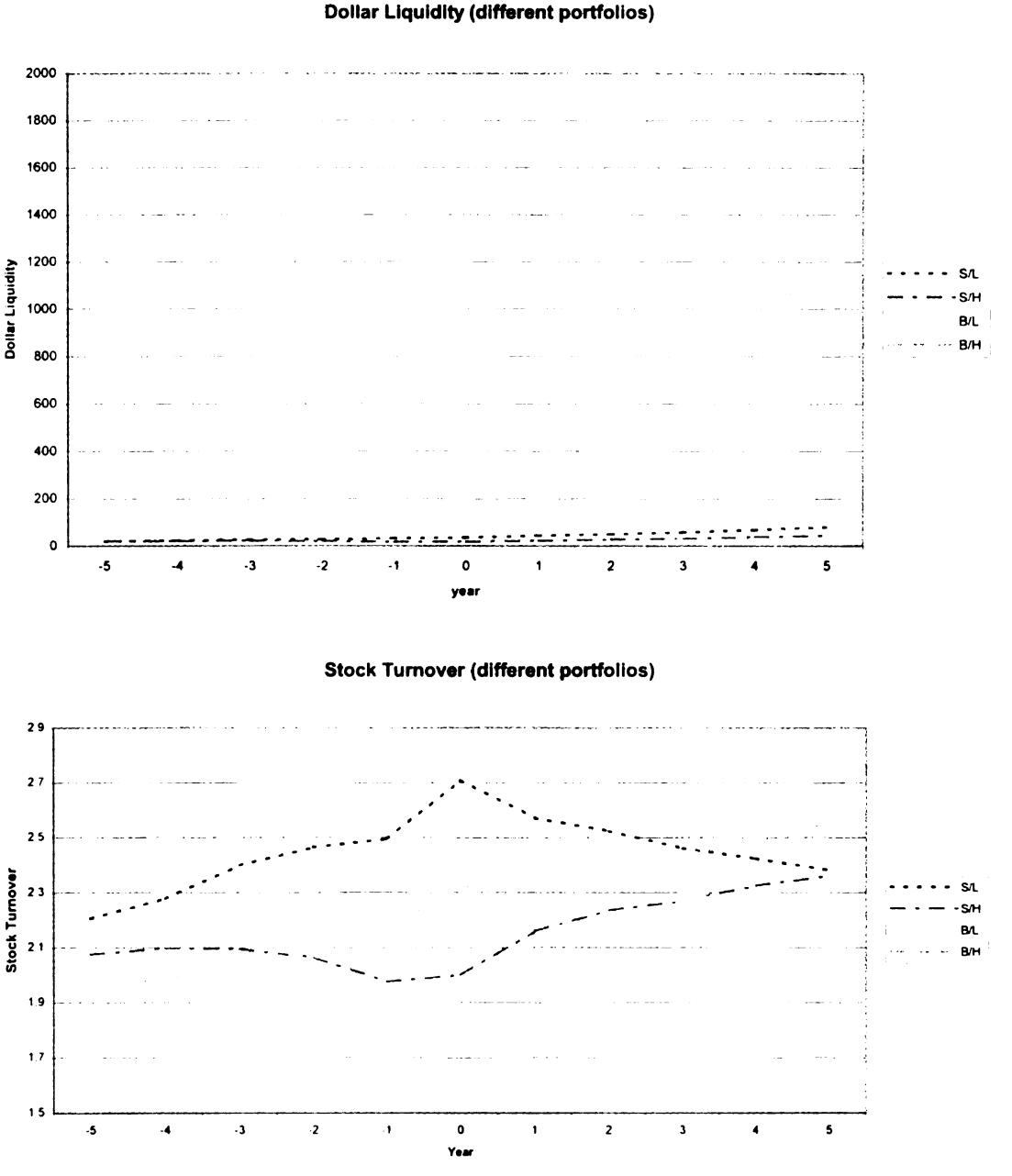


Figure 2: The relationship between real investment growth and R&D growth

"rdg" is R&D growth rate throughout time. "inv1g" is actual investment growth rate throughout time.

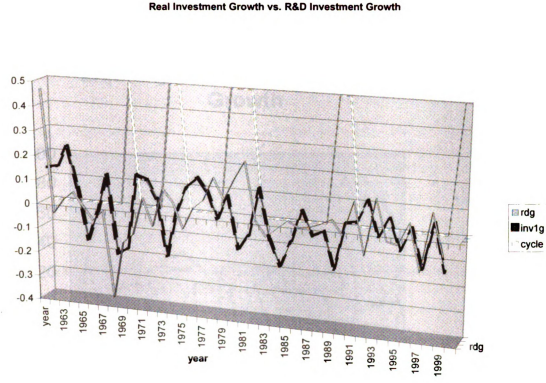
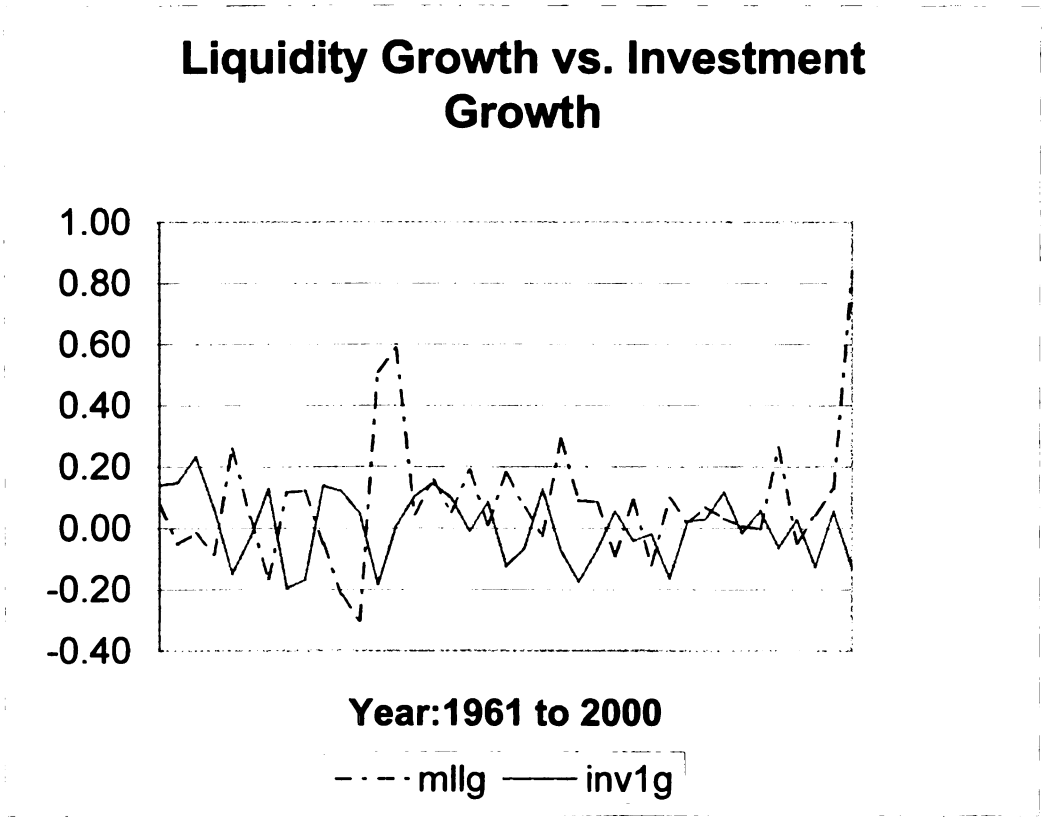


Figure 3: Liquidity growth and investment growth

Market level investment growth rates are calculated by finding average of all firms' investment for each year. Firms' investment data are collected from COMPUSTAT. Market liquidity is obtained by taking value-weighted average of all firms' dollar liquidity for each year. MLLG is the growth rate of firm dollar liquidity, which is defined by daily trading volume divided by daily absolute return.



APPENDIX 1B The Difference between Dollar Liquidity and Stock Turnover

The difference between dollar liquidity and stock turnover may be from the fact that they represent different aspects of liquidity. Dollar liquidity is more related to transaction cost feature of liquidity. Stock turnover represents more about level of trading activity. The difference between dollar liquidity and turnover can be illustrated in the following manner. We follow the portfolio technique used in Lakonishok, Shleifer and Vishny (1994), and Fama and French (1995). Six portfolios (*S/L, S/M, S/H, B/L, B/M, B/H*) are formed yearly from a simple sort of firms into two groups on market equity value (ME) and another sort into three groups on BE/ME. Three BE/ME groups are based on the breakpoints for the bottom 30 percent (low), middle 40 percent (medium) and top 30 percent (high). We focus on four of these portfolios: *S/L, S/H, B/L* and *B/H*. For example, the *S/L* portfolios contains the stocks in small ME group that are also in the low BE/ME group. For each portfolio formation year (from 1966 to 1997), the dollar liquidity and stock turnover are calculated for year $t+i$, i=-5, -4, ..., 4, 5. The liquidity measures for year $t+i$ are then averaged across portfolio formation years, respectively.

Figure 1 illustrates the different patterns between dollar liquidity and stock turnover. In Figure 1 Panel A, *B/L* portfolio has the highest dollar liquidity, while *S/H* portfolio has the lowest. The dollar liquidity is increasing for all four portfolios. It appears that investors are able to identify, through dollar liquidity, the change in fundamentals (e.g. profitability, earnings growth, and etc.) around the portfolio formation, although the evidence is not very strong. Figure 1 Panel B shows the pattern of stock turnover, as a function of size and BE/ME, for a long period around portfolio formation. Different from

the pattern in Panel A, the *S/L* portfolio has the highest stock turnover (liquidity), while *S/H* portfolio has the lowest. The stock turnover is increasing for *B/H* and *B/L* portfolios as shown in Panel B. However, stock turnover changes direction around portfolio formation for *S/L* and *S/H* portfolios. Again, it seems investors are able to identify, through stock turnover, the change in fundamentals around the portfolio formation. The evidence is stronger for stocks contained in smaller ME portfolios. While we do not want to dispute whether this approach has a valid theoretical basis,[16] our liquidity analysis shows that, for some portfolios, the investor sentiment may be developing after portfolio formation when earnings actually start declining, because liquidity continues to increase after portfolio formation for some portfolios. The figures show that two liquidity measures behave differently even we control for firms size and BE/ME. This suggests they may capture different things about liquidity, although they also share some aspects of liquidity. According to the definitions of these liquidity variables, we think dollar liquidity is more related to transaction cost feature of liquidity but stock turnover represents more about level of trading activity. This is because that dollar liquidity implies how many dollars are needed if stock return is driven up or down by 1 percent, while turnover captures how many shares are being traded compared to the total outstanding.

[16] For example, some authors argue there is no theory indicating firms have similar economic shocks every eleven years.

REFERENCE **Reference for Chapter 1**

Almeida, H. and M. Campello, 2001, "Financial constraints and investment-cash flow sensitivities: New theoretical foundations", working paper, NYU

Almeida, H., M. Cambello, and M. Weisbach, 2002, "Corporate demand for liquidity", working paper, NYU

Amihud, Y., 2002, "Illiquidity and stock returns: Cross-section and time-series effects", *Journal of Financial Markets* 5: 31-56

Baberis N. and R. Thaler, 2003, "A survey of behavioral finance", *Handbook of the Economics of Finance*, Chapter 18, Elsevier Service

Baker, M. and J. Wurgler, 2002, "Market timing and capital structure", *Journal of Finance*, Forthcoming

Baker, M., Stein, J. and J. Wurgler, 2003, "When does the market matter? Stock prices and the investment of equity-dependence firms", *Quarterly Journal of Economics*, Forthcoming

Bolton, P. and D.S. Scharfstein, 1998, "Corporate finance: the theory of the firm, and organization", *Journal of Economic Perspectives* 12: 95-114

Chirinko R., 1987, "Tobin's Q and financial policy", *Journal of Monetary Economics* 19, 69-87

Chordia, T., R. Roll and A. Subrahmanyam, 2000, "Commonality in liquidity", *Journal of Financial Economics* 56, 3-28

Chordia, T., R. Roll and A. Subrahmanyam, 2001, "Market liquidity and trading activity", *Journal of Finance* 56, 501-530

Cochrane J., 1992, "Production-based asset pricing and the link between stock returns and economic fluctuations", *Journal of Finance,* 46, 209-237

Cochrane J., 1996, "A cross-sectional test of an investment-based asset pricing model", *Journal of Political Economy*, 104, 572-621

Daniel, K., D. Hirshleifer and A. Subrahmanyam, 1998, "Investor Psychology and security market under- and overreactions", *Journal of Finance* 53: 1839-1885

Eckbo, B.E. R. Masulis and O. Norli, 2000, "Seasoned public offerings: resolution of the 'new issues puzzle'", *Journal of Financial Economics* 56, 251-292

Erickson, T. and T. Whited, 2000, "Measurement errors and the relationship between investment and Q", *Journal of Political Economy* 108: 1027-1057

Fama E. and M. Gibbons, 1982, "Inflation, real returns and capital investment", *Journal of Monetary Economy*, 9, 297-323

Fama E. and K. French, 1992, "The cross-section of expected stock returns", *Journal of Finance*, 47, 427-465

Fama E. and K. French, 1995, "Size and book-to-market factors in earnings and returns", *Journal of Finance*, 50, 131-155

Fazzari S., G. Hubbard, and B. Petersen, 1998a, "Financing constraints and corporate investment", *Brookings papers on Economic Activity,* 1, 141-195

