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Essays on the Effect of Financial Institution's Dual Holdings of Debt and Equity Securities

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ESSAYS ON THE EFFECT OF FINANCIAL INSTITUTION'S DUAL HOLDINGS OF DEBT AND EQUITY SECURITIES

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ABSTRACT

This dissertation analyzes the effects on the stock markets when institutional investors hold their client firms' stocks. The first essay examines the trading impact around earnings announcements and the second essay studies the effect on stock liquidity. In the first essay, we find that relationship institutions (that have lent/underwritten and hold shares of clients) support their clients when these client firms have negative earnings shocks. Their support not only mitigates the negative abnormal return around earnings announcements but also reduces the post-earnings-announcement-drift, thus, earnings momentum profits. In the second essay, we find that client firms held by relationship institutions suffer more from the adverse selection problem. As a result, they tend to have higher trading cost, more non-trading days and larger price impact of trades. These findings provide general implications for the financial institutions literature and the asset pricing literature. On the one hand, inactive institutional relationships can be considered a risk factor because supportive institutional relationships can alter stock return profiles and smooth out temporary negative shocks. On the other hand, active relationships can also create adverse selection and impose negative effects on stock liquidity.

CHAPTER 1 INTRODUCTION

Financial conglomerates have exerted more influences on the U.S. capital markets after they are allowed to combine different business lines. After the breakdown of the walls between commercial banking and investment banking, commercial banks are expanding their business into asset management, such as mutual funds. Massa and Rehman (2008) show that the private information acquired through lending activities facilitates the trading performance of affiliated mutual funds. On the other hand, the banking fees collected from client firms can provide incentives to support stock prices of their clients to maintain the relationships. Cohen and Schmidt (2009) find that mutual fund families distort their portfolio allocations to secure the trustee relationship and those family trustees significantly overweight their 401(k) clients' stocks, especially when others are dumping their clients' stocks. These studies indicate that the effects of financial institutions on their clients do not stop at their traditional function as the intermediary to channel capital.

To understand the non-intermediary role of financial conglomerates in the capital markets, this dissertation studies the impacts on the stock markets when financial institutions hold their client firms' stocks. We examine the effect of institutions' trading activities on stock prices around earnings announcements of their clients in the first essay. On the second essay, we study the influence on the stock liquidity if firms are held by more relationship institutions. To obtain broader insight on these issues, we divide all sample companies into two groups. The first group (connected firm) has paid banking/underwriting fees to financial institutions within three years and its stock is held by the same financial institutions. Meanwhile, these financial institutions are classified as "relationship institutions" and the rest of institutions holding this stock are "independent institutions". The second group (unconnected firm) doesn't have any relationship

institution holding it. Therefore, one can view that unconnected firm has no institutions overlapping the equity holdings and banking services.

In the first essay, the empirical study shows that relationship institutions have a great influence on the stock performances of their clients around the earnings announcements in several ways. First, relationship institutions, on average, support their client firms (connected firms) when these firms have negative earnings surprises. Such activities also discourage selling pressures from independent institutions. Second, price support from relationship institutions can mitigate downward swing of stock prices when their clients have negative earnings shocks. Also, the post-earnings-announcement-drifts of connected firms are less pronounced. Third, the price support from relationship institutions is more effective than that of independent institutions. Relationship institutions tend to support their client firms with lower liquidity when these firms have negative earnings shocks.

In the second essay, we examine the long term influence when firms are held by more relationship institutions. We find that, consistent with previous literature, firms with more aggregate institutional holdings have better stock liquidity because of better information environment. However, because of adverse selection problem, market makers will charge a higher bid-ask spread when they are more likely to trade with informed traders. Thus, firms with higher relationship institutions' holdings exhibit a lower liquidity in terms of higher price impact measure, larger effective trading cost and more non-trading days.

This dissertation contributes to literature on financial institutions by studying the non-intermediary role of financial institutions in the capital markets with a broad sample of firms and a regular earnings announcement event. These findings can provide general implications for asset pricing literature. On the one hand, inactive institutional relationship can be considered a risk factor because supportive institutional relationship can alter stock return profiles and smooth

out temporary negative shocks while firms without such relationship would have incurred the price swing. By reducing unnecessary price movements, financial institutions can mitigate the noise in the market and enhance the stock prices of their clients.[1] On the other hand, active relationship can also create the adverse selection problem of the connected firms and cause them to suffer from a lower liquidity because market makers would charge a higher spread to compensate for the higher probability of informed trading.

[1] See Black (1986) regarding how noise can affect the capital market and Arnott, Hsu, Liu, and Markowitz (2008) on the positive relation between expected return and noise. See also Sadka (2006) on the role of informed and noise traders on momentum and post-earnings-announcement drift.

CHAPTER 2 THE EFFECT OF FINANCIAL INSTITUTION'S DUAL HOLDINGS OF DEBT AND EQUITY SECURITIES AROUND EARNINGS ANNOUNCEMENT PERIOD

2.1 Introduction

The passage of the Gramm-Leach-Bliley Act in 1999 is an important development in the U.S. financial services industry since the wall between commercial banks and investment banks is officially torn down. Compared to other investors, financial conglomerates have an inherent advantage in collecting and processing information. For example, they own resources to gather private corporate information from their affiliated banks to improve their investment performance. Ivashina and Sun (2007) find that institutional managers use loan renegotiation information to trade the stocks and outperform other managers by 8.8% in annualized returns in the month following loan renegotiation. Massa and Rehman (2008) show that the private information through lending activities facilitates the performances of the affiliated mutual funds.

On the contrary, the banking fees collected from client firms can provide incentives to support stock prices of their clients to maintain the relationship. For example, Cohen and Schmidt (2009) show that mutual fund families distort their portfolio allocations to secure the trustee relationship. They claim that family trustees significantly overweight their 401(k) clients' stocks, especially when other mutual funds are selling their clients' stocks. Ellis, Michaely and O'Hara (2000) document that market markers within a financial group tend to support the stock prices of new IPO firms if they are underwritten by investment banks within the same group. In fact, the economic impacts of holding clients' stocks and providing other banking services have attracted many attentions among researchers.[2]

[2] Gorton and Schmid (1998) study the effect of bank equity ownership on firm performance in Germany. Jiang, Li and Shao (2008) find that syndicated loans with dual-holder participation have lower loan yield spreads.

Although supportive trading for new IPO firms and 401(k) client firms has been documented, it is not clear whether such support exists among other firms. More importantly, if such support activities exist, how effective they can be given that financial conglomerates have more complex incentives and may have to trade against many independent institutions whose objectives are to maximize trading profits. To obtain broader insight on these issues, we use a comprehensive sample of firms followed by analysts and quarterly earnings announcements as events in this study. Specifically, we analyze the stock trading patterns of two different types of institutions (relationship institutions vs. independent institutions) surrounding the earnings announcements of their client firms.

Instead of using an infrequent firm event, we use regular quarterly earnings announcements. The sample consists of the universe of firms followed by analysts from 1990 to 2004. Essentially, we use institutional trading, earnings momentum, and abnormal stock returns surrounding earnings announcements to study the impacts of relationship institutions. Earnings surprises offer a convenient opportunity to examine institutional trading behavior surrounding the change of client firm information. The high and regular frequency also facilitates the analysis in a large scale when the business is as usual. It avoids the selection bias since an infrequent event in other study is not randomly observed. Findings from our analysis are more general and have broader implications not only to financial regulations and institutions but also to asset pricing literature. It also captures the long-term nature of relationships between corporations and institutions better than infrequent corporate events.