Fenn G. and N. Liang, 2001, "Corporate payout policy and managerial stock incentives", *Journal of Financial Economics* 60: 45-72

Gibson, R. and N. Mougeot, 2001, "The pricing of systematic liquidity risk: Empirical evidence from the US stock market", working paper, University of Zurich

Glaser, M. and M. Weber, 2003, "Overconfidence and trading volume", working paper, University of Mannheim

Graham, J. and C. Harvey, 2001, "The theory and practice of corporate finance: Evidence from the field", *Journal of Financial Economics* 61

Hadlock, C., 1998, "Ownership, liquidity, and investment", *RAND Journal of Economics* 29, 487-508

Himmelberg C. and P. Bruce, 1994, "R&D and internal finance: A panel study of small firms in high-tech industries", *Review of Economics and Statistics* 76, 38-51

Hong, H. and M. Huang, 2001, "talking up liquidity: Insider trading and investor relations", working paper, Stanford University

Hong, H., T. Lim and J. Stein, 2000, "Bad news travels slowly: size, analyst coverage, and overreaction in financial markets", *Journal of Finance* 55, 265-295

Hubbard, R., 1998, "capital market imperfections and investment", *Journal of Economic Literature* 36, 193-225

Jensen, M.C., 1986, "Agency costs of free cash flow, corporate finance, and takeovers", *American Economic Review* 76, 323-329

Jensen, M.C. and W. Meckling, 1976, "Theory of the firm: Managerial behavior, agency costs and ownership structure", *Journal of Financial Economics* 3: 305-360

Kaplan S. and L. Zingales, 1997, "Do financing constraints explain why investment is correlated with cash flow?" *Quarterly Journal of Economics* 112, 169-215

Kaplan S. and L. Zingales, 2002, "Investment-cash flow sensitivities are not useful measures of financial constraints" *Quarterly Journal of Economics* 115, 707-12

Keynes, J.M., 1936, "The general theory of employment, interest, and money", MaCmillan Press, London

Lakonishok, J., A. Shleifer and R. Vishny, "Contrarian investment, extrapolation, and risk", *Journal of Finance,* 49, 1541-1578

Lamont O., C. Polk and J. Saa-Requejo, 2001, "Financial constraints and stock returns", *Review of Financial Studies* 14: 529-54

Li, Z., 2004, "Why do seasoned offering firms underperform in investment growth?" working paper, Michigan State University

Lo, A. and J. Wang, 2000, "Trading volume: Definitions, data analysis, and implications of portfolio theory", *Review of Financial Studies* 13: 257-300

Loughran T. and J. Ritter, 1995, "The new issue puzzle", *Journal of Finance*, Vol. 50

Lucas, D. and R. McDonald, 1990, "Equity issues and stock price dynamics", *Journal of Finance* 45: 1019-1043

Morck, R., Shleifer, A. and R. Vishny, 1990a, "The stock market and investment: Is the market a sideshow?", *Brookings papers on Economic Activity*: 157-215

Myers, S.C., 1977, "Determinants of Corporate Borrowing", *Journal of Financial Economics* 5: 147-175

Myers S. and Majluf N., 1984, "Corporate financing and investment decisions when firms have information that investors do not have" *Journal of Financial Economics*, 13, 187-221

Pastor, L. and R. Stambaugh, 2001, "Liquidity risk and expected stock returns", the Wharton School, University of Pennsylvania

Polk, C. and P. Sapienza, 2002, "The real effect of investor sentiment", Working paper, Northwestern University

Scharfstein, D.S. and J. Stein, 1990, "Herd behavior and investment", *American Economic Review* 80: 465-479

Shefrin Hersh, 2001, "Behavioral corporate finance", *Journal of Applied Corporate Finance*, Volume 14, Number 3, 8-19

Shleifer, A., 2000, "Inefficient markets: An introduction to behavior finance", *Oxford University Press*

Statman M., S. Thorley, and K. Vorkink, 2004, "Investor overconfidence and trading volume", working paper, BYU

Stein Jeremy, 1996, "Rational capital budgeting in an irrational world", *Journal of Business*, Vol. 69

Tobin, J., 1969, "A general equilibrium approach to monetary theory", *Journal of Money, Credit and Banking* 1: 15-29

Tversky A. and D. Kahneman, 1986, "Rational choice and the framing of decisions", *Journal of Business*, Volume 59

Von Furstenberg, G.M., 1977, "Corporate investment: Does market valuation matter in the aggregate?", *Brookings papers on Economic Activity* 2: 347-397

Zwiebel, J., 1995, "Corporate conservatism and relative compensation", *Journal of Political Economy* 103: 1-25

CHAPTER 2

WHY DO SEASONED OFFERING FIRMS UNDERPERFORM IN INVESTMENT GROWTH?

2.1 Introduction

The long-term performance of the firms conducting seasoned issues (seasoned equity offerings and seasoned debt offerings) has been a hot topic for past two decades. Despite the well-documented evidence indicating that seasoned issuers usually underperform their stylized matches in equity returns, it is still highly controversial on how to explain the long-term underperformance in the literature.

In this article, we are going to revisit this issue by focusing on the growth of corporate investment. We use this approach for two reasons. First, to the extent that financial market reflects a firm's investment opportunities like a mirror, equity returns and investment growth are two sides of the same coin (e.g. Gibbons and Fama (1982), and Cochrane (1991, 1998)).[1] Thus, it is interesting to investigate how investment growth

[1] Practically, if stock price is the present value of future cash flows, which could be from *existing* investment and/or *new* investment, then, the change in stock prices, or stock returns, should be closely related to the change in the cash flows of *existing* investment and/or the change in the cash flows of *new* investment. The change in the cash flow of existing investments is usually predicted based on historical performance of the existing investment (operating income, sales, etc). However, the change in the cash flows of new investment is very difficult to predict due to lack of historical data about future *new* investment. The current investment growth provides an alternative for "current expectation about future growth" because, after all, the future new cash flows will be generated from new investment. Since the cash flows from the *existing* investment are predictable and should be already priced, both stock returns and investment growth rates will only reflect expectations about future new cash flows from *new* investment. This

performs. Second, Loughran and Ritter (1997) show that the issuing firms continue to have higher investment *levels* than their stylized matches do after offering. This seems to suggest that the issuing firms continue to have better investment opportunities and should have no fundamental difficulties doing new investments. However, they do not explain why this is relevant for the underperformance of the issuing firms. We are going to provide more details on how issuing firms invest around offerings. More importantly, we carefully consider several hypotheses and examine which theory is the most consistent with the evidence.

Using 2247 firms conducting seasoned equity offering (SEO firms) and 802 firms conducting seasoned debt offering (SDO firms) between 1985 and 1996, we find that the seasoned issuing firms significantly increase their investment growth before offering, however, they significantly reduce investment growth afterward. On average, the seasoned equity offering (SEO) firms increase investment growth rate from 33 percent to 56 percent during four years before offering, then investment growth rate drops to 17 percent during three years after offering. This pattern is also true for seasoned debt offerings firms. The SDO firms, on average, increase investment growth rate from 18 percent to 34 percent during four years before offering but reduce it to only 13 percent during three years after offering. More interestingly, we find the issuing firms' investment growth rates outperform their stylized (matched by issuing years, industry, firm size and book-to-market (BE/ME)) matches' investment growth rates before offering, but significantly underperform their stylized matches after offering. For the

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thus leads to the conclusion of identical movements in stock returns and investment growth.

SEO firms, their stylized matches' investment growth rates outperform by an average of 333 basis points during a three-year window one year after offering. The SDO firms are not better. Their stylized matches' investment growth rates outperform by an average of 700 basis points during a three-year window one year after offering. Moreover, if we split SEOs into primary SEOs and secondary SEOs,[2] we find the primary SEOs significantly underperform in investment growth but secondary SEOs do not. Using different matching benchmarks (matched by issuing years, industry, and firm size, or matched by issuing years, industry, firm size, and operating income performance) does not change the above conclusions. Our evidence shows that there exists a significant underperformance in investment growth after offering for seasoned issuing firms.

Our results are not surprising because, as we mentioned above, theoretically stock returns and corporate investment growth rates can behave similarly. Nevertheless, our new evidence on investment growth raises a natural question: why do seasoned offering firms underperform in investment growth rates? For example, if the underperformance in stock returns can be explained by the lowered risk after the seasoned offering (e.g. Eckbo, Masulis and Norli (2000)), then, can lowered risk explain the underperformance in investment growth? Interestingly, the "lowered risk" explanation is very doubtful because there is no particular theory indicating lowered risk would necessarily lead to a more conservative corporate investment. Actually, if lowered risk suggests cheap cost of financing, then it would rather lead to higher investment. In addition, given newly raised

[2] The difference between primary SEOs and secondary SEOs is that primary SEOs will bring in new funds to the issuing firms, while secondary SEOs are sold by large shareholders and will not generate new cash for the firms.

fund from capital market and lowered risk, managers might be more likely to conduct more aggressive expansion, as suggested by Ritter (2002).

Our extensive robustness checks confirm that the underperformance in investment growth can be explained by the market sentiment hypothesis, first documented by Li (2003). This explanation suggests that, if high liquidity followed by low stock returns signals investor sentiment as argued in Baker and Stein (2003), then for the same reasons, managers also interpret low stock returns as a consequence of investor sentiment. Thus, both individual investors and managers tend to reduce their investment due to worse-than-expected business conditions and lack of knowledge about the true value of the risky assets.[3] This explanation is supported by both primary SEOs data and SDOs data in this article.

Further, our evidence on the underperformance in investment growth casts new light on the explanations of "New Issues Puzzle". From the existing evidence and the new findings documented in this article, we suggest that the market sentiment is the dominant reason that causes both types of the underperformance following seasoned offerings, i.e., the underperformance in stock returns *and* the underperformance in investment growth. The lowered risk hypothesis (e.g. Eckbo, Masulis, and Norli (2000)) may be able to provide a reason for the underperformance in equity returns but fails to explain the underperformance in investment growth. Because there is so far no particular theory that can explain why lowered risk can result in lowered investment. The earning management hypothesis (e.g. Teoh, Welch, and Wong (2000)) suggests that the issuing managers tend

[3] It is helpful to think that both managers and individual investors are investors, but individual investors are investors in financial market while managers are investors in real economy. When market sentiment is very high, both tend to hold cash and reduce their investments.

to borrow future earnings to dress the offering window prior to offering. Thus, this will lead to some bad earning numbers and bad performance in equity returns afterward. However, if managers really cannot deliver sound earning numbers, then why do they not increase corporate investment to fulfill investors' high expectations, especially, given the fact that they have enough cash? It is hard to believe that, on the one hand, managers manipulate earnings to decorate issuing window prior to offering, but on the other hand, the same managers do nothing to reduce the effect of the bad earnings after offering.[4] In this sense, the earning management hypothesis is inconsistent. Finally, the agency hypothesis in Jung, Kim, and Stulz (1996) suggests that managers tend to squander corporate resources when given the opportunities, although this may not be intentional. Clearly, our evidence of the underperformance in investment growth does not support this hypothesis, because managers actually tend to hold cash after offering.

The rest of the article is organized as follows. Section 2 briefly summarizes the hypotheses. Section 3 describes the data and main sample characteristics. Section 4 discusses the methodologies. The empirical results are reported in Section 5. We conclude in section 6.

2.2 Hypotheses

The evidence shows that the issuing firms tend to have a lower investment growth after offering, compared to their stylized matches. We propose five hypotheses that potentially explain this underperformance.

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[4] Burning cash (doing more investment) is even more credible.

"Mean reversion hypothesis": Because we observe an outperformance prior to offering but an underperformance afterward, this hypothesis simply suggests a pure mean-reverting process in the issuing firms' investment growth. The underperformance in investment growth after offering is simply due to the issuing firms' lower investment growth in the first place prior to offering. We consider this hypothesis as our "benchmark" hypothesis. This hypothesis predicts investment growth increases before offering but regresses gradually to the mean after offering.

"Cash shortage hypothesis": This hypothesis suggests that seasoned offering firms aggressively and quickly use up most of their cash during the first year after offering. Thus, managers will not have enough cash to do more investment in the following years. Nevertheless, their matches do not have this situation. This hypothesis predicts that, compared to their matches, the offering firms will have lower cash growth after offering.

"Substitution hypothesis": To make investors believe issuing firms are doing well and having plenty of investment opportunities, managers tend to delay some expenses and save most of their cash for investment before offering. In other words, managers tend to substitute some expenses with investment through "cash tunneling". This hypothesis implies that this is the reason why we usually observe high investment growth before offering, because investors may believe issuing firms face more investment opportunities. However, after offering, the issuing firms will have to reduce their investment and use some newly raised cash to pay off the delayed expenses since the operating income usually deteriorates after offering. This hypothesis predicts a lower investment growth after offering because issuing firms do not have enough cash for new investment if they

will have to use some cash to pay off more expenses. According to this hypothesis, one would observe the underperformance in both cash growth and investment growth after offering.

"Mismatched investment opportunities hypothesis": This hypothesis implies that seasoned offering firms actually have fewer investment opportunities than the selected matches do after offering, due to mismatched investment opportunities. As a result, they underperform in investment growth. The reason is that one of the matching criteria, book-to-market ratio, is no longer a good proxy for equal investment opportunities when investor sentiment provides a false market perception for the issuing firms. This hypothesis predicts no underperformance once the matches are selected based on the same market perception. In this article, we will use different matching benchmarks to test this hypothesis.