One major difference between relationship institutions and independent institutions is that the former can collect interest revenues and underwriting fees from their clients; thus, trading profit is not the only incentive of trading clients' stocks. Although extant literature has shown some information advantages of relationship institutions, their trading behaviors may not be as

informative as those of independent institutions due to other incentives mentioned above. Given the information advantage and additional incentives, it is an empirical question whether relationship institutions provide price support to their clients experiencing negative earnings shocks (relationship insurance hypothesis) or these institutions will exploit their private information from their affiliated banks and shed their holdings prior to bad news (information advantage hypothesis).

The evidence in this study is more consistent with the relationship insurance hypothesis. Analysis on institutional trading shows that relationship institutions significantly increase their aggregated holdings of connected firms by 0.03% of shares outstanding one quarter prior to negative surprises (the bottom quintile of earnings surprises) while independent institutions decrease their aggregated holdings by 0.2%. When firms with negative shocks, the average number of relationship institutions is 3 and that number of independent institutions is 138. Therefore, independent institutions on average outnumber relationship institutions by the scale of hundreds for a firm. Such imbalanced numbers indicate that relationship institutions are actively supporting their clients' shares rather than dumping the shares like others when their client firms have negative earnings shocks.

We also find that the post-earnings-announcement-drift is less pronounced when firms with relationship institutions. Relationship institutions tend to support their client firms with lower liquidity when these firms have negative earnings shocks. Further evidence shows that the price support from relationship institutions is more effective than that of independent institutions. To mitigate potential sample selection bias, we also examine the price support effect within the connected firms and compare the price impact within the connected firms. The magnitude of price impact is economically substantial. Relative to similar firms sold by relationship

institutions, the difference is $4.41 (based on $100 of pseudo stock price 6 months following the announcements).

This paper contributes to literature on financial institutions by confirming their relationship insurance role in the capital markets using a broad sample of firms and a regular and frequent earnings announcement event. The findings provide general implications for asset pricing literature. Inactive institutional relationship can be considered a risk factor because supportive institutional relationship can alter stock return profiles and smooth out temporary negative shocks whereas those without such relationship would have incurred the price swing. By reducing unnecessary price movements, financial institutions can reduce the noise in the market and enhance the stock prices of their clients.

The remainder of the first essay is organized as follows. Section 2.2 presents relevant literature and develops the hypothesis. Section 2.3 describes the sources of data and research design. Section 2.4 reports the empirical results and Section 2.5 concludes.

2.2 Literature Review and Hypothesis Development

2.2.1 Literature Review

2.2.1-1 Institutional Investor and Earnings Announcement

Whether sophisticated institutional investors have more information and own skills to select stocks with abnormal return is an interesting topic in the literature. Many researches study this question around earning announcements period. For example, Ali, Durtschi, Lev and Trombley (2004) find an association between quarterly change in institutional ownership and abnormal returns of the subsequent quarterly earnings announcement. Baker, Litov, Watchter and Wurgler (2009) document that the average mutual fund's recent buys significantly outperform its recent sells around subsequent earnings announcements and that mutual fund trades can forecast EPS surprises. Berkman and McKenzie (2009) study daily trading data of institutional investors and

short sellers prior to the earnings announcements and find that pre-announcement trading has significant explanatory power to the upcoming earnings announcement. These evidences are consistent with the notion that institutional investors have better information about firms' earnings announcements.

On the contrary, Griffin, Shu and Topaloglu (2008) examine whether institutional investors can trade in the correct direction immediately prior to large value-relevant events, such as takeovers, earnings announcements, or other large price moves. Surprising, they find no evidence that institutional trading shows superior information about the forthcoming earnings announcements. Daske, Richardson and Tuna (2005) study the daily transaction data of short seller and find no reliable evidence that daily changes in short sales transactions lead daily stock returns. Although the empirical evidence whether institutional investors can time the market is mixed, it is generally believed that institutional investors have better ability to collect and process information.

2.2.1-2 Relationship and Support Behavior

The passage of the Gramm-Leach-Bliley Act in 1999 has great influence on the development of the U.S. financial institutions. Although the process has been started in 1987, commercial banks did not acquire significant underwriting business until the rule was further relaxed since 1996 (Lown, Osler, Strahan and Sufi, 2000). Besides the newly developed combined underwriting and lending, commercial banks and investment banks have invested in their clients' stocks for years. Financial institutions have advantages in acquiring and producing information on their client firms by developing close relationships. By exploiting economies of scale and scope, financial institutions can accumulate private information about their clients and share the information between different divisions.

With the expansion of commercial banks into mutual funds, the economic impacts of holdings client stocks and providing other banking services have attracted renewed attention among researchers. Among them, Ellis, Michaely and O'Hara (2000) specifically examine the price support activities of IPO underwriters. They find that market markers within a financial group tend to support the stock prices of IPO firms if those firms are underwritten by investment banks within the same group. Cohen and Schmidt (2009) find that mutual fund families distort their portfolio allocations to secure a trustee relationship and those family trustees significantly overweight their 401(k) clients' stocks. This phenomenon is more pronounced when the conflict of interest of the trustee family is more severe and when other mutual funds are selling the client firm's stock.

Institutional investors have incentives to maintain good relationship with their customers to secure the potential business. For example, Reuter (2006) documents a robust positive correlation between the annual brokerage payments that mutual fund families make to lead underwriters and the IPO allocations to mutual funds. This study shows that the strength of the business relationships with lead underwriters is an economically significant determinant of how IPOs are allocated across institutional investors. Ferreira and Matos (2009) also find that strong bank-firm relations (board seats, direct equity stakes or through institutional holdings) increase banks' probability of being picked as lead arrangers than banks without such representation. Furthermore, these banks with influence in firm's governance also gain by having less credit risk subsequent to loan initiation.

2.2.1-3 Information Advantage from Combined Business

Another strand of studies focuses on the information advantage of combined business lines. Through underwriting or lending, banks have the privilege to acquire the private information of their clients. Massa and Rehman (2008) find that the mutual funds affiliated with banks increase

their portfolio weights in the firms borrowing from these banks following the deal. They show that this strategy enhance fund performance by 1.4% per year. Ivashina and Sun (2007) examine the stock trading of institutional investors that also hold loans in their portfolio. They find that institutional managers participating in loan renegotiations consequently trade on information disclosed in the loan market and outperform their comparison group by approximately 8.8% in annualized term in the month following loan renegotiation.

However, Dass and Massa (2006) argue that the privileged position of bank will increase information asymmetry and adverse selection for the stocks of those borrowing firms. The information disadvantage reduces the incentive of other investors to trade the stocks. They find that a more intense relationship between financial conglomerates and borrowing firms increases the stock's illiquidity and the information asymmetry, thus lowering the stock's trading volume and the investment in the firm by institutional investors.

2.2.2 Hypothesis Development

In order to study effects on the stock markets when financial institutions hold their client firms' stocks, we focus on the trading behaviors of two types of institutions: relationship institutions and independent institutions around their client firms' earnings announcements. Specifically, if a bank has lending or underwriting business with a firm, the bank's affiliated institution is defined as a "relationship institution" of the firm. The firm's other holding institutions whose groups do not have lending or underwriting relations with this firm are defined as "independent institution". For example, if Merrill Lynch underwrote the stocks of IBM in the previous three years, the asset management division of Bank of American is IBM's relationship institution. Meanwhile, if J. P. Morgan didn't have any lending or underwriting relationship with IBM but holds the shares of IBM, J. P. Morgan is the independent institution of IBM. Furthermore, we divide all firms in our study into two types: "connected firms" and

"unconnected firms". Connected firms (e.g. IBM) are those firms paying banking fees to their relationship institutions within three years. Unconnected firms are those firms which do not have any relationship institutions holding them now.

Relationship institutions and independent institutions may have different incentives and trading behaviors. It is obvious that the only goal of independent institutions is to pursue capital gains. However, relationship institutions, especially those belong to financial conglomerates with extensive asset management as well as commercial and investment banking divisions, may choose to maintain good relation with the client firms. The banking fees paid by corporate clients and future fees provide incentive for them to maintain long-term relationship. Because of information asymmetry in the markets, firms suffering from temporary negative shocks may not be able to credibly convey information to outsider. Thus, relationship institutions can play a role to certify their client firms with such transitory shocks. One possible strategy is to increase the equity holdings of client firms because relationship institutions can signal to the market by betting on their money in the client firms. If this is true, the price support behaviors should be more prominent when client firms experience negative earnings surprises or lack of stock liquidity.

We hypothesize that if price support from relationship institutions can mitigate downward swing of their client stock prices surrounding negative earnings surprise, reactions of stock prices will be smaller and the post-earnings-announcement-drift will be less pronounced; thus, earnings momentum profit will be reduced. These can be summarized into the following hypothesis:

H_1: Compared to unconnected firms, connected firms have smaller earnings momentum and higher return with negative earning surprises. Also, relationship institutions will increase their positions when their client firms have negative earnings shocks or need liquidity. (Relationship insurance hypothesis)

On the other hand, relationship institutions can also choose to exploit their private information obtained from their affiliated banks to improve their investment performance. If this holds, relationship institutions should dump shares before bad news. Therefore, we can have another hypothesis:

H_2: Relationship institutions reduce their positions prior to negative earnings shocks of their client firms. (Information advantage hypothesis)

To examine whether the trading behaviors of relationship institutions and independent institutions are different around firm's earnings announcement, we construct a price support measure (PS measure) to verify the trading behaviors. This measure is similar to Shu's (2007) positive-feedback measure (MT measure) in price momentum. This price support measure captures the extent of buying or selling activities and incorporates the extent of surprises. When firm has positive earnings surprise, a larger PS measure means "strong buy" from institutions. On the contrary, for negative surprises, a smaller PS measure (more negative number) indicates "strong buy" when earnings surprise is very negative.

We calculate the PS measures from relationship and independent institutions and examine whether their impacts on stock price or liquidity are different. Since the relationship institutions have more information and higher incentives to help their client firms, we should expect the following hypothesis:

H_3: Trading supports from relationship institutions are more effective than the support from independent institutions.

2.3 Data and Sample Description

2.3.1 Data

The sample in this study consists of common stocks listed on NYSE, AMEX and NASDAQ from 1990 to 2004. Prime, closed-end fund, real estate investment trust (REIT), American

Depository Receipt (ADR) and foreign companies are eliminated from this study. The sample is constructed from different databases.

First, the quarterly earnings announcement information comes from the I/B/E/S Summary database. Second, stock prices, returns, and shares outstanding are obtained from the daily and monthly CRSP database. Third, firm characteristics information is from the Compustat database. Fourth, quarterly institutional holding data are extracted from the CDA/Spectrum database. All institutions' positions greater than 10,000 shares or $200,000 must be disclosed to the Securities and Exchange Commission (SEC) and CDA/Spectrum collects information from these filings. Fifth, the bond and equity underwriting information come from Thomson Financial SDC/Platinum new issues database. Because there are many mergers and acquisitions during the sample period, the M&A activities are gathered from Thomson Financial SDC/Platinum merger and acquisition database to link institutions overtime correctly. The last database is the Reuter's LPC Dealscan database, which contains the loan deal and lender information.

The information of relationship bank equity holdings is constructed by merging the lenders from LPC and/or underwriters from SDC/Platinum to the institutions in CDA database[3]. They include more than 10,000 institution names from CDA and about 10,000 lender and underwriter names. Those names are corrected for parent holding company names by incorporating M&A information. Because the enormous amount of efforts required to hand check institution information, we only focus on those with brokerage services[4], which should include most of the financial conglomerates. Next, these data are merged with the I/B/E/S, CRSP and Compustat data by "cusip". The final step is to compute the standardized unexpected earnings (SUE) for each firm in the merged data.

[3] I appreciate Wei-Ling Song for providing the merged relationship institution data.
[4] Banks without brokerage services are unlikely to exert more impacts on client firms than these major financial institutions.

Based on the most recent earning surprise, we calculate every firm's standardized unexpected earnings (SUE) for each quarter as the standard practice in post-earnings announcement drift literatures. Earnings momentum, or the post-earnings announcement drift, is first documented by Ball and Brown (1968). In the study of earnings momentum, most studies typically measure earnings momentum with the standardized unexpected earnings (SUE). SUE is defined as:

$$SUE = \frac{\text{Quarterly earnings - Expected quarterly earnings}}{\text{Standard deviation of earnings change in the prior eight quarters}} \qquad (2.1)$$

Previous literature use different time series models to estimate the expected quarterly earnings. Although most papers assume that the quarterly earnings follow a seasonal random walk with the drift, the specifications of the growth in the same fiscal quarter are different in these studies. For example, some studies assume that quarterly earnings grow at a constant rate (Jones and Litzenberger, 1970; Latane and Jones, 1979). Some studies assume that earnings grow as an AR (1) model (Bernard and Thomas, 1989). Others assume that earnings grow at a zero rate (Chan, Jegadeesh and Lakonishok, 1996). However, the robustness of the result in the literatures indicates that the accuracy of the earnings expectation model is not particularly important for the purpose of measuring unexpected earnings to predict returns (Jegadeesh and Titman, 2001).

We follow the method of Chordia and Schivakumar (2006) to construct SUE, which is defined as real earnings minus expected earnings (reported earnings four quarters ago) and is standardized by the standard deviation of the earnings change in the prior eight quarters. They use standard deviation as the denominator rather than other variables such as the stock price, market capitalization, total assets or sales because these variables may proxy for size or expected returns (Chordia and Shivakumar, 2006). We construct the SUE from the combined data and the sample consists of 107,792 firm-quarter announcements from 1990 to 2004.

We use traditional event study to test whether the abnormal return around earnings announcement is different between stocks with relationship institutional holdings (connected firms) and stocks without relationship institutional holdings (unconnected firms). The abnormal returns of the announcement period are computed from the market model. Specifically, for each announcement, we use the data from the estimation period (from days -255 to days -10) to estimate the beta from the following equation:

$$R_{it} - R_{ft} = \alpha_i + \beta_i (R_{mt} - R_{ft}) \tag{2.2}$$

where R_{it}, R_{mt} and R_{ft} is the daily return of stock i, the return of CRSP value-weighted index and the risk-free rate on day t.