"Market sentiment hypothesis": According to Baker and Stein (2003), a big increase in liquidity followed by low stock returns signals the high market sentiment. After offering, managers realize that the business conditions are actually not as good as they were thought to be, and they are not sure about the true value of the risky assets after high level of market sentiment. They thus reduce investment and prefer to hold cash. This then results in an underperformance in investment growth. This hypothesis predicts that issuing firms will experience higher level of investor sentiment prior to offering, thus they reduce investment growth afterward.

2.3 Data

2.3.1 Sample Selection

Our data are selected from three different sources. The data about stock prices, stock returns, trading volume, capitalization, value-weighted market returns, equal-weighted market returns, and shares outstanding are drawn from CRSP.[5] The financial accounting data are collected from COMPUSTAT. The seasoned equity offering firms, seasoned debt offering firms, and the information about the use of proceeds are all selected from SDC Platinum database.

We choose all firms that have valid financial and accounting numbers. We ignore those firms with negative accounting numbers for book assets, capital, or investment. We also drop firms with assets less than 5 million, and other extreme observations. Because assets in utilities, financial institutions, investment funds, and REITs have different trading characteristics from ordinary equities, we exclude all of them from the sample by deleting observations with SIC code between 4911 and 4941 (utilities), between 6000 and 6081 (financial institutions), and 6722, 6726, 6792 (investment funds and REITs).

It is also possible that some firms have multiple offerings in five years, so we may have the problem of overlapping returns (this is usually called the problem of cross-sectional dependence). To deal with this problem, we strict our analysis to the firms that do not repeat offerings in a five-year post-issue window. Above procedures yield 2066 primary

[5] The value-weighted market returns and the equal-weighted market returns are used to replicate the evidence of the underperformance in equity returns to make sure our data are comparable to other studies.

seasoned equity offering firms, 181 secondary seasoned offering firms, and 802 seasoned debt offering firms between 1985 and 1996.

2.3.2 Sample Characteristics

Table 1 shows the number of primary SEOs, secondary SEOs, and SDOs for each issuing year. For the primary SEOs (Panel A), 71.4 percent of the sample is after 1991, corresponding to the heavy issuing activities associated with the hot market that commenced in 1992. For the secondary SEOs (Panel B), the heavy issuing activities occurred around 1986 and 1992, which are both years that market was becoming hot. Similar to the SEOs, the SDOs (Panel C) also experienced heavy issuing activities around 1986 and 1992. The distribution of the issuing activities confirms that firms usually wait for an issuing window when market situations become favorable. Interestingly, the investor sentiment is also most likely to be developed in hot market rather than in cold market.

In addition, Table 1 reports the industry classification using two-digit Standard Industrial Classification codes for the sample. The evidence suggests that most of the seasoned offering firms are from the manufacturing industry (firms with SIC between 20 and 39) and the services industry (firms with SIC between 70 and 89). For the primary SEOs (Panel A), manufacturing industry and services industry are the two major industries that have relatively more primary SEOs (41.38 percent and 17.47 percent, respectively). The secondary SEOs (Panel B) usually cluster in the manufacturing industry (38.12 percent).

For the SDOs (Panel C), we find 41.65 percent of SDOs is in the manufacturing industry, and 8.60 percent is in the services industry.

2.4 Methodologies

2.4.1 Matching Techniques

We mainly use four criteria to select matches for the issuers in our analysis: issuing years, industry, firm size, and book-to-market ratio. Fama and French (1992, 1996) suggest that firm size and book-to-market ratio factors can better explain cross-sectional stock returns. According to Gibbons and Fama (1982) and Cochrane (1991, 1998), if financial market reflects investment opportunities like a mirror, then investment growth should be linked to stock returns, and thus should be related to firm size and BE/ME ratio. In addition, BE/ME ratio itself is sometimes used as a proxy for investment opportunities, like Q variables. Only those non-issuing firms that are listed on the NYSE/AMEX/Nasdaq available on both CRSP and COMPUSTAT databases are used as a pool of possible matching firms. We first sort stocks by their equity market-caps into quintiles. Within each size quintile, book-to-market (BM) ratio quintile cut-off points are defined. The cutoff points for size quintiles are based on the market capitalization at the end of each month. The cutoff points for BM quintiles are based on the book value of equity divided by the market value of equity at the end of each month, using all NYSE/AMEX or Nasdaq firms available on both CRSP and COMPUSTAT databases. We obtain 25 portfolios from above procedures. To identify matching firms for a given issuing firm, we go into the same size quintile first, and then choose at least one but at most five firms

with the closest BM ratio. Because firms in different industries will have quite different investment patterns, we also match issuing firms according to industries. The two-digit SIC codes are used to select matching firms. Finally, we only select our matches in a four-year window (two years before and two years after) of the offering dates.

To ensure our results are robust, we also try other matching techniques. One of them is to find matching firms by using issuing years, industry, firm size, BE/ME, and operating income performance. The operating income performance is defined as operating income divided by previous year's assets. We form 10 portfolios based on the operating income performance. To select a match, we first repeat the above selection procedure and then choose a firm in the related income performance portfolio. In addition, the matching firms found based on only issuing years, industry, and firm size are also considered to make sure our results are independent of matching techniques.

2.4.2 Fiscal Year-End Month and Calendar Year-End Month

Since we need to investigate the investment growth before and after offerings, and many firms do not issue new equity or debt in the same month that fiscal year ends, it is usually difficult to determine the correct amount of investment around offering dates. For example, if the fiscal year-end month is February and the issuing month is February, then the data about investment (capital expenditure) from COMPUSTAT will not have any problem. We can easily treat the year before February (this year) as "-1" year --- the year before offering, and the next fiscal year as "+1" year --- the year after offering. However, if the issuing month is February and the fiscal year-end month is December of the same

year, then we should not treat next fiscal year as "+1" year because most of the investment has been made in this year. Instead, we should treat "this year" as "+1" year --- the year after offering, and the last year as "-1" year --- the year before offering. Clearly, distinguishing between the fiscal year-end month and the issuing month is crucial for measuring correct amount of investment.

To deal with the above problem, we use the following procedures.

I. If the fiscal year-end month is after the issuing month, and if there are less than six months between fiscal year-end month and issuing month, then we treat this year as "the year before offering" and next year as "the year after offering".

II. If the fiscal year-end month is after the issuing month, and if there are more than six months between fiscal year-end month and issuing month, then we treat last year as "the year before offering" and this year as "the year after offering".

III. If the fiscal year-end month is before the issuing month, and if there are less than six months between fiscal year-end month and issuing month, then we treat this year as "the year before offering" and next year as "the year after offering".

IV. If the fiscal year-end month is before the issuing month, and if there are more than six months between fiscal year-end month and issuing month, then we treat next year as "the year before offering" and the year after next year as "the year after offering".

Table 0: Year Selection Procedures

Fiscal vs. Issuing	Difference	Year Selection
Fiscal > Issuing	≥ 6 months	-1 YR: last year
		+1 YR: this year
	< 6 months	-1 YR: this year
		+1 YR: next year
Fiscal < Issuing	≥ 6 months	-1 YR: next year
		+1 YR: the year after next year
	< 6 months	-1 YR: this year
		+1 YR: next year
Fiscal = Issuing	---	-1 YR: this year
		+1 YR: next year

Notes: 1. "Fiscal" is the fiscal year-end month, and "Issuing" is the issuing month.
2. "Fiscal > Issuing" means the fiscal year-end month is before the issuing month. "Fiscal < Issuing" means the fiscal year-end month is after the issuing month.
3. "-1 YR" means the year before offering, and "+1 YR" means the year after offering.
4. "last year" means last fiscal year, and "this year" means this fiscal year.

The above table illustrates how we distinguish between the fiscal year-end month and the issuing month.

2.4.3 The Calculation of Buy-and-Hold Returns (BHRs)

The three-year and five-year buy-and-hold returns (BHRs) are calculated to replicate long-term underperformance in equity returns. Barber and Lyon (1997a), and Kothari and Warner (1997) both indicate BHRs are attractive in comparison to cumulative abnormal returns (CARs), which implicitly assumes frequent rebalancing and thus ignore the potentially high transaction costs. Blume and Stambaugh (1983), Roll (1983), and Conard and Kaul (1993) offer empirical evidence that frequent rebalancing can lead to upward bias due to bid-ask bounce.

We calculate the BHRs by compounding daily returns over either 1250 trading days (5 years) or the number of trading days from the offering date until the delisting date, whichever is smaller. The following formula is used to calculate BHRs.

$$BHR_i = \prod_{t=1}^{T}(1+r_{it}) - 1$$

The same holding periods are used to calculate the BHRs of matching firms. If a matching firm is delisted before the end of the three-year/five-year anniversary or the issuing firm's delisting day, whichever is earlier, either CRSP value-weighted returns or CRSP equal-weighted returns are inserted into the calculation of the BHRs from the removal date.

2.5 Results

2.5.1 Replicating BHRs

We first replicate the well-known long-term underperformance in equity returns found by other authors. Panel A of Table 2 shows our results. Using 2247 SEO firms, we find equally weighted average 5-year buy-and-hold return is 31.3 percent, compared to their stylized matches' 49.9 percent. The annualized difference is around –3.2 percent, which is similar to –3.9 percent found by Brav, Geczy and Gompers (2000). Cai and Loughran (1998) use Japanese data and find an annualized difference of –3.5 percent. Notice that the annualized difference in Eckbo, Masulis and Norli (2000) is higher (–4.8 percent).

This is due to the different sample period and different number of years used to calculate annualized returns.

We also divide whole sample into two subsamples: primary issues and secondary issues. The difference is that primary issues generate new cash to the issuing firms while secondary issues generate cash to the large shareholders except issuing firms. Different from the evidence documented in primary issues, the existing evidence on secondary issues indicates an outperformance of issuing firms in equity returns. In our sample, the primary issues have an average of –3.5 percent annualized return difference for 5 years after offering, and the secondary issues have an average of 4.5 percent annualized difference for 5 years after offering.

We also find long-term underperformance of equity returns for SDO firms. See Panel B of Table 2. On average, the annualized return difference is –2.6 percent for 5 years (-2.4 percent for 3 years) after the debt offerings in this article. Eckbo, Masulis and Norli (2000)'s paper is the other one considering debt issues. They find firms issuing convertible debt have an annualized difference of –3.3 percent, while firms issuing straight debt have an annualized difference of –2.3 percent. Our result is a little different because we do not distinguish between convertible debt and straight debt. Overall, our results on the long-term underperformance in equity returns are very similar to other authors' findings. This indicates a very comparable sample in this article.

2.5.2 Main Results

As we briefly mentioned before, there exists difference between the performance of the primary equity issuers and the performance of the secondary equity issuers. We divide our SEO sample into primary SEOs and secondary SEOs, and then report our results accordingly. Keep in mind that the difference is that primary issues generate new cash to the issuing firms while secondary issues generate cash to the large shareholders except issuing firms.

2.5.2.1 Primary Seasoned Equity Issues

2.5.2.1.1 The Underperformance in Investment Growth

There are 2066 primary SEO issues between 1985 and 1996 in our sample. Three or four years before offering, the issuing firms appear to have similar or lower investment growth rates than their stylized matches. In Panel A of Table 3, four years before offering, the issuing firms have an average of 32 percent investment growth, compared to an average of 37 percent investment growth of their matches. This situation changes as the offering announcement date approaches. During a three-year window before offering, the issuing firms have significantly higher investment growth rates than their matches' investment growth rates. The issuing firms' investment growth rates increase from 33 percent to 56 percent, while their matches' investment growth rates increase from 35 percent to 39 percent. The average difference (issuers' growth minus their matches' growth) in investment growth between the issuing firms and their matches is 13.5 percentage points, and the difference is statistically significant at 99.9 percent level. Right before offering,

the difference of investment growth peaks at 17 percentage points. The evidence suggests a greater investment growth rates run-up for the issuing firms before offering.

We observe that issuing firms continue to outperform their matches in investment growth during the first year after offering. There are two reasons why issuing firms continue to outperform their stylized matches in investment growth during the first year after offering. First, it may be due to momentum effect: the issuing firms continue to perform well and managers want to keep investing more. Second, it may be because that issuing managers want to fulfill investors' expectation right after offering. However, the high investment growth quickly disappears after the first year. We find that both issuers and their matches experience decreasing investment growth after the first year of offering. Shown in Panel A of Table 3, the issuers' investment growth rates decrease from 53 percent to 17 percent, while their matches' investment growth rates decrease from 41 percent to 23 percent during four years after offering. Surprisingly, the evidence shows that the issuers actually keep underperforming their matches in investment growth beginning in the second year until the fifth year after offering. The three-year average difference (issuers' growth minus their matches' growth) in investment growth after the first year is –4.67 percent and is statistically significant at 95 percent. This tells us that there exists a significant underperformance in investment growth for the issuing firms. Graph 1 illustrates the underperformance in investment growth and compares it to the graph of investment level.[6]

[6] The investment level is defined as a firm's capital expenditure divided by its year beginning total assets. We provide the evidence of investment level, cash level, sales level, and expenses level only for the reason of comparison. Actually, firms' total assets are affected by many things, the above "level measures" may thus be biased.

As we discussed above, since we are dealing with how issuing firms invest around the offerings, the amount of investments is crucial in this article. To make sure our results about investment growth are correct, we perform following two robustness checks. First, instead of raising new funds for more future investments after offering, issuing firms may raise new funds for other reasons. For example, they may issue new equity to collect cash for retiring debt. Thus, lower investment growth may be pre-determined even before offering. To investigate this issue, we check the issuing firms' *use of proceeds*. We find more than 50 percent firms do not provide explicit information about how they are going to use the new funds. Their uses of proceeds are either "others" or "general corporate uses". This indeed leads to a very flexible use of new funds. Further, one of our matching benchmark is book-to-market ratio, which is closely related to the measure of investment opportunities (Q variables). Thus, even for those issuing firms that may not raise funds for new investment, they should have similar investment growth, especially they have more funds after offering. However, on the other hand, book-to-market ratio also reflects market perception, and what if the market perception is different for issuers and their matches in the first place? After all, issuers usually have better performance before offering. This may potentially produce a "mismatched investment opportunities" problem. To ensure this is not the case, we add one more matching criterion --- similar income performance --- to make sure the market perception is similar for both issuers and their matches. We find the identical results: a significant outperformance in investment growth before offering, but a significant underperformance in investment growth after offering. The results are shown in Panel B of Table 3.

Second, issuers may not want to invest more in capital expenditures, instead they do more mergers and acquisitions. This thus makes those issuers look like they reduce investment (capital expenditure) growth. To deal with this concern, we first look at the use of proceeds and find the issuers that will use new funds to do "merger and acquisition" only count for 4.55 percent in the primary SEOs sample. Excluding those firms that explicitly indicate they will do "merger and acquisition" after offering yields almost identical results. Therefore, we think this will not cause any troubles in our results. The results are shown in Panel C of Table 3.

Overall, for primary SEO firms, our results indicate a significant outperformance in investment growth before offering, but a significant underperformance in investment growth after offering. Also noteworthy is that the underperformance should not be due to mismatched investment opportunities since even after controlling for similar income performance, their stylized matches still show strong investments after offering. Although issuers do have high investment before offering, if the assumption that firms' current investment decisions are not correlated with their past investment decisions holds, then this tells us that the "mismatched investment opportunities hypothesis" is not supported by the data.

Finally, shown in Graph 1 (Panel B), notice that issuers appear to have higher investment level (investment divided by assets) than their stylized matches. However, the calculation of investment level can be biased by changes in many variables such as cash, inventories, investments, and etc.

2.5.2.1.2 Cash, Sales, and Expenses

It is natural to think that the above underperformance may be due to the fact that the issuing firms have already had higher investment level before offering, thus it becomes more difficult for them to always keep the investment growth rates at a higher level. To answer this question, we look at other variables to investigate whether issuing firms' high post-issue starting level can cause any difficulties in sustaining growth. We mainly consider issuing firms' cash growth rates, sales growth rates and expenses growth rates. The idea is, if issuers can sustain growth in cash, sales, and expenses, then they should also be able to sustain investment growth. Especially, they just raise a lot of money in the capital market and have a higher investors' expectation to fulfill. Otherwise, there must exist other reasons that produce the underperformance in investment growth. Further, the evidence of cash growth, sales growth, and expense growth will help us determine whether the underperformance in investment growth is caused by cash shortage or managers' manipulation of cash.

Table 4 (Panel A) shows our evidence on cash growth. We find both issuers and their stylized matches increase cash growth rates before offering, and issuers have more significant increase than their matches. During three years before offering, issuers generally have higher cash growth than their matches. Especially, during the year before offering, the issuers have a cash growth rate of 167 percent, compared to 54 percent of their matches' cash growth, although part of the reason is the new cash raised in the financial market. After offering, although both issuers and their matches have lower cash growth rates, issuers continue to have significantly better cash growth than their matches

in next four or five years except the second year after offering. From Graph 2 (Panel A), it is clear that issuers' cash-to-assets ratios decrease after they issue new equity in the capital market, but continue to outperform their matches' cash-to-assets ratios. According to our matching techniques, because matches have similar size, this evidence also indicates a better cash position in the issuing firms after offering.

This suggests that the issuing firms are able to maintain a better cash growth after offering. In other words, many issuers will not experience cash shortage after offering. Thus, the underperformance in investment growth should not result from the lack of cash. The cash shortage hypothesis is not supported by our data. However, right now we still cannot rule out the possibility that issuers have fewer investment opportunities, and this may also cause the lower investment growth and higher cash growth. We will address this point later in this article.

We further examine the sales growth and expenses growth of the issuing firms. Tables 4 (Panel B) shows the results of sales growth. Consistent with the existing evidence, the issuing firms usually have very good sales numbers before offering. Their stylized matches however do not have such good sales growth. During the three-year window before offering, the issuing firms outperform their matches by an average of 16 percentage points in sales growth rates. This situation does not change after offering. During the three-year window after offering, the issuers continue to outperform their matches by an average of 13 percentage points, although both issuers and matches have lower sales growth. The evidence implies that, after offering, the issuing firms still manage to maintain better performance in terms of sales growth.

Tables 4 (Panel C) shows the evidence on expenses growth. We find issuers outperform their matches in expenses growth prior to offering, and continue to have higher expenses growth afterward. The evidence is statistically significant. Our results show that, as issuers' sales growth continues to be higher than their matches' sales growth after offering, their expenses growth is also higher than their matches' expenses growth. This however results in a lower profit margin in the issuing firms. Combined with the fact that issuers have enough cash after offering, our findings raise an interesting question: if issuers can have higher cash growth, sales growth, and expenses growth, then what causes a lower investment growth?

From the available evidence, we can conclude that the mean reversion hypothesis is not supported by our data because (1). we actually find a prompt drop in investment growth only one year after offering instead of a slow and smooth mean-reverting process. (2). The investment growth will converge to the mean, but we actually find the investment growth drops to the level that is significantly lower than the starting point four years before the offering. (3). It seems that the issuing firms have no difficulties sustaining the better growth in sales, cash, and expenses. Intuitively, given ample cash, there should have had a better investment growth as well. However, why do we observe a bigger decline in investment growth? (4). We do find a mean-reverting process in investment growth for those matching firms. However, the gap in the investment growth process between the issuing firms and their matches is significantly bigger than the gap that a simple mean-reverting process may suggest. That is, the mean reversion hypothesis may be able to explain a decrease in investment growth, but fails to explain why investment

growth suddenly drops to the level that is *lower* than their matches' investment growth, i.e. an underperformance. This phenomenon thus requires a different theory to explain.

In summary, our evidence on growth in investment, cash, sales, and expenses suggests the following conclusions about the issuing firms' post-issue investment decisions:

I. There should not be any cash problem regarding future investments.
II. A simple mean revision or a diminishing growth cannot convincingly explain the underperformance in investment growth.
III. Since the issuing firms have no problems maintaining growth in cash, sales, and expenses, they should not have any fundamental problems sustaining the growth in investment, given that they do have similar investment opportunities after issuing.

The underperformance in investment growth should be due to other reasons, especially non-fundamental reasons.

2.5.2.1.3 Liquidity and Market Sentiment

In the corporate investment literature, corporate investment decisions are usually affected by investment opportunities, financial constraints, and non-fundamental factors. If the assumption that firms' current investment decisions are not correlated with their past investment decisions holds, and since the issuing firms' stylized matches have higher investment growth, the issuing firms should at least have similar investment growth, especially given ample amount of cash. Therefore, the underperformance in investment growth should not come from either lack of investment opportunities or lack of cash. We

then need to investigate whether the underperformance in investment growth is due to a non-fundamental reason.

Li (2003) documents a significant and negative relationship between corporate investment and equity liquidity. Because equity liquidity can be treated as a mirror of investor sentiment (e.g. Baker and Stein (2003)), Li suggests that the negative relationship can be explained by the *market sentiment hypothesis*. That is, if high liquidity followed by low stock returns signals investor sentiment as argued in Baker and Stein (2003), then for the same reasons, managers also interpret low stock returns as a consequence of investor sentiment. Thus, both individual investors and managers tend to hold cash and reduce their investment due to worse-than-expected business conditions and lack of knowledge about the true value of the risky assets. According to this argument, we want to study whether issuing firms experience big liquidity increase before offering. If we do observe a big increase of liquidity in issuing firms before offering, then issuers' underperformance in investment growth may be due to high market sentiment. Eckbo, Masulis and Norli (2000) compare the liquidity level of the issuing firms to the liquidity level of their matches. They find that the issuing firms usually have higher liquidity level before offering. However, they do not report any evidence about change of liquidity. As we mentioned before, because investor sentiment is most likely to emerge when liquidity significantly increases, investor sentiment should be more related to the change of liquidity instead of liquidity level.

Thus, according to the market sentiment hypothesis, our goal is to find whether there is a significant liquidity run-up prior to offering. The evidence shown in Panel A of Table 5

indicates such a liquidity run-up before offering. For 2066 primary SEO firms, we find SEO firms' stock turnover on average increases by 75.2 percent from three years before offering to one year before offering. While their matches' stock turnover on average increases by 50.7 percent. The difference between above two groups (issuing firms' liquidity change minus their matches' liquidity change) is statistically significantly greater than zero as t-statistic is 5.88. We also test stock turnover run-up during two years before offering. The primary SEO firms' stock turnover on average increases by 40.3 percent but their matches' stock turnover increases by 20.6 percent. The difference is statistically significantly greater than zero as t-statistic is 6.18. The evidence suggests a significantly bigger liquidity run-up for primary SEO firms before offering, and it implies a stronger investor sentiment in those issuing firms in a hot market.

During a three-year post-issue window, primary SEO issuers have a significant decrease (average of -19.4 percent decrease) in stock turnover, compared to their matches' slight increase (average of 3.07 percent increase) in stock turnover. The difference between their changes of liquidity is statistically significant (issuing firms' liquidity change minus matches' liquidity change, t=-24.61). This can be thought as another indicator of the investor sentiment in the issuing firms before offering, because their liquidity significantly reverses while their stylized matches' liquidity continues to increase.

To make sure the market has the same perception for both issuers and their matches, we again add income performance as one more criterion to select matches. Panel B of Table 5 shows even stronger evidence of investor sentiment in issuing firms. It is clear that matches with similar prior-issue income performance actually have a much lower

increase of liquidity (only 20.2 percent, compared to 75.2 percent of issuers' liquidity change). The difference between them is statistically significant (t=9.16). After offering, the issuers' turnover drops by 19.4 percent, while their matches' turnover continues to increase by 5.6 percent. The statistically significant difference, on the other hand, implies that issuers do have abnormally big increase in stock turnover.

Overall, our results indicate that both investors and managers generally reduce their investing interest in the issuing firms after offering, because they all realize that the business conditions of these firms are not as rosy as they were thought to be, and they are not sure about the true value of the risky assets. As a result, we observe simultaneous less trading activities (liquidity) in the capital market and reduced investments in the real economy. This conclusion is, therefore, consistent with the market sentiment hypothesis.

2.5.2.2 Secondary Seasoned Equity Issues

We now turn to study those firms conducting secondary seasoned equity issues. Different from the underperformance in stock returns for primary SEOs, the existing evidence suggests an outperformance in stock returns for secondary SEOs. However, so far there is no consensus in explaining why secondary SEOs exhibit such an outperformance. In addition, there is no evidence about how secondary SEO firms invest around offering date.

We again start with replicating the existing evidence to make certain our data are comparable. For 181 secondary SEO firms, Table 1 shows that there is an outperformance in stock returns. During a five-year post-issue window, the issuing firms'

buy-and-hold return (BHR) is 100.39 percent, compared to their stylized matches' 67.75 percent. The annualized difference of above BHRs is 4.52 percent. Using three-year window reduces the BHRs, but still indicates a weak outperformance. This is consistent with Clarke, Dunbar, and Kahle (2003), in which they also find outperformance in stock returns after secondary SEOs, although the results are statistically insignificant.

Looking at the investment growth, shown in Table 6 (Panel A), we find the secondary SEO firms outperform their matches in investment growth around the offering dates. However, unlike the strong underperformance in investment growth for primary SEOs, they only exhibit very weak underperformance of investment growth during a three-year window after the first year of the offering. The difference of the investment growth between the issuing firms and their matches is 1.67 percent, and the difference is not statistically significant. This suggests that there is almost no underperformance in investment growth for the secondary SEO firms. Now it is engrossing to see if there is investor sentiment before offering for those secondary SEO firms.

An examination of the liquidity changes leads to no evidence of the investor sentiment. We actually find that the issuers have lower liquidity increase than their matches prior to offering. Table 7 shows that the issuers have an average of 8.8 percent liquidity change during a three-year window before offering but their matches' stock turnover on average increases by 28.7 percent. The difference between above two groups (issuing firms' liquidity change minus their matches' liquidity change) is statistically significantly greater than zero as t-statistic is –2.50. We also test stock turnover run-up during two years before offering. The secondary SEO firms' stock turnover on average increases by

6.7 percent but their matches' stock turnover increases by 25.6 percent. Once again, the difference is statistically significantly (t-statistic is –3.52). The evidence suggests a significantly lower liquidity run-up for secondary SEO firms before offering, and it implies no evidence of investor sentiment for those secondary equity issuing firms. After offering, the issuers' stock turnover drops while their matches' turnover continues to increase, although the increase is small. We find that issuers have a 16.9 percent decrease in liquidity, compared to their matches' 3.1 percent increase in liquidity after offering. The difference is statistically significant (t=-6.52). Using a more detailed matching benchmark does not change our results (Shown in Panel B of Table 7).