For each quarter, we run the Fama-Macbeth cross-sectional regression to study the stock behavior around the earnings announcement. The dependent variables are cumulative abnormal returns ($CAR_{-1,+1}$ or $CAR_{0,2}$). The full model can be expressed as following:

$$\begin{aligned} CAR_i = {} & \beta_0 + \beta_1 Dum\_rela_i + \beta_2 Re\_num_i + \beta_3 Size_i + \beta_4 (B/M)_i \\ & + \beta_5 SUE_i + \beta_6 Age_i + \beta_7 Err_i + \beta_8 Numest_i + \beta_9 Stdev_i + \beta_{10} Cum\_return_i + e_i \end{aligned} \tag{2.3}$$

The definitions of independent variables are:

Dum_rela: equal to 1 when the firm is a connected firm and 0 when the firm is unconnected.

Re_num: the number of relationship institution

Size: firm's log market value at the end of each quarter prior to its earnings announcement.

B/M: book value divided by market value in each quarter prior to earnings announcements.

SUE: current quarter's standardized unexpected earnings.

Age: the number of year that the firm has record in the CRSP.

Err (forecast error): actual earnings per share minus the consensus of analysts' forecast right before the announcement deflated by the stock price at the end of each quarter prior to the earnings announcement.

Numest: number of analyst followings before the announcement.

Stdev (forecast dispersion): standard deviation of analysts' earnings forecast.

Cum_return: three-month cumulative return before the announcement.

To verify whether our results are robust to different setting of abnormal return, we also compute market-adjusted return as the abnormal return and investigate whether the result is unchanged. In the robust check, we define the abnormal return as the following equation:

$$AR_{i,t} = R_{it} - R_{mt} \tag{2.4}$$

where the abnormal return is the difference between the daily return of stock i and the value weighted average return for the market. We compute the cumulative abnormal return and run the regression model again and the result is similar to the market model.

2.3.2 Description of the Sample

Table 2.1 provides the description statistics of sample firms in this study. We divide all announcements into two groups (connected vs. unconnected firms) depending on whether a firm's stock is held by its relationship institutions around quarterly earnings announcement. Compared to unconnected firms, connected firms are larger and followed by more analysts. They also have higher standardized unexpected earnings (SUE), better earning per share, and smaller book-to-market ratios. In order to test whether market reacts to positive and negative earnings surprises differently, we divide all announcements into two categories based on the sign of standardized unexpected earnings (SUE). Firms exhibit more positive earnings surprises in this period. The firm characteristics are significantly different between positive surprises group and negative surprises group.

Figure 2.1 and Figure 2.2 show the stock price reactions in positive surprises and negative surprises respectively. In both graphs, connected firms appear to have moderate stock reactions surrounding earnings announcement and it is particularly obvious for the negative surprises.

Table 2.1 Summary Statistics

	All announcements			Positive earnings surprise			Negative earnings surprise		
	connected	unconnected	Difference	connected	unconnected	Difference	connected	unconnected	Difference
SUE	0.463	0.406	0.057***	1.120	1.024	0.096***	-0.934	-0.883	-0.051***
Err	0.013	0	0.013***	0.032	0.026	0.006***	-0.043	-0.148	0.105***
B/M	0.453	0.512	-0.059***	0.399	0.461	-0.062***	0.570	0.631	-0.061***
Size	1144.23	301.42	842.81***	1371.27	370.74	1000.53***	797.51	202.65	594.86***
Cash ratio	0.050	0.074	-0.024***	0.052	0.076	-0.024***	0.046	0.070	-0.024***
ROA	0.039	0.042	-0.003***	0.050	0.056	-0.005***	0.021	0.021	0.000
Capital_exp	0.050	0.052	-0.002***	0.053	0.057	-0.004***	0.045	0.046	-0.001*
Div_yield	0.6%	0.7%	-0.1%***	0.6%	0.8%	-0.2%***	0.6%	0.5%	0.1%***
Numest	7	3	4***	7	4	3***	6	3	3***
EPS	0.230	0.180	0.050***	0.280	0.220	0.060***	0.115	0.085	0.030***
Pct	61.35%	44.88%	16.47%***	62.85%	46.59%	16.26%***	58.42%	41.61%	16.81%***
Rela_pct	1.10%	0.00%	1.10%***	1.15%	0.00%	1.15%***	1.03%	0.00%	1.03%***
Nonrela_pct	58.86%	44.88%	13.98%***	60.32%	46.59%	13.73%***	55.78%	41.61%	14.17%***
Avepct	0.48%	0.80%	-0.32%***	0.46%	0.76%	-0.30%***	0.53%	0.88%	-0.34%***
Averelapct	0.32%	0%	0.32%***	0.33%	0%	0.33%***	0.30%	0%	0.30%***
Avenonrelapct	0.48%	0.80%	-0.32%***	0.46%	0.75%	-0.30%***	0.53%	0.88%	-0.34%***
# of observations	58058	49734		38231	32855		19827	16879	

This table reports the Median statistics for the sample of 107,792 firm-quarters from March 1990 to December 2004 in the study of earnings announcement. All firms are divided into connected and unconnected firms depending on whether their shares are held by relationship institutions whose affiliated banks have lending or underwriting relation with them in the previous three years. Furthermore, all announcements are divided into positive and negative earnings surprises depending on the sign of SUE defined as

$$SUE = \frac{\text{Quarterly earnings - Expected quarterly earnings}}{\text{Standard deviation of earnings change in the prior eight quarters}}$$

where the expected quarterly earnings is the earnings four quarters ago. Err (in %) is actual earnings per share minus the consensus of analysts' forecast and is deflated by the stock price at the end of each quarter prior to the earnings announcement. B/M is the book value divided by the market value. Size is the market capitalization (in millions). Cash ratio is the ratio of total cash to lagged assets. ROA (return on assets) is income before extraordinary items divided by the lagged assets. Capital_exp is the ratio of capital expenditures to lagged assets. Div_yield is the yearly dividend yield. Numest is the number of analyst followings before the announcement. EPS is the exact earnings per share, recorded by I/B/E/S. Pct is the aggregate percentage holding of all institutions. Rela_pct and Nonrela_pct are aggregate percentage holdings of relationship and independent institutions respectively. Avepct is the average percentage holding of all institutions. Averelapct and Avenonrelapct are average percentage holdings of relationship and independent institutions respectively. The symbols: *, **, and *** denote statistical significance at 10%, 5% and 1% respectively.

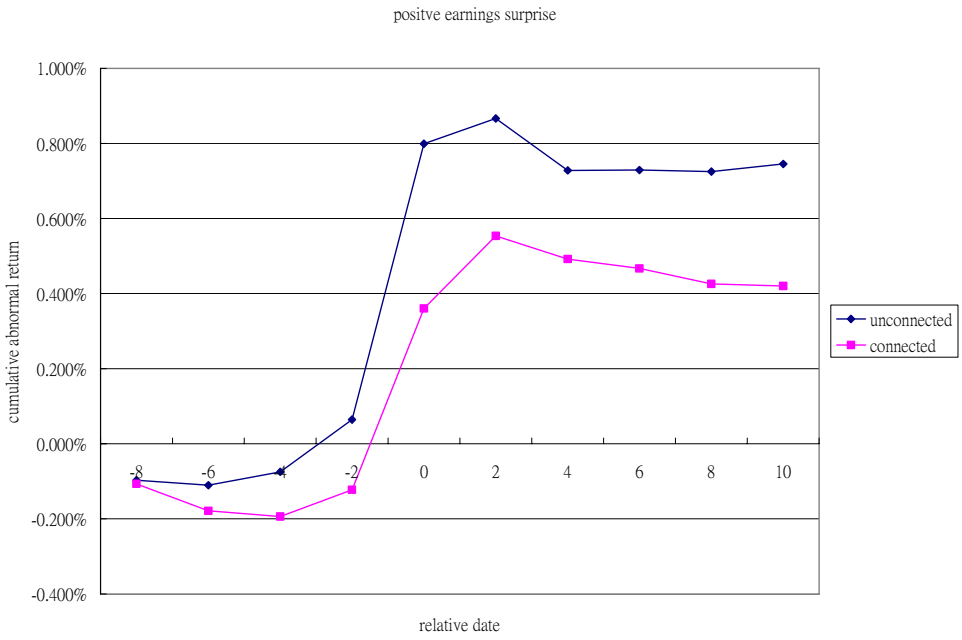

Figure 2.1 Cumulative Abnormal Returns: Positive Earnings Surprises

The figure shows the cumulative abnormal return of connected and unconnected firms during quarterly earnings announcement. Sample contains firms with positive earnings surprises from 1990 to 2004. The abnormal return is calculated from the market model and the cumulative return is the sum of abnormal return since day -10.