Nevertheless, the evidence offers a new question, even if there is no investment sentiment for secondary SEOs, why do they have a decrease in stock liquidity? What causes this decrease? This can be answered by the nature of the secondary SEOs. We know that the secondary SEOs are sold by large shareholders instead of firms. This could send a negative signal about a firm' quality to the market place. Other investors thus will reduce their investments in the issuing firms. However, for primary SEOs, the signal is rather very mixed, because primary SEO firms may want to raise new funds for future growth. Combined with the evidence of their matches, it is thus believed that primary SEOs' post-issue liquidity decrease is from the investor sentiment.

Looking at income performance, sales, cash, and expenses, we find similar but weaker outperformance as in the primary SEO firms. The results are reported in Table 6, Panel B, C, and D. Overall, it seems that the only significant difference is from the evidence of liquidity change. This implies that the different pattern in the investment growth is most

likely from the different pattern in the liquidity change, or the investor sentiment. A closer investigation of the data tells us that, different from the primary SEO firms, the secondary SEO firms are usually larger firms with lower growth. Although the secondary SEO firms experience a little better performance and more active trading prior to offering, the weak outperformance will not make investors put much weight on the expectations. This explains why there is no huge liquidity increase for the secondary issuers prior to offering. Therefore, the investor sentiment for those issuers should not be high, and the investors and the managers will not be affected. Hence, we do not find strong evidence of the underperformance for either secondary SEO issuing firms or their matches.

2.5.2.3 Seasoned Debt Issues

As we demonstrated before, our debt data are comparable to the data in other researches. Our goal is to explore whether there is an underperformance in investment growth for the seasoned debt offering firms (SDOs). The results are shown in Table 8. During the year before offering, the SDO issuers usually have very high investment growth, but then they significantly underperform their stylized matches in investment growth after offering. The average difference of investment growth is –7.0 percent and statistically significant (p=0.001) for a three-year window. Similar to the underperformance in investment growth for primary SEO firms, the evidence suggests that the SDO managers tend to invest less after offering.

To ensure our results about investment growth are correct for SDO firms, we also perform following two robustness checks. First, we check the issuing firms' *use of proceeds*. We find 38.26 percent firms do not explicitly disclose information about how they are going to use the new funds. Their uses of proceeds are either "others" or "general corporate uses". Like those primary SEOs, this indeed leads to a very flexible use of proceeds. Further, to consider "mismatched investment opportunities" problem, we add one more matching benchmark --- similar income performance --- to make sure the market perception is similar to both issuers and matches. We find the identical results: a significant outperformance in investment growth before offering, but a significant underperformance in investment growth after offering. Second, issuers may do more mergers and acquisitions instead of other investments in fixed assets, it thus seems that issuers reduce investment growth. To deal with this concern, we first look at the use of proceeds. We find the SDO issuers that will use new funds to do "merger and acquisition" only count for 4.81% in the sample. If we exclude those firms that explicitly indicate they will do "merger and acquisition" after offering from the sample, the new sample yields almost identical results. The evidence confirms the existence of the underperformance in investment growth for SDOs. For the reason of simplicity, we do not report these results in this article.

Next, we investigate the growth in cash, sales, and expenses for the SDO firms. Overall, the results shown in Table 8 indicate that the issuers usually underperform in the income performance, but they are able to have better or at least same cash and sales growth than their matches. The evidence implies that (1) similar to the evidence for primary SEOs, there should not be any cash problem regarding future investment for SDO firms, and (2)

because the issuing firms have no problems maintaining growth in cash, sales, and expenses, they should not have any fundamental problems sustaining the growth in investment. Therefore, like the case in primary SEO firms, the underperformance in investment growth should be also related to the non-fundamental reason.

Now we want to study whether or not the underperformance is due to investor sentiment. To investigate this issue, we again look at the liquidity change prior to offering. Shown in Table 9, during three years before offering, the SDO firms on average have 14 percent increase in stock turnover. Meanwhile, their matches only have an average increase of 9 percent. The difference is statistically significant (t=2.64). To reduce the possibility that the market has different perception for issuers and their matches, we also add income performance as one more criterion to select matches. Panel B of Table 9 shows even slightly stronger evidence. Once again, the results confirm the existence of investor sentiment.

The evidence of the SDO firms further confirms our market sentiment hypothesis. It is well known that firms conducting seasoned offerings are usually small and fast-growing firms. When they decide to raise new funds in the capital market, they wait for a window in which they have superior performance. However, at the same time, their companies are inducing high investor sentiment. Both investors and managers think the issuing firms would have very good growing opportunities and would continue to have superior performance. This is then reflected in their investing activities. Thus, we usually observe very significant increase in liquidity in the stock market, and very high investment growth in the real economy. Nevertheless, after managers issue new securities in the

capital market, the worse-than-expected performance reveals the existence of investor sentiment and worse-than-expected business conditions in the issuing firms, then investors and managers both realized that things are not as rosy as they were thought to be, and they do not have the certain knowledge about the true value of the risky assets. Consequently, we observe significant decrease in trading activities in the stock market, and an underperformance in investment growth in the real economy. Our results also confirm that the negative adjustments in investment growth are not due to lack of cash, or lack of investment opportunities.

2.5.3 Robustness Checks

2.5.3.1 Different Matching Benchmarks

We perform some robustness checks to make sure our results are robust. Because book-to-market ratios reflect market perception, and market perception may be different for the issuing firms and matching firms in the first place, this may lead to a mismatching problem. One of the solutions is to add the income performance as one more criterion to provide similar market perception. In the previous discussion, we have already shown identical results after we consider similar income performance. To further guarantee our results are not sensitive to the matching benchmark selection, we exclude the book-to-market ratio as one of our matches selection criteria. We will match by issuing year, industry, firm size and income performance. Later, we also try to match by issuing year, industry, and firm size only.

To match by issuing year, industry, firm size and income performance, we first limit our matches to the two years around the issuing date, and firms with same two-digit SIC code. Then, we form ten size portfolios and five income performance portfolios for all available matching candidates. We select at least one but at most five firms for each issuer. Table 10 shows our results. Clearly, the underperformance in investment growth after offering shows up in our new sample. As we expect, the issuers also have significantly higher increase in stock turnovers than their size-and-income performance matched firms. To rule out the cash shortage hypothesis, we further study the growth of cash, sales, and expenses. Again, we find that the primary SEO issuers can continue to sustain growth in sales, cash, and expenses. The SDO firms have a little different pattern. We find the SDO firms usually do not have better performance in sales, cash, and expenses. However, no difference between the issuers and their matches is statistically significant. This implies that the SDO firms should at least have similar performance. Using a new matching benchmark confirms that the underperformance in investment growth is due to high investor sentiment, instead of different matching techniques.

Only matching by firm size does not change the underperformance pattern in the investment growth. We form 10 portfolios for all available matching candidates, and then select at least one and at most five matching firms for each issuer. The underperformance in investment growth is shown in Table 11. This underperformance pattern is also true for the SDO firms. Further, we investigate the liquidity change and find that the issuers' liquidity increase is significantly bigger than their size-matched firms. Other patterns of sales, cash, and expenses also remain the same. For the reason of simplicity, we do not report the results in this article.

2.5.3.2 Regression Analysis

Next, we want to use regression analysis to confirm the market sentiment hypothesis. The advantage of the regression analysis is that the significance level can be calculated. If there is a significant negative adjustment in investment growth after high investor sentiment (liquidity change), one would expect to see this adjustment captured by the regression analysis. We control for year dummies because we wan to see whether this relationship shows up for only a few hot issuing years.

The regression model is the following,

$$INVG_i = a + bLIQC_i + cSEODummy_i + \sum_{j=1985}^{1996} d_j YRDummy_j + e_i$$

where *INVG* is the investment growth rate for a window of three-year after the first year of issuing. *LIQC* is the change of the stock turnover measured in percentage during three years before offering. We also include year dummies between 1985 and 1996. Variable *SEODummy* is another dummy variable that takes value of one if the observation is a seasoned security issuer, and zero if it is a match. In our regression sample, we limit one match for each issuer.

Table 11 shows our regression results. As we expect, the coefficient of the stock turnover change is –0.02, and it is statistically significant (t=-2.24). The negative sign confirms that the relationship between liquidity change (investor sentiment) and the investment

growth rate is negative. We then split the sample into two subsamples: one has only negative or zero liquidity change, and the other one has positive liquidity change. If investor sentiment emerges only when stock turnover increases, then only the sample with positive stock turnover changes will exhibit significant negative relationship. The results from subsample regressions confirm this is the case. In addition, for those issuing firms with positive liquidity changes, the coefficient not only remains statistically significant, but also becomes greater (coefficient=-0.02, t=-2.53). However, for the primary SEOs that have negative or zero turnover changes during three years before offering, the coefficient of the liquidity change is statistically insignificant. Our results imply that the bigger the investor sentiment, the stronger the negative adjustment in investment growth.

Finally, following Amihud (2000) and Li (2003), we also try a different measure of liquidity: dollar liquidity. The dollar liquidity is obtained by applying following procedures: we first find ratio of daily volume (dollar volume) to daily absolute return, and then average all ratios for each year and each firm.

$$DLIQ_i = \sum_{t=1}^{T} \left(\frac{DollarVolume}{abs(r)} \right)_{it}$$

According to Amihud (2000), if ratio of absolute return to volume is a measure of illiquidity, then the inverse should be a measure of liquidity. The use of another liquidity measure does not qualitatively change our results, we thus do not report the results in this article.

2.6 Conclusions

We investigate how seasoned offering firms invest in this article. We find a significant long-term underperformance in investment growth for primary seasoned equity offering firms and seasoned debt offering firms. This underperformance can be explained by our market sentiment hypothesis, i.e., high liquidity followed by low stock returns signals investor sentiment as argued in Baker and Stein (2003), then for the same reason, managers also interpret low stock returns as a consequence of investor sentiment. Thus, both individual investors and managers tend to reduce their investment due to worse-than-expected business conditions and lack of knowledge about the fundamental value of the risky assets. As a result, both investors and managers tend to be conservative in investment and prefer to hold cash. This thus leads to an underperformance in investment growth, compared to their stylized matches. In addition, we find this post-issue negative adjustment in investment growth is significantly and negatively related to the investor sentiment being developed prior to offering. Our extensive robustness checks confirm our conclusions.

Our conclusions are important in the following ways. First, the underperformance in investment growth confirms the well-known argument that firms' stock returns and their investment growth rates should behave similarly. We prove this is true for the seasoned offering firms. Second, the negative relationship between investor sentiment and corporate investment found in Li (2003) is supported by our seasoned offering data. This shows that the corporate investment can also be significantly affected by the non-fundamental components in the financial market. Third, our results provide a new

research direction in explaining well debated "new issues puzzle". In the existing literature, the "new issues puzzle" usually refers to the long-term underperformance in the equity returns. However, our evidence indicates a new long-term underperformance in investment growth for the seasoned offering firms. Therefore, we suggest that the two types of the underperformance should be explained *together* to provide a reasonable explanation to the "new issues puzzle".

In this sense, the results help us to reconsider some possible explanations. In the literature, four well-known hypotheses about the long-term underperformance in stock returns are: lowered risk hypothesis, market sentiment hypothesis, earning management hypothesis, and agency hypothesis. Combined with the results found in this article, the market sentiment hypothesis is clearly the one that can explain two types of underperformance together. The lowered risk hypothesis is capable to offer a reason for the underperformance in equity returns but fails to explain the underperformance in investment growth. Because there is so far no particular theory that can explain why lowered risk can result in lowered investment. Actually, if lowered risk suggests cheap cost of financing, then it would rather lead to higher investment.

The earning management hypothesis cannot simultaneously explain the two types of underperformance either. The earning management hypothesis suggests that the issuing managers tend to borrow future earnings to dress the offering window prior to offering. Thus, this will lead to some bad earning numbers and bad performance in stock returns afterward. However, the earning management is inconsistent in the following sense. To fulfill investors' high expectations, if managers really cannot deliver sound earning

numbers, they need to do other things. Making more investments is obviously one of the most efficient ways. Nevertheless, the evidence shows that those issuing firms underperform their matches in investment growth after offering, given that they have enough cash. Finally, the agency hypothesis in Jung, Kim, and Stulz (1996) suggests that managers tend to squander corporate resources when given the opportunities, although this may not be intentional. Clearly, our evidence of the underperformance in investment growth does not support this hypothesis. Another noteworthy fact is that it seems investors never learn a lesson in the market. This suggests that investors have their own problems identifying or processing the correct signals sent by the issuing firms. Hence, they are more likely to develop investor sentiment when market becomes hot.

Our results conclude that the market sentiment hypothesis is able to explain both types of underperformance together, or at least, market sentiment is the dominant factor in this context.

APPENDIX 2A Tables and Figures

Table 1: Number of seasoned offerings by year and industry

The sample includes all available firms that conduct seasoned offerings between 1985 and 1996. We exclude firms that issue twice in five years. We choose all firms that have valid financial and accounting numbers. The firms with negative accounting numbers for book assets, capital, or investments are ignored. We also exclude firms with assets less than 5 million, and extreme observations. We delete observations with SIC code between 4911 and 4941 (utilities), between 6000 and 6081 (financial institutions), and 6722, 6726, 6792 (investment funds and REITs). The two-digit Standard Industry Classification codes (SIC code) are used.