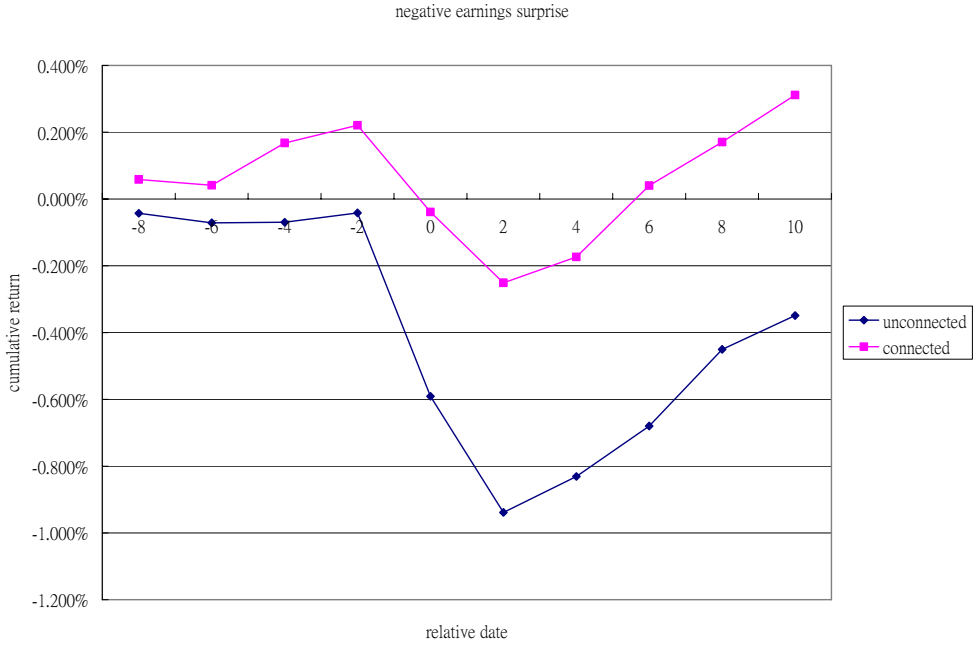

Figure 2.2 Cumulative Abnormal Returns: Negative Earnings Surprises

The figure shows the cumulative abnormal return of connected and unconnected firms during quarterly earnings announcement. Sample contains firms with negative earnings surprises from 1990 to 2004. The abnormal return is calculated from the market model and the cumulative return is the sum of abnormal return since day -10.

2.4 Empirical Result

2.4.1 Earnings Momentum

We conduct earnings momentum strategies for "connected" and "unconnected" firms respectively. Every month, we divide all firms into connected and unconnected stocks first and independently sort them into quintiles based on their SUE ranking from the most recent earnings announcements. Firms in Portfolio SUE1 have the lowest SUE and firms in portfolio SUE5 have the highest SUE. The positions are held for 3, 6, 9 or 12 months respectively.

Table 2.2 presents the return on the earnings momentum strategy for holding 3, 6, 9 and 12 months respectively. In Panel A, the return on the strategy which longs SUE5 and shorts SUE1 is a statistically significant 0.93 % (t-value=3.49) per month for unconnected firms. On the contrary, the earning momentum for connected firm is not significant in the same period. This finding suggests that the stock prices of connected firms have been supported from their relationship institutions when negative earnings shocks occur.

Similar result is observed in the 6-month period. In Panel B, the difference in return between the highest and the lowest SUE portfolio in unconnected firms is a statistically significant 0.59% (t-value=2.15) per month. However, the return of earning momentum strategy for connected firms is insignificant. Furthermore, the return of unconnected firms in 6-month is smaller than that in the 3-month period (0.93%), which suggests that the effect of earning momentum decreases over time. This is consistent with previous literatures that earnings momentum is a short-term phenomenon. Earnings momentum is not significant in the 9 and 12 month periods.

These results indicate that connected firms have smaller earnings momentum than unconnected firms both in 3-month and 6-month periods. The further decomposition shows that the return of the lowest SUE portfolio in connected firms is higher than that in unconnected firms. This finding is consistent with the relationship insurance hypothesis. Although prior studies have

Table 2.2 Earnings Momentum

	Panel A: 3-month			Panel B: 6-month		
	Connected	Unconnected	Difference	Connected	Unconnected	Difference
SUE 1 (Lowest)	1.63%	1.04%	0.59%	1.76%	1.20%	0.55%
	(3.19)***	(2.31)**	(2.34)**	(3.42)***	(2.67)***	(2.04)**
SUE2	1.20%	1.47%	-0.27%	1.32%	1.56%	-0.23%
	(2.99)***	(3.44)***	(-1.67)	(3.34)***	(3.70)***	(-1.42)
SUE3	1.54%	1.83%	-0.29%	1.54%	1.83%	-0.29%
	(4.00)***	(4.79)***	(-2.05)**	(4.00)***	(4.72)***	(-2.10)**
SUE4	1.66%	1.96%	-0.30%	1.55%	1.81%	-0.26%
	(4.15)***	(5.31)***	(-1.56)	(3.78)***	(4.98)***	(-1.32)
SUE 5 (Highest)	1.43%	1.97%	-0.54%	1.34%	1.79%	-0.45%
	(3.87)***	(5.89)***	(-4.31)***	(3.62)***	(5.28)***	(-3.83)***
H-L	-0.19%	0.93%	-1.13%	-0.42%	0.59%	-1.00%
	(-0.61)	(3.49)***	(-4.46)***	(-1.28)	(2.15)**	(-3.79)***
	Panel C: 9-month			Panel D: 12-month		
	Connected	Unconnected	Difference	Connected	Unconnected	Difference
SUE 1 (Lowest)	1.76%	1.34%	0.42%	1.80%	1.44%	0.36%
	(3.46)***	(2.98)***	(1.55)	(3.56)***	(3.20)***	(1.33)
SUE2	1.43%	1.61%	-0.18%	1.45%	1.71%	-0.26%
	(3.64)***	(3.87)***	(-1.09)	(3.74)***	(4.12)***	(-1.53)
SUE3	1.50%	1.81%	-0.31%	1.50%	1.77%	-0.27%
	(3.89)***	(4.67)***	(-2.35)**	(3.89)***	(4.58)***	(-2.09)**
SUE4	1.49%	1.73%	-0.23%	1.50%	1.67%	-0.16%
	(3.61)***	(4.82)***	(-1.20)	(3.60)***	(4.66)***	(-0.83)
SUE 5 (Highest)	1.33%	1.70%	-0.37%	1.31%	1.64%	-0.34%
	(3.56)***	(5.00)***	(-3.29)***	(3.51)***	(4.85)***	(-3.02)***
H-L	-0.44%	0.36%	-0.80%	-0.49%	0.21%	-0.70%
	(-1.39)	(1.31)	(-3.00)***	(-1.60)	(0.77)	(-2.65)***

This table reports the average monthly returns of earnings momentum portfolios for holding 3, 6, 9 and 12 months. Each month, all firms are divided into connected and unconnected stocks based on whether they are held by relationship institutions. Then, all firms are independently sorted into quintiles based on SUE of the most recent earnings announcements. Portfolio SUE1 contains firms with the lowest SUE and SUE5 contains the highest. The time-series average monthly returns of holding these portfolios in different periods are presented and t-statistics are in parenthesis. The symbols: *, **, and *** denote statistical significance at 10%, 5% and 1% respectively.

documented that earnings momentum are more pronounced among smaller firms, this study provides one explanation, i.e., lack of support from relationship banks leaves the uncertainty from earnings surprises slower to clear.

2.4.2 Abnormal Returns around Earnings Announcements

In the previous section, we provide preliminary evidence that the cumulative returns of connected and unconnected firms after the earnings announcement periods are different. In this section, we use the Fama-Macbeth (1973) regression model to examine the 3-day window abnormal return around earnings announcements. Specifically, we run all the announcements with the Fama-Macbeth regression every quarter. Then, we separate the announcements into positive surprises and negative surprises by the sign of SUE and run the regressions again since the reactions to the positive and negative earnings surprises may be different.

In order to examine whether our result is robust to different definition of cumulative abnormal return, we use different periods to compute the three-day cumulative abnormal return. The first one begins from one day prior to the announcement date (t=-1, 0, +1) and the second one begins from the announcement date (t=0, +1, +2). Because the results are essentially similar, we only report CAR (-1, +1) for brevity.

For each quarter, we run a cross-sectional regression model as equation 2.3. We estimate the coefficient of each variable and compute the time-series average of these coefficients over the sample period. Table 2.3 presents the correlation matrix between all explanatory variables. The correlations are high between Size and Dum_rela, Numest and Dum_rela, and Numest and Size respectively. This suggests that connected firms are bigger and have more analyst followings.

Table 2.4 reports the regression result. Panel A presents the result for all announcements when the dependent variable is the cumulative abnormal return during the period (-1, +1). We use different models to estimate the system. It is obvious that the coefficients of Dum_rela in all

Table 2.3 Correlation Matrix of Explanatory Variables in the Multivariate Regression

	Dum_rela	Re_num	Size	B/M	SUE	Age	Err	Numest	Stdev	cum_return
Dum_rela	1.00									
Re_num	0.56	1.00								
Size	0.38	0.52	1.00							
B/M	-0.06	-0.06	-0.36	1.00						
SUE	0.02	0.03	0.26	-0.25	1.00					
Age	0.09	0.22	0.45	-0.03	0.02	1.00				
Err	0.01	0.01	0.03	-0.08	0.04	0.01	1.00			
Numest	0.30	0.42	0.72	-0.21	0.18	0.21	0.02	1.00		
Stdev	0.01	0.02	-0.05	0.12	-0.10	0.00	-0.04	-0.03		
cum_return	-0.02	-0.03	0.02	-0.10	0.13	-0.03	0.02	-0.02	-0.04	1.00

The table presents the correlation matrix of the explanatory variables in the multivariate regression analysis. The definitions of all variables are as follows: Dum_rela is equal to 1 when the firm is a connected firm and 0 otherwise. Re_num is the number of relationship institution. Size is the logarithm of firm's market value. B/M is the book value divided by the market value. SUE is the current quarter's standardized unexpected earnings. Age is the logarithm of the year that the firm has record in the CRSP. Err is the forecast error, which is defined by actual earnings per share minus the consensus of analysts' forecast and is deflated by the stock price at the end of each quarter prior to the earnings announcement. Numest is the number of analyst followings. Stdev is the standard deviation of analysts' earnings forecast. Cum_return is the three-month cumulative return before earning announcement.

models are positive and significant. For example, we find that connected firms have 0.29% higher cumulative abnormal return than unconnected firms in Model 3. According to the coefficient of Re_num in Model 4, firms with one more relationship investor on average has 0.08% higher return. This finding is consistent with the relationship insurance hypothesis.

Panel B shows the coefficients of regression model estimated with positive earnings surprise announcements. In Panel B, the coefficient estimates on Dum_rela are all positive and significant in all models. For example, the estimated coefficient on Dum_rela is 0.0020 with a t-statistic of 2.86 in Model 3, suggesting a higher cumulative abnormal return of 0.2% for connected firms in the period (-1, +1). It seems that investors are more optimistic about the positive earnings surprises when these companies are held by their relationship institutions that know them better. From Model 4, firms with one more relationship can increase 0.07% higher abnormal return.

The result from the regression model shows that market will react to good earnings surprises more when a firm is concurrently held by its relationship institutions. This may be explained by the certification effect. Literatures show that commercial banks and investment banks play certifying roles for their clients since they have particular access to the private information. When a firm held by their relationship institutions announces a positive earnings surprise, investors will have more confidence in the firm's continuity of keeping good performance. Therefore, investors will be more willing to buy these stocks, resulting in a higher abnormal cumulative return.

Panel C provides the results of the regressions with negative earnings surprise announcements. All models' estimated coefficients on Dum_rela are positive and significant with t-statistic higher than 2. Specifically, the estimated coefficient of Dum_rela is 0.0038 with a t-statistic of 3.18 in Model 3, which indicates that connected firms have 0.38% higher abnormal

return than unconnected firms. From Model 4, firms with one more relationship institution can increase 0.04% higher return. These findings confirm that connected firms have smaller price impact than unconnected firms with negative earnings shocks. It is consistent with the relationship insurance hypothesis.

There are many interesting findings in our regression models. For example, the estimated coefficient of Dum_rela in Model 3 of Panel B is smaller than that of model 3 in Panel C (0.0020 vs. 0.0038). Thus, the difference of abnormal return between the connected and unconnected firm is higher when firms have negative earnings surprises. This finding is consistent with the relationship insurance hypothesis, since the relationship institution will tend to support their clients' stock prices when these firms are facing bad earnings shocks, rather than good earnings news. Furthermore, the estimated coefficient of SUE in Model 3 of Panel B is smaller that that of model 3 in Panel C (0.0010 vs. 0.0030). This finding suggests that negative earnings surprise has larger impact in the stock price than positive earnings surprise.

To check the robustness of our finding, we run equation 2.3 again with the Pooled Regression and report the result in Table 2.5. The finding is similar to the Fama-Macbeth regression and supports the relationship insurance hypothesis. Connected firms have better stock performance in the 3-day window around earnings announcements.