Panel A: Number of primary SEOs by year and industry

Number of Primary SEOs by Calendar Year		
Year	Number of Primary SEOs	Percentage of Sample
1985	95	4.60%
1986	153	7.41%
1987	124	6.00%
1988	55	2.66%
1989	91	4.40%
1990	73	3.53%
1991	220	10.65%
1992	186	9.00%
1993	251	12.15%
1994	179	8.66%
1995	286	13.84%
1996	353	17.09%
Total	2066	100.00%

Number of Primary SEOs by Industrial Classification			
Industry	SIC code	Number of Primary SEOs	Percentage
Chemicals, pharmaceuticals, and biotech	28	242	11.71%
Office and computer equipment	35	194	9.39%
Communication and electronic equipment	36	235	11.37%
Transportation equipment	37	40	1.94%
Measuring, analyzing, and controlling instruments	38	144	6.97%
Wholesale trade durable goods	50	99	4.79%
Eating and drinking places	58	58	2.81%
Miscellaneous retail	59	66	3.19%
Computer and data processing services	73	216	10.45%
Health services	80	101	4.89%
Engineering, accounting, research, and others	87	44	2.13%
Other	-	627	30.35%
Total	-	2066	100.00%

Table 1: Number of seasoned offerings by year and industry (Continued)

Panel B: Number of Secondary SEOs by year and industry

Number of Secondary SEOs by Calendar Year		
Year	Number of Secondary SEOs	Percentage of Sample
1985	18	9.94%
1986	23	12.71%
1987	12	6.63%
1988	7	3.87%
1989	6	3.31%
1990	7	3.87%
1991	15	8.29%
1992	25	13.81%
1993	27	14.92%
1994	18	9.94%
1995	12	6.63%
1996	11	6.08%
Total	181	100.00%

Number of Secondary SEOs by Industrial Classification			
Industry	SIC code	Number of Secondary SEOs	Percentage
Food and kindred products	20	6	3.31%
Apparel and others	23	7	3.87%
Printing, publishing, and allied industries	27	5	2.76%
Chemicals, pharmaceuticals, and biotech	28	11	6.08%
Office and computer equipment	35	10	5.52%
Communication and electronic equipment	36	17	9.39%
Measuring, analyzing, and controlling instruments	38	5	2.76%
Miscellaneous manufacturing industries	39	8	4.42%
Communications	48	8	4.42%
Wholesale trade durable goods	50	5	2.76%
Wholesale trade non-durable goods	51	9	4.97%
Apparel and accessory stores	56	6	3.31%
Miscellaneous retail	59	8	4.42%
Computer and data processing services	73	14	7.73%
Other	-	62	34.25%
Total	-	181	100.00%

Table 1: Number of seasoned offerings by year and industry (Continued)

Panel C: Number of SDOs by year and industry

Number of SDOs by Calendar Year		
Year	Number of Secondary SDOs	Percentage of Sample
1985	97	12.09%
1986	136	16.96%
1987	75	9.35%
1988	30	3.74%
1989	50	6.23%
1990	34	4.24%
1991	47	5.86%
1992	78	9.73%
1993	81	10.10%
1994	37	4.61%
1995	54	6.73%
1996	83	10.35%
Total	802	100.00%

Number of SDOs by Industrial Classification			
Industry	SIC code	Number of SDOs	Percentage
Oil and gas	13	55	6.86%
Food and kindred products	20	38	4.74%
Paper and allied products	26	36	4.49%
Chemicals, pharmaceuticals, and biotech	28	74	9.23%
Office and computer equipment	35	66	8.23%
Communication and electronic equipment	36	42	5.24%
Transportation equipment	37	39	4.86%
Measuring, analyzing, and controlling instruments	38	39	4.86%
Computer and data processing services	73	35	4.36%
Health services	80	34	4.24%
Other	-	344	42.89%
Total	-	802	100.00%

Table 2: Replicate the evidence on the underperformance in stock returns for seasoned offering firms

There are 2247 SEO firms in our sample. 2066 firms are primary SEOs and 181 firms are secondary SEOs. There are 802 SDO firms. The buy-and-hold returns are calculated by using $BHR_i = \prod_{t=1}^{T}(1+r_{it}) - 1$. The annualized difference in stock returns is defined as $[(BHR_i)^{1/T} - (BHR_m)^{1/T}] \times 100\%$. Where T is the holding period length, BHR_i is the average buy-and-hold return for the issuing firms, and BHR_m is the average buy-and-hold return for the matching firms. The matches are selected based on year, industry, size and BE/ME ratios.

Panel A: The evidence on the underperformance of SEOs

				Buy-and-hold Return		
Study	Holding Period	Sample size	Period	SEOs	Matches	Annualized Difference
Eckbo, Masulis and Norli	5 years	3315	1964-1995	44.30%	67.50%	-4.80%
Jedadeesh	5 years	2992	1970-1993	59.40%	93.60%	-4.90%
Brav, Geczy and Gompers	5 years	3775	1975-1992	57.60%	83.90%	-3.90%
Cai, Loughran (Japanese data)	5 years	1389	1971-1992	74.10%	103.20%	-3.50%
This work (Primary)	5 years	2066	1985-1996	30.72%	51.31%	-3.51%
This work (Primary)	3 years	2066	1985-1996	7.30%	30.31%	-6.85%
This work (Secondary)	5 years	181	1985-1996	100.39%	67.75%	4.52%
This work (Secondary)	3 years	181	1985-1996	39.27%	36.92%	0.63%
This work(Primary and Secondary)	5 years	2247	1985-1996	31.30%	49.90%	-3.20%
This work(Primary and Secondary)	3 years	2247	1985-1996	6.90%	28.40%	-6.40%

Panel B: The evidence on the underperformance of SDOs

				Buy-and-hold Return		
Study	Holding Period	Sample size	Period	SDOs	Matches	Annualized Difference
Eckbo, Masulis and Norli (straight debt)	5 years	1125	1964-1995	51.70%	62.90%	-2.30%
Eckbo, Masulis and Norli (convertible debt)	5 years	1125	1964-1995	51.70%	67.70%	-3.30%
This work	5 years	802	1985-1996	35.90%	51.60%	-2.60%
This work	3 years	802	1985-1996	21.30%	29.60%	-2.40%

Table 3: The evidence on the underperformance in investment growth (primary SEOs)

There are 2066 primary SEOs between 1985 and 1996 in our sample. The investment growth rate is defined as the difference between this year's capital expenditure and last year's capital expenditure, divided by last year's capital expenditure. The difference of the investment growth is the average investment growth of primary SEOs minus the average investment growth of their matches. P-statistic is reported. Panel A shows the difference between primary SEOs and matches that are selected based on year, industry, size and BE/ME ratios. Panel B reports the difference between primary SEOs and matches that are selected based on year, industry, size, BE/ME ratios, and income performance. Panel C reports the difference between primary SEOs and matches that are selected based on year, industry, size and BE/ME ratios, but we exclude those issuing firms that will use new funds to do "merger and acquisition". The income performance is defined as a ratio of a firm's operating income before depreciation to its last period's assets.

Panel A: The evidence on the underperformance (The matches are based on year, industry, size and BE/ME ratio)

Year	-4	-3	-2	-1	1	2	3	4	5
Issuers	0.32	0.33	0.42	0.56	0.53	0.29	0.23	0.17	0.23
Matches	0.37	0.35	0.32	0.39	0.41	0.33	0.28	0.23	0.21
Difference	-0.05	-0.03	0.10	0.17	0.13	-0.04	-0.04	-0.06	0.02
p-value of difference (dif<0)	0.05	0.15	1.00	1.00	1.00	0.04	0.03	0.00	0.80

Panel B: The evidence on the underperformance (The matches are based on year, industry, size, BE/ME ratio, and income performance)

Year	-4	-3	-2	-1	1	2	3	4	5
Issuers	0.34	0.35	0.49	0.54	0.46	0.27	0.19	0.18	0.26
Matches	0.33	0.33	0.35	0.39	0.42	0.31	0.24	0.22	0.18
Difference	0.01	0.03	0.14	0.16	0.04	-0.04	-0.04	-0.04	0.08
p-value of difference (dif<0)	0.60	0.76	1.00	1.00	0.86	0.05	0.05	0.08	0.89

Panel C: The underperformance (The matches are based on year, industry, size and BE/ME ratio, M&A issuers are excluded)

Year	-4	-3	-2	-1	1	2	3	4	5
Issuers	0.32	0.33	0.41	0.56	0.53	0.30	0.23	0.17	0.23
Matches	0.37	0.36	0.31	0.39	0.41	0.33	0.28	0.23	0.21
Difference	-0.05	-0.02	0.10	0.17	0.12	-0.03	-0.05	-0.06	0.03
p-value of difference (dif<0)	0.06	0.17	1.00	1.00	1.00	0.08	0.01	0.00	0.84

Table 4: The evidence on Cash, Sales, and Expenses (primary SEOs)

There are 2066 primary SEOs between 1985 and 1996 in our sample. The cash growth is defined as a firm's this year's cash or cash equivalent minus last year's cash or cash equivalent, and then divided by last year's cash or cash equivalent. The sales or expenses growth rates are calculated by using similar approaches.

Panel A: Cash growth

Year	-4	-3	-2	-1	1	2	3	4	5
Issuers	0.70	0.69	0.92	1.64	0.84	0.36	0.41	0.40	0.43
Matches	0.45	0.39	0.44	0.54	0.46	0.36	0.33	0.34	0.38
Difference	0.25	0.30	0.48	1.09	0.38	0.00	0.07	0.07	0.05
p-value of difference (dif<0)	1.00	1.00	1.00	1.00	1.00	0.39	1.00	0.99	0.92

Panel B: Sales growth

Year	-4	-3	-2	-1	1	2	3	4	5
Issuers	0.27	0.28	0.37	0.50	0.44	0.29	0.23	0.19	0.20
Matches	0.29	0.23	0.23	0.23	0.24	0.18	0.15	0.13	0.14
Difference	-0.01	0.05	0.15	0.27	0.20	0.11	0.07	0.06	0.06
p-value of difference (dif<0)	0.25	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Panel C: Expenses growth

Year	-4	-3	-2	-1	1	2	3	4	5
Issuers	0.18	0.22	0.27	0.35	0.37	0.25	0.19	0.15	0.15
Matches	0.17	0.15	0.15	0.15	0.17	0.14	0.12	0.11	0.10
Difference	0.01	0.06	0.12	0.19	0.19	0.11	0.07	0.04	0.05
p-value of difference (dif<0)	0.80	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00

Table 5: The indicator of investor sentiment: liquidity run-up (Primary SEOs)

The proxy for liquidity is stock turnover, which is average ratio of daily trading volume to total shares outstanding. Variable Tob3_1 is the stock turnover growth rate for a time window of three years before offering. Variable To3_1 is the stock turnover growth rate for a time window of three years after offering. T-statistics are reported in the table. In Panel A, matches are selected based on year, industry, size, and BE/ME. In Panel B, matches are selected based on year, industry, size, BE/ME, and income performance.

Panel A: The evidence on liquidity

Before	Mean	95% Confidence Interval	t-statistic (diff.>0)
tob3_1	0.752	[0.697, 0.808]	
tob3_1_m	0.507	[0.442, 0.572]	
tob3_1-tob3_1_m	0.245	[0.163, 0.327]	5.88

After	Mean	95% Confidence Interval	t-statistic (diff.>0)
to3_1	-0.194	[-0.206, -0.183]	
to3_1_m	0.031	[0.016, 0.046]	
to3_1-to3_1_m	-0.225	[-0.163,-0.327]	-24.61

Panel B: The evidence on liquidity (different matches)

Before	Mean	95% Confidence Interval	t-statistic (diff.>0)
tob3_1	0.751	[0.697, 0.807]	
tob3_1_m	0.202	[0.177, 0.230]	
tob3_1-tob3_1_m	0.541	[0.333, 0.627]	9.16

After	Mean	95% Confidence Interval	t-statistic (diff.>0)
to3_1	-0.195	[-0.206, -0.186]	
to3_1_m	0.056	[0.036, 0.076]	
to3_1-to3_1_m	-0.251	[-0.293, -0.207]	-26.67

Table 6: The evidence on the underperformance in investment growth (Secondary SEOs)

There are 181 secondary SEOs between 1985 and 1996 in our sample. The investment growth rate is defined as the difference between this year's capital expenditure and last year's capital expenditure, divided by last year's capital expenditure. The difference of the investment growth is the average investment growth of secondary SEOs minus the average investment growth of their matches. P-statistic is reported. The cash growth is defined as a firm's this year's cash or cash equivalent minus last year's cash or cash equivalent, and then divided by last year's cash or cash equivalent. The sales or expenses growth rates are calculated by using similar approaches.