2.4.3 Institutional Holding Changes

We examine the trading behaviors of relationship institutions and independent institutions around each earnings announcement in Table 2.6. We divide all observations into quintiles (Panel A) and tertiles (Panel B). In panel A, the quintile 5 contains firms with the highest SUE and quintile 1 with the lowest SUE. Table 2.6 show distinct trading patterns for relationship and independent institutions when the SUE is at the bottom quintile. Relationship institutions significantly increase holdings of connected firms around negative earnings shocks while the

Table 2.4 Multivariate Regressions (Fama-Macbeth Model)

Model	(1)	(2)	(3)	(4)
Panel A: All Announcements				
Dum rela	0.00208***	0.00251***	0.00289***	
	(3.45)	(4.00)	(4.49)	
Re num				0.000776***
				(2.96)
Size	-0.00148***	-0.00164***	-0.00206***	-0.00220***
	(-5.42)	(-3.61)	(-4.23)	(-4.00)
B/M	0.00819***	0.00770***	0.0105***	0.0113***
	(7.03)	(5.90)	(8.00)	(7.96)
SUE	0.00384***	0.00325***	0.00174***	0.00161***
	(21.19)	(16.46)	(7.94)	(6.85)
Age	0.00129***	0.00129**	0.00128***	0.00104*
	(3.03)	(2.52)	(2.81)	(1.88)
Err			0.0945***	0.249***
			(3.53)	(5.62)
Numest		0.000180*	0.000380***	0.000412***
		(1.98)	(3.96)	(3.71)
Stdev		-0.00974***	0.00561	0.0105
		(-2.80)	(1.21)	(1.46)
Cum return			0.0546***	0.0546***
			(24.90)	(22.24)
R^2	0.02	0.02	0.08	0.08
N	103887	90594	90589	79118
Panel B: Positive earnings surprises				
Dum rela	0.00124*	0.00163**	0.00201***	
	(1.72)	(2.30)	(2.86)	
Re num				0.000737***
				(2.81)
Size	-0.00245***	-0.00289***	-0.00247***	-0.00242***
	(-6.78)	(-6.10)	(-4.81)	(-4.14)
B/M	0.0126***	0.0130***	0.0156***	0.0160***
	(9.38)	(8.22)	(10.80)	(9.99)
SUE	0.00176***	0.00151***	0.000960***	0.000903***
	(7.61)	(6.96)	(4.18)	(3.60)
Age	0.000773	0.000829	0.00106*	0.000797
	(1.28)	(1.29)	(1.81)	(1.15)
Err			0.486***	0.907***
			(5.30)	(6.24)
Numest		0.000316***	0.000425***	0.000418***
		(3.45)	(4.30)	(3.60)
Stdev		-0.0125*	-0.0216*	-0.0242*
		(-1.76)	(-1.89)	(-1.71)
Cum return			0.0506***	0.0509***
			(19.30)	(18.40)
R^2	0.02	0.02	0.09	0.09
N	68792	60881	60879	53483

(table 2.4 continued)

Panel C: Negative earnings surprises				
Dum rela	0.00325**	0.00372***	0.00377***	
	(2.48)	(2.95)	(3.18)	
Re num				0.000351*
				(1.73)
Size	0.00211***	0.00118**	-0.000751	-0.000318
	(6.30)	(2.49)	(-1.33)	(-0.49)
B/M	0.00892***	0.00770***	0.00924***	0.00921***
	(4.92)	(3.46)	(4.62)	(5.46)
SUE	0.00657***	0.00650***	0.00295***	0.00281**
	(10.30)	(9.07)	(3.87)	(2.49)
Age	0.000356	0.000713	0.000511	-0.000359
	(0.86)	(1.28)	(0.92)	(-0.33)
Err			0.0652*	0.287**
			(1.87)	(2.61)
Numest		0.000284**	0.000510***	0.000496***
		(2.12)	(3.80)	(3.21)
Stdev		-0.000747	0.0123	0.0372***
		(-0.10)	(1.64)	(3.29)
Cum return			0.0573***	0.0546***
			(20.71)	(15.82)
R^2	0.02	0.03	0.08	0.09
N	35095	29713	29710	25635

This table provides the result of Fama-Macbeth multivariate regressions. The dependent variable is the cumulative abnormal return, CAR(-1,+1), from the market model. Panel A, B and C are estimated with all earnings announcements, positive earnings surprise and negative earnings surprise respectively. Dum_rela is equal to 1 when the firm is a connected firm and 0 when the firm is unconnected. Re_num is the number of relationship institution. The definitions of other control variables are as followings. Size is the logarithm of firm's market value. B/M is the book value divided by the market value. SUE is the current quarter's standardized unexpected earnings. Age is the logarithm of the year that the firm has record in the CRSP. Err is the forecast error, which is defined by actual earnings per share minus the consensus of analysts' forecast and is deflated by the stock price at the end of each quarter prior to the earnings announcement. Numest is the number of analyst followings. Stdev is the standard deviation of analysts' earnings forecast. Cum_return is the three-month cumulative return before earning announcement. Numbers in parentheses are t-value and regression intercepts are suppressed for brevity. The symbols: *, **, and *** denote statistical significance at the 10%, 5% and 1% respectively.

Table 2.5 Multivariate Regressions (Pooled Model)

Model	(1)	(2)	(3)	(4)
Panel A: All Announcements				
Dum rela	0.00251***	0.00281***	0.00317***	
	(4.65)	(5.11)	(5.87)	
Re num				0.000442***
				(5.76)
Size	-0.00168***	-0.00204***	-0.00224***	-0.00252***
	(-7.29)	(-7.07)	(-7.86)	(-7.77)
B/M	0.00603***	0.00426***	0.00643***	0.00641***
	(5.33)	(4.71)	(6.91)	(5.99)
SUE	0.00381***	0.00325***	0.00241***	0.00240***
	(27.54)	(23.57)	(17.80)	(16.33)
Age	0.00142***	0.00158***	0.00203***	0.00206***
	(4.04)	(4.37)	(5.69)	(5.25)
Err			0.00517***	0.00865***
			(2.80)	(3.12)
Numest		0.000188***	0.000323***	0.000358***
		(2.83)	(4.97)	(5.16)
Stdev		-0.00880***	-0.00575***	-0.00770*
		(-3.57)	(-2.60)	(-1.73)
Cum return			0.0374***	0.0379***
			(29.04)	(26.91)
R^2	0.01	0.01	0.04	0.04
N	103887	90594	90589	79118
Panel B: Positive earnings surprises				
Dum rela	0.00210***	0.00222***	0.00271***	
	(3.37)	(3.47)	(4.29)	
Re num				0.000423***
				(5.03)
Size	-0.00272***	-0.00311***	-0.00292***	-0.00318***
	(-11.29)	(-9.11)	(-8.68)	(-8.47)
B/M	0.0105***	0.00988***	0.0125***	0.0136***
	(9.61)	(8.07)	(10.17)	(9.68)
SUE	0.00194***	0.00166***	0.00152***	0.00159***
	(11.75)	(9.84)	(9.20)	(8.86)
Age	0.000875**	0.000928**	0.00166***	0.00174***
	(2.19)	(2.16)	(3.92)	(3.76)
Err			0.00459**	0.00693**
			(2.14)	(2.21)
Numest		0.000267***	0.000350***	0.000376***
		(3.47)	(4.62)	(4.66)
Stdev		-0.00466	-0.00535	-0.00993
		(-1.49)	(-1.45)	(-1.31)
Cum return			0.0343***	0.0349***
			(21.66)	(20.05)
R^2	0.01	0.01	0.04	0.04
N	68792	60881	60879	53483

(table 2.5 continued)