Panel A: Evidence of investment growth

Year	-4	-3	-2	-1	1	2	3	4	5
Issuers	0.16	0.24	0.37	0.47	0.41	0.31	0.29	0.32	0.24
Matches	0.26	0.40	0.42	0.35	0.30	0.34	0.33	0.19	0.17
Difference	-0.10	-0.16	-0.05	0.12	0.11	-0.03	-0.04	0.13	0.07
p-value of difference (dif<0)	0.06	0.02	0.22	0.98	0.97	0.29	0.16	0.98	0.79

Panel B: Evidence of cash

Year	-4	-3	-2	-1	1	2	3	4	5
Issuers	0.51	0.90	0.92	0.74	0.82	0.50	0.48	0.63	0.62
Matches	0.42	0.48	0.41	0.45	0.35	0.43	0.43	0.28	0.36
Difference	0.09	0.41	0.51	0.29	0.47	0.07	0.04	0.35	0.26
p-value of difference (dif<0)	0.81	1.00	1.00	1.00	1.00	0.80	0.68	1.00	0.98

Panel C: Evidence of sales

Year	-4	-3	-2	-1	1	2	3	4	5
Issuers	0.09	0.17	0.26	0.36	0.27	0.22	0.14	0.15	0.16
Matches	0.23	0.22	0.22	0.25	0.34	0.18	0.21	0.16	0.15
Difference	-0.14	-0.05	0.04	0.11	-0.08	0.05	-0.07	-0.02	0.01
p-value of difference (dif<0)	0.00	0.12	0.86	1.00	0.16	0.97	0.02	0.30	0.57

Panel D: Evidence of expense

Year	-4	-3	-2	-1	1	2	3	4	5
Issuers	0.19	0.17	0.18	0.26	0.28	0.19	0.16	0.16	0.17
Matches	0.11	0.13	0.16	0.14	0.18	0.13	0.12	0.12	0.11
Difference	0.07	0.04	0.02	0.12	0.11	0.06	0.04	0.04	0.07
p-value of difference (dif<0)	1.00	0.97	0.89	1.00	1.00	1.00	1.00	0.99	1.00

Table 7: The indicator of investor sentiment: liquidity run-up (Secondary SEOs)

The proxy for liquidity is stock turnover, which is average ratio of daily trading volume to total shares outstanding. Variable Tob3_1 is the stock turnover growth rate for a time window of three years before offering. Variable To3_1 is the stock turnover growth rate for a time window of three years after offering. T-statistics are reported in the table. In Panel A, matches are selected based on year, industry, size, and BE/ME. In Panel B, matches are selected based on year, industry, size, BE/ME, and income performance.

Panel A: The evidence on liquidity

Before	Mean	95% Confidence Interval	t-statistic (diff.>0)
tob3_1	0.088	[-0.026, 0.203]	
tob3_1_m	0.287	[0.172, 0.403]	
tob3_1-tob3_1_m	-0.200	[-0.356, -0.042]	-2.50

After	Mean	95% Confidence Interval	t-statistic (diff.>0)
to3_1	-0.169	[-0.208, -0.130]	
to3_1_m	0.031	[-0.017, 0.079]	
to3_1-to3_1_m	-0.200	[-0.260, -0.140]	-6.52

Panel B: The evidence on liquidity (different matches)

Before	Mean	95% Confidence Interval	t-statistic (diff.>0)
tob3_1	0.098	[0.035, 0.175]	
tob3_1_m	0.226	[0.160, 0.292]	
tob3_1-tob3_1_m	-0.127	[-0.206, -0.036]	-2.81

After	Mean	95% Confidence Interval	t-statistic (diff.>0)
to3_1	-0.160	[-0.171, -0.145]	
to3_1_m	0.023	[0.011, 0.037]	
to3_1-to3_1_m	-0.184	[-0.201, -0.168]	-21.98

Table 8: The evidence on the underperformance in investment growth (SDOs)

There are 802 SDOs between 1985 and 1996 in our sample. The investment growth rate is defined as the difference between this year's capital expenditure and last year's capital expenditure, divided by last year's capital expenditure. The difference of the investment growth is the average investment growth of SDOs minus the average investment growth of their matches. P-statistic is reported. The cash growth is defined as a firm's this year's cash or cash equivalent minus last year's cash or cash equivalent, and then divided by last year's cash or cash equivalent. The sales or expenses growth rates are calculated by using similar approaches.

Panel A: Evidence of investment growth

Year	-4	-3	-2	-1	1	2	3	4	5
Issuers	0.18	0.20	0.25	0.34	0.28	0.12	0.13	0.13	0.14
Matches	0.22	0.23	0.29	0.27	0.28	0.23	0.18	0.19	0.15
Difference	-0.04	-0.03	-0.04	0.07	0.00	-0.10	-0.05	-0.06	0.00
p-value of difference (dif<0)	0.05	0.04	0.04	0.99	0.54	0.00	0.00	0.00	0.45

Panel B: Evidence of cash

Year	-4	-3	-2	-1	1	2	3	4	5
Issuers	0.47	0.49	0.46	0.92	0.56	0.31	0.38	0.32	0.35
Matches	0.58	0.53	0.42	0.44	0.48	0.33	0.31	0.30	0.34
Difference	-0.11	0.06	0.03	0.48	0.07	-0.01	0.06	0.02	0.02
p-value of difference (dif<0)	0.02	0.91	0.80	1.00	0.95	0.33	0.94	0.75	0.64

Panel C: Evidence of sales

Year	-4	-3	-2	-1	1	2	3	4	5
Issuers	0.16	0.21	0.28	0.33	0.27	0.19	0.19	0.13	0.12
Matches	0.20	0.21	0.25	0.25	0.25	0.20	0.16	0.13	0.15
Difference	-0.04	0.00	0.04	0.08	0.02	-0.01	0.03	0.01	-0.03
p-value of difference (dif<0)	0.11	0.45	0.91	1.00	0.79	0.28	0.93	0.63	0.06

Panel D: Evidence of expense

Year	-4	-3	-2	-1	1	2	3	4	5
Issuers	0.12	0.13	0.13	0.19	0.17	0.12	0.10	0.09	0.09
Matches	0.12	0.13	0.13	0.14	0.15	0.13	0.10	0.10	0.09
Difference	0.00	0.00	0.00	0.05	0.02	-0.01	0.00	-0.01	0.00
p-value of difference (dif<0)	0.28	0.27	0.23	1.00	1.00	0.06	0.35	0.02	0.32

Table 9: The indicator of investor sentiment: liquidity run-up (SDOs)

The proxy for liquidity is stock turnover, which is average ratio of daily trading volume to total shares outstanding. Variable Tob3_1 is the stock turnover growth rate for a time window of three years before offering. Variable To3_1 is the stock turnover growth rate for a time window of three years after offering. T-statistics are reported in the table. In Panel A, matches are selected based on year, industry, size, and BE/ME. In Panel B, matches are selected based on year, industry, size, BE/ME, and income performance.

Panel A: The evidence on liquidity

	Mean	95% Confidence Interval	t-statistic (diff.>0)
tob3_1	0.14	[011, 0.16]	
tob3_1_m	0.09	[0.07, 0.12]	
tob3_1-tob3_1_m	0.05	[0.01, 0.08]	2.64

	Mean	95% Confidence Interval	t-statistic (diff.>0)
to3_1	0.01	[-0.01, 0.03]	
to3_1_m	0.003	[-0.02, 0.02]	
to3_1-to3_1_m	0.007	[-0.02, 0.03]	0.485

Panel B: The evidence on liquidity (different matches)

	Mean	95% Confidence Interval	t-statistic (diff.>0)
tob3_1	0.14	[011, 0.16]	
tob3_1_m	0.09	[0.06, 0.13]	
tob3_1-tob3_1_m	0.05	[0.01, 0.08]	2.89

	Mean	95% Confidence Interval	t-statistic (diff.>0)
to3_1	0.01	[-0.01, 0.03]	
to3_1_m	0.04	[0.01, 0.08]	
to3_1-to3_1_m	-0.03	[-0.08, 0.03]	-2.99

Table 10: Robustness check: underperformance in investment growth (Different matching benchmarks)

Panel A shows the evidence on the underperformance when matches are selected according to year, industry, size, and income performance. Panel B shows the evidence on the underperformance when matches are selected according to year, industry, and size. P-values are reported.

Panel A: Evidence of the underperformance (Matched by year, industry, size, and income performance)

Primary SEOs

Year	-4	-3	-2	-1	1	2	3	4	5
Issuers	0.30	0.33	0.45	0.58	0.46	0.23	0.19	0.14	0.21
Matches	0.32	0.33	0.36	0.36	0.41	0.29	0.23	0.22	0.17
Difference	-0.01	0.00	0.09	0.23	0.05	-0.06	-0.04	-0.08	0.05
p-value of difference (dif<0)	0.37	0.52	1.00	1.00	0.96	0.02	0.04	0.00	0.96

Secondary SEOs

Year	-4	-3	-2	-1	1	2	3	4	5
Issuers	0.21	0.17	0.38	0.38	0.40	0.33	0.30	0.19	0.20
Matches	0.26	0.36	0.37	0.39	0.35	0.35	0.17	0.21	0.16
Difference	-0.05	-0.20	0.00	-0.01	0.05	-0.03	0.13	-0.02	0.04
p-value of difference (dif<0)	0.28	0.02	0.52	0.45	0.73	0.35	0.94	0.41	0.66

SDOs

Year	-4	-3	-2	-1	1	2	3	4	5
Issuers	0.16	0.15	0.23	0.30	0.21	0.09	0.08	0.10	0.15
Matches	0.24	0.25	0.25	0.21	0.20	0.20	0.17	0.13	0.16
Difference	-0.08	-0.10	-0.03	0.08	0.02	-0.10	-0.08	-0.03	-0.01
p-value of difference (dif<0)	0.00	0.00	0.13	1.00	0.75	0.00	0.00	0.05	0.42

Table 10: Robustness check: underperformance in investment growth (Different matching benchmarks, Continued)

Panel B: Evidence of the underperformance (Matched by year, industry, and size)

Primary SEOs

Year	-4	-3	-2	-1	1	2	3	4	5
Issuers	0.29	0.32	0.41	0.56	0.45	0.22	0.19	0.15	0.20
Matches	0.33	0.33	0.33	0.37	0.42	0.31	0.26	0.24	0.22
Difference	-0.04	-0.01	0.09	0.19	0.03	-0.09	-0.07	-0.09	-0.02
p-value of difference (dif<0)	0.13	0.40	1.00	1.00	0.86	0.00	0.00	0.00	0.19

Secondary SEOs

Year	-4	-3	-2	-1	1	2	3	4	5
Issuers	0.19	0.25	0.39	0.41	0.35	0.27	0.27	0.23	0.16
Matches	0.25	0.26	0.38	0.26	0.30	0.29	0.24	0.24	0.20
Difference	-0.06	-0.01	0.01	0.15	0.05	-0.02	0.02	-0.02	-0.04
p-value of difference (dif<0)	0.22	0.44	0.55	0.99	0.76	0.39	0.64	0.39	0.34

SDOs

Year	-4	-3	-2	-1	1	2	3	4	5
Issuers	0.11	0.16	0.18	0.27	0.21	0.12	0.10	0.11	0.13
Matches	0.21	0.22	0.24	0.25	0.27	0.21	0.18	0.20	0.16
Difference	-0.10	-0.06	-0.05	0.02	-0.06	-0.09	-0.08	-0.09	-0.03
p-value of difference (dif<0)	0.00	0.00	0.00	0.89	0.00	0.00	0.00	0.00	0.08

Table 11: Regression analysis (Primary SEOs)

The sample contains 2206 primary SEOs between 1985 and 1996. Variable *INVG* is the investment growth in a period of three years after the first year of offering. *LIQC* is the stock turnover change during a period of three years before offering. *SEODUMMY* is a dummy variable. It takes a value of 1 if the firm is a primary SEO. *YRDummy* is year dummy variable. Each primary SEO has only one match in the sample. Panel A reports the regression results using all primary SEOs. In Panel B, we only use the primary SEOs that have positive turnover changes during three years before offering. Panel C shows the regression results of the primary SEOs that only have negative or zero turnover changes during three years before offering. The regression specification is the following

$$INVG_i = a + bLIQC_i + cSEODummy_i + \sum_{j=1985}^{1996} d_j YRDummy_j + e_i$$

Robust t-statistics are reported in parentheses.

Panel A: Regression results using whole sample

Parameter Estimates				
Intercept	LIQC	SEODummy	R_squred	Observations
0.07	-0.02	-0.17		
(4.76)	**(-2.24)**	**(-2.85)**	2.70%	1916

Panel B: Regression results only using the primary SEOs that have positive turnover changes before offering

Parameter Estimates				
Intercept	LIQC	SEODummy	R_squred	Observations
0.07	-0.02	-0.28		
(3.53)	**(-2.53)**	**(-3.38)**	3.20%	1030

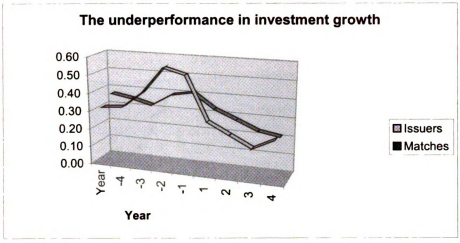
Panel C: Regression results only using the primary SEOs that have negative or zero turnover changes before offering

Parameter Estimates				
Intercept	LIQC	SEODummy	R_squred	Observations
0.63	0.17	-0.04		
(2.45)	(0.75)	(-0.51)	3.60%	886

Figure 1: The underperformance in investment growth (Primary SEOs)

The investment growth rate is defined as the difference between this year's capital expenditure and last year's capital expenditure, divided by last year's capital expenditure. The investment level is calculated as a firm's capital expenditure to last year's assets ratio. The matches are selected based on year, industry, size and BE/ME ratios.

Panel A: The underperformance in investment growth



Panel B: The evidence on investment level

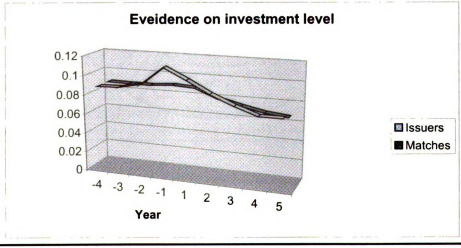
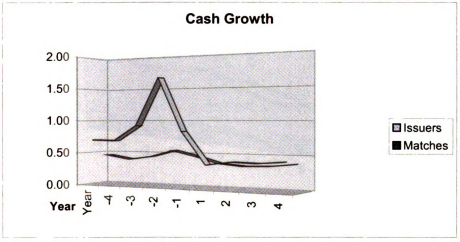


Figure 2: The evidence on cash, sales, and expenses (Primary SEOs)

The cash growth is defined as a firm's this year's cash or cash equivalent minus last year's cash or cash equivalent, and then divided by last year's cash or cash equivalent. The sales or expenses growth rates are calculated by using similar approaches. The cash level is defined as a firm's cash or cash equivalent to last year's assets ratio. The sales or expenses levels are calculated by using similar approaches.

Panel A: Cash growth vs. Cash level



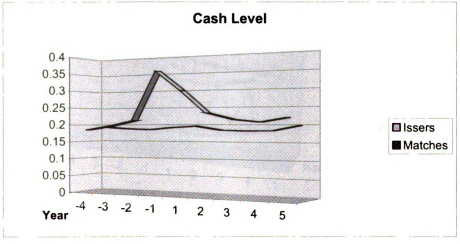
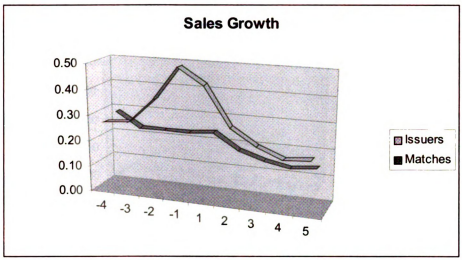


Figure 2: The evidence on cash, sales, and expenses (Primary SEOs) (continued)

Panel B: Sales growth vs. Sales level



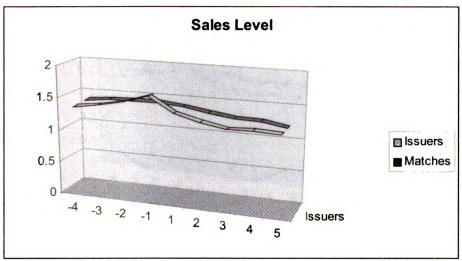
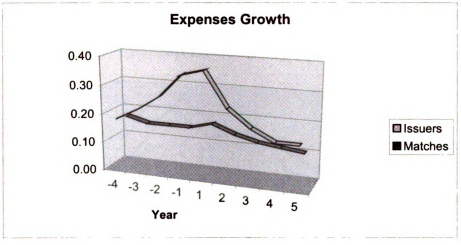


Figure 2: The evidence on cash, sales, and expenses (Primary SEOs) (continued)

Panel C: Expenses growth vs. Expenses level



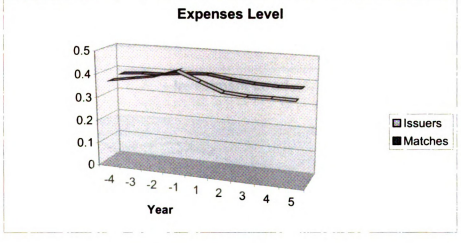
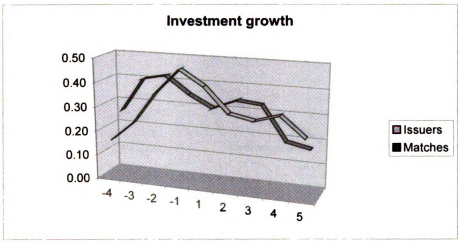


Figure 3: The underperformance in investment growth (Secondary SEOs)

The investment growth rate is defined as the difference between this year's capital expenditure and last year's capital expenditure, divided by last year's capital expenditure. The investment level is calculated as a firm's capital expenditure to last year's assets ratio. The matches are selected based on year, industry, size and BE/ME ratios.

Panel A: The underperformance in investment growth



Panel B: Evidence on investment level

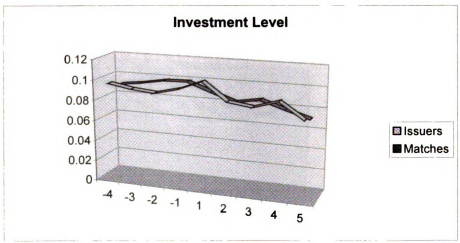
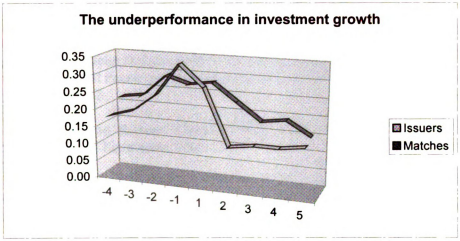


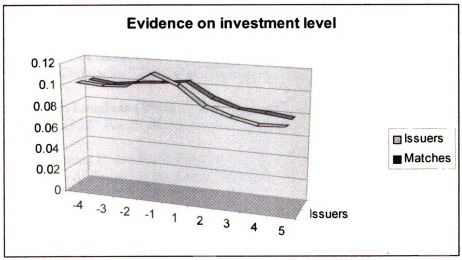
Figure 4: The underperformance in investment growth (SDOs)

The investment growth rate is defined as the difference between this year's capital expenditure and last year's capital expenditure, divided by last year's capital expenditure. The investment level is calculated as a firm's capital expenditure to last year's assets ratio. The matches are selected based on year, industry, size and BE/ME ratios.

Panel A: The underperformance in investment growth



Panel B: Evidence on investment level



REFERENCE **Reference for Chapter 2**

Amihud, Y., 2002, "Illiquidity and stock returns: Cross-section and time-series effects", *Journal of Financial Markets* 5: 31-56

Baker, M., Stein, J. and J. Wurgler, 2003, "When does the market matter? Stock prices and the investment of equity-dependence firms", *Quarterly Journal of Economics*, Forthcoming

Barber, Brad M., and John D. Lyon (1997) "Detecting Long-Run Abnormal Stock Returns: The Empirical Power and Specification of Test-Statistics," *Journal of Financial Economics* 43, 341-372.

Barberis, Nicholas, and Richard Thaler (2002) "A Survey of Behavioral Finance," Handbook of Financial Economics, 2003

Bayless, Mark, and Susan Chaplinsky (1996) "Is There a 'Window of Opportunity' for Seasoned Equity Issuance?" *Journal of Finance* 51, 253-278

Billett, Matthew, Mark J. Flannery, and Jon A. Garfinkel (2001) "The Long-Run Performance of Firms Following Loan Announcements," unpublished University of Iowa and University of Florida working paper.

Brav, Alon (2000) "Inference in Long-Horizon Event Studies: A Bayesian Approach with Applications to Initial Public Offerings," *Journal of Finance* 55, 1979-2016.

Brav, Alon, and Paul Gompers (1997) "Myth or Reality? The Long-Run Underperformance of Initial Public Offerings: Evidence from Venture and Nonventure Capital-Backed Companies" *Journal of Finance* 52, 1791-1821.

Cai, Jun, and Tim Loughran (1998) "The Performance of Japanese Seasoned Equity Offerings, 1971-1992" *Pacific-Basin Finance Journal* 6, 395-425.

Chemmanur, Thomas J., and Paolo Fulghieri (1999) "A Theory of the Going-Public Decision" *Review of Financial Studies* 12, 249-279.

Chen, Hsuan-Chi and Jay R. Ritter (2000) "The Seven Percent Solution," *Journal of Finance* 55, 1105-1131.

Cochrane J., 1992, "Production-based asset pricing and the link between stock returns and economic fluctuations", *Journal of Finance,* 46, 209-237

Cochrane J., 1996, "A cross-sectional test of an investment-based asset pricing model", *Journal of Political Economy*, 104, 572-621

Cornett, Marcia Millon, Hamid Mehran, and Hassan Tehranian, 1998, "Are Financial Markets Overly Optimistic about the Prospects of Firms that Issue Equity? Evidence from Voluntary versus Involuntary Issuances by Banks", *Journal of Finance* 53, 2139-2159.

Daniel, K., D. Hirshleifer and A. Subrahmanyam, 1998, "Investor Psychology and security market under- and overreactions", *Journal of Finance* 53: 1839-1885

Daniel, Kent, and Sheridan Titman, (1995) "Financing Investment Under Asymmetric Information" chapter 23 in Jarrow, Maksimovic, and Ziemba's *Handbooks in Operations Research and Management Science: Finance* Amsterdam: North-Holland.

Denis, David J., and Atulya Sarin (2001) "Is the Market Surprised by Poor Earnings Realizations Following Seasoned Equity Offerings?" *Journal of Financial and Quantitative Analysis* 36, 169-193.

Eckbo, Espen, and Ronald Masulis, (1995) "Seasoned Equity Offerings: A Survey," chapter 31 in Jarrow, Maksimovic, and Ziemba's *Handbooks in Operations Research and Management Science: Finance* Amsterdam: North-Holland.

Eckbo, Espen, Ronald Masulis, and Oyvind Norli (2000) "Seasoned Public Offerings: Resolution of the 'New Issues Puzzle'" *Journal of Financial Economics* 56, 251-291.

Eckbo, Espen, and Oyvind Norli (2001) "Leverage, Liquidity, and Long-run IPO Returns," Unpublished Dartmouth College working paper.

Fama, Eugene F. (1998) "Market Efficiency, Long-term Returns, and Behavioral Finance" *Journal of Financial Economics* 49, 283-306.

Fama E. and M. Gibbons, 1982, "Inflation, real returns and capital investment", *Journal of Monetary Economy*, 9, 297-323

Fazzari S., G. Hubbard, and B. Petersen, 1998a, "Financing constraints and corporate investment", *Brookings papers on Economic Activity,* 1, 141-195

Foerster, Stephen R., and G. Andrew Karolyi (2000) "The Long-Run Performance of Global Equity Offerings," *Journal of Financial and Quantitative Analysis* 35, 499-528.

Graham, John R., and Campbell R. Harvey (2001) "The Theory and Practice of Corporate Finance:
Evidence from the Field," *Journal of Financial Economics* 60, 187-243.

Hadlock, C., 1998, "Ownership, liquidity, and investment", *RAND Journal of Economics* 29, 487-508

Howton, Shawn D., Shelly W. Howton, and Steven B. Perfect (1998) "The Market Reaction to Straight Debt Issues: The Effects of Free Cash Flow" *Journal of Financial Research* 21, 219-228.

Hubbard, R., 1998, "capital market imperfections and investment", *Journal of Economic Literature* 36, 193-225

Ibbotson, Roger G., and Jeffrey F. Jaffe (1975) "'Hot Issue' Markets" *Journal of Finance* 30, 1027-1042.

Jung, Kooyul, Yong-Cheol Kim, and René Stulz (1996) "Managerial Discretion, Investment Opportunities, and the Security Issue Decision," *Journal of Financial Economics* 42, 159-185.

Kang, Jun-Koo, Yong-Cheol Kim, and René Stulz (1999) "The Underreaction Hypothesis and the New Issue Puzzle: Evidence from Japan," *Review of Financial Studies* 12, 519-534.

Kothari, S. P., and Jerold B. Warner (1997) "Measuring Long-horizon Security Price Performance" *Journal of Financial Economics* 43, 301-339. 49

Lee, Inmoo, and Tim Loughran (1998) "Performance Following Convertible Bond Issuance," *Journal of Corporate Finance* 4, 185-207.

Li, Zhikun (2003), "Liquidity, financial market sentiment, and corporate investment", Working paper, Michigan State University

Loughran, Tim, and Jay R. Ritter (1995) "The New Issues Puzzle," *Journal of Finance* 50, 23-51.

Loughran, Tim, and Jay R. Ritter (1997) "The Operating Performance of Firms Conducting Seasoned Equity Offerings," *Journal of Finance* 52, 1823-1850.

Lucas, D. and R. McDonald, 1990, "Equity issues and stock price dynamics", *Journal of Finance* 45: 1019-1043

McLaughlin, Robyn, Assem Saffieddine, and Gopala K. Vasudevan (1998) "The Long-Run Performance of Convertible Debt Issuers" *Journal of Financial Research* 21, 373-388.

Morris, Stephen (1996) "Speculative Investor Behavior and Learning," *Quarterly Journal of Economics* 111, 1111-1133.

Myers, Stewart and Nicholas Majluf (1984) "Corporate Financing and Investment Decisions When Firms Have Information that Investors Do Not Have," *Journal of Financial Economics* 13, 187-222.

Rangan, Srinivasan (1998) "Earnings Management and the Performance of Seasoned Equity Offerings," *Journal of Financial Economics* 50, 101-122.

Shefrin Hersh, 2001, "Behavioral corporate finance", *Journal of Applied Corporate Finance*, Volume 14, Number 3, 8-19

Shleifer, A., 2000, "Inefficient markets: An introduction to behavior finance", *Oxford University Press*

Smith, Clifford (1986) "Investment Banking and the Capital Acquisition Process," *Journal of Financial Economics* 15, 3-29.

Spiess, Katherine, and John Affleck-Graves (1995) "The Long-run Performance Following Seasoned Equity Issues," *Journal of Financial Economics* 38, 243-267.

Spiess, Katherine, and John Affleck-Graves (1999) "The Long-run Performance of Stock Returns Following Debt Offerings," *Journal of Financial Economics* 54, 45-73.

Stein, Jeremy C. (1996) "Rational Capital Budgeting in an Irrational World," *Journal of Business* 69, 429-455.

Stein, Jeremy C. (2001) "Agency, Information, and Corporate Investment," *Handbook of Financial Economics*. 2003, Elsevier Service

Teoh, Siew Hong, Ivo Welch, and T.J Wong (1998) "Earnings Management and the Post-issue Underperformance in Seasoned Equity Offerings," *Journal of Financial Economics* 50, 63-99.