Panel C: Negative earnings surprises				
Dum rela	0.00295***	0.00377***	0.00375***	
	(2.89)	(3.65)	(3.70)	
Re num				0.000305*
				(1.91)
Size	0.00176***	0.000762	-0.000293	-0.000141
	(3.99)	(1.48)	(-0.57)	(-0.24)
B/M	0.00571***	0.00301**	0.00418***	0.00415***
	(3.34)	(2.45)	(3.36)	(2.97)
SUE	0.00655***	0.00623***	0.00407***	0.00371***
	(9.89)	(9.03)	(6.00)	(4.99)
Age	0.000605	0.00130**	0.00134**	0.00120*
	(0.94)	(1.97)	(2.06)	(1.68)
Err			0.00444	0.00812**
			(1.56)	(1.97)
Numest		0.000284**	0.000447***	0.000484***
		(2.23)	(3.59)	(3.63)
Stdev		-0.00901***	-0.00424	-0.00137
		(-2.68)	(-1.48)	(-0.25)
Cum return			0.0410***	0.0417***
			(20.20)	(19.22)
R^2	0.01	0.01	0.04	0.043
N	35095	29713	29710	25635

This table provides the result of Pooled multivariate regressions. The dependent variable is the cumulative abnormal return, CAR(-1,+1), from the market model. Panel A, B and C are estimated with all earnings announcements, positive earnings surprise and negative earnings surprise respectively. Dum_rela is equal to 1 when the firm is a connected firm and 0 when the firm is unconnected. Re_num is the number of relationship institution. The definitions of other control variables are as followings. Size is the logarithm of firm's market value. B/M is the book value divided by the market value. SUE is the current quarter's standardized unexpected earnings. Age is the logarithm of the year that the firm has record in the CRSP. Err is the forecast error, which is defined by actual earnings per share minus the consensus of analysts' forecast and is deflated by the stock price at the end of each quarter prior to the earnings announcement. Numest is the number of analyst followings. Stdev is the standard deviation of analysts' earnings forecast. Cum_return is the three-month cumulative return before earning announcement. Numbers in parentheses are t-value and regression intercepts are suppressed for brevity. The symbols: *, **, and *** denote statistical significance at the 10%, 5% and 1% respectively.

independent institutions reduce their holdings significantly. The supports of relationship institutions to connected firms are also obvious when the buy pattern is compared to the significant selling of unconnected firms by independent institutions. When the SUE is at the top quintile, significantly buying activities prevail for all categories. In Panel B, we find similar supporting behaviors for relationship institutions in the bottom tertile. The findings are consistent with the relationship insurance hypothesis, rather than information advantage hypothesis.

To further study the trading behavior of relationship and independent institutions, we divide all announcements into four groups depending on the sign of the two consecutive quarters' earnings surprises (SUE). Table 2.7 shows a significant support of relationship institutions in connected firms when SUE turns negative, which is different from the independent institutions. Meanwhile, the independent institutions also reduce their holdings in unconnected firms when the SUE turns negative. On average, independent institutions tend to sell more unconnected firms than connected firms. It is worthy to mention that independent institutions stop selling connected firms after they observe the supportive trading behaviors of relationship institutions. These findings are consistent with the relationship insurance hypothesis. The different trading patterns of independent institutions for connected and unconnected firms also suggest that their trading behaviors may be affected by those of relationship institutions.

2.4.4 Price Support Measure

In this section, we construct a price support measure (PS measure) to examine institutional investors' trading behaviors around earnings announcement. This measure is similar to Shu's (2007) positive-feedback measure (MT measure) in price momentum. Specifically, we use the following procedures to calculate the PS measure. First, we calculate Δholdi,t for every quarter t and divide it by $\sum_{t=-3}^{0}\left|\Delta hold_{it}\right|$, the total absolute value of institutional trading in the estimated period (previous 4 quarters). Second, we calculate the SUEindexit, a discrete index measure

Table 2.6 Relationship Trading and Earnings Surprises

Panel A: Sorting into quintiles (change of % holding)

	1 (lowest SUE)				2				3				4				5 (highest SUE)			
	connected		unconnected		connected		unconnected		connected		unconnected		connected		unconnected		connected		unconnected	
QTR	REL	NON	NON		REL	NON	NON		REL	NON	NON		REL	NON	NON		REL	NON	NON	
[-3,-2]	0.039 **	-0.349 ***	-0.436 ***		0.060 ***	0.099	-0.040		0.075 ***	0.483 ***	0.520 ***		0.087 ***	0.775 ***	0.565 ***		0.133 ***	0.563 ***	0.590 ***	
[-2,-1]	0.046 ***	-0.192 **	-0.629 ***		0.086 ***	0.183 **	-0.034		0.090 ***	0.751 ***	0.528 ***		0.115 ***	0.859 ***	0.742 ***		0.138 ***	0.683 ***	0.553 ***	
[-1,0]	0.028 **	-0.177 **	-0.693 ***		0.092 ***	0.406 ***	-0.116		0.080 ***	0.690 ***	0.453 ***		0.125 ***	0.966 ***	0.626 ***		0.153 ***	0.500 ***	0.428 ***	
[0, 1]	0.046 ***	0.205 ***	-0.733 ***		0.102 ***	0.642 ***	-0.224 **		0.112 ***	0.846 ***	0.186 *		0.116 ***	1.168 ***	0.102		0.155 ***	0.568 ***	-0.247 **	
[1, 2]	0.001	0.174 **	0.541 ***		0.023	0.096	0.507 ***		-0.002	0.102	0.785 ***		0.020	-0.011	0.898 ***		0.046 ***	-0.490 ***	0.739 ***	
[2, 3]	0.013	0.443 ***	0.430 ***		0.025	0.385 ***	0.513 ***		0.042 ***	0.299 ***	0.356 ***		0.040 ***	0.191 **	0.405 ***		0.050 ***	-0.149	0.225 **	
[3, 4]	0.025	0.447 ***	0.473 ***		0.013	0.652 ***	0.457 ***		0.068 ***	0.373 ***	0.317 ***		0.041 ***	0.072	0.151		0.052 ***	-0.145	0.185 *	
[4, 5]	0.024	0.487 ***	0.489 ***		0.027	0.391 ***	0.318 ***		0.036 **	0.405 ***	0.336 ***		0.056 ***	0.241 **	0.278 **		0.040 **	-0.216 **	0.195 **	
QTR 0	2.22	53.67	41.74		2.13	53.48	41.87		2.18	55.87	44.19		2.23	57.44	45.23		2.41	61.10	48.68	

(table 2.6 continued)

Panel B: Sorting into tertiles (change of % holding)

	1(lowest SUE)					2					3(highest SUE)				
	connected			unconnected		connected			unconnected		connected			unconnected	
QTR	REL		NON	NON		REL		NON	NON		REL		NON	NON	
[-3,-2]	0.048	***	-0.215 ***	-0.320	***	0.076	***	0.492 ***	0.440	***	0.112	***	0.668 ***	0.599	***
[-2,-1]	0.053	***	-0.085	-0.428	***	0.097	***	0.711 ***	0.490	***	0.134	***	0.750 ***	0.632	***
[-1,0]	0.050	***	-0.006	-0.539	***	0.094	***	0.780 ***	0.416	***	0.143	***	0.660 ***	0.538	***
[0,1]	0.066	***	0.389 ***	-0.551	***	0.116	***	0.841 ***	0.117		0.137	***	0.824 ***	-0.114	
[1,2]	0.010		0.126 **	0.507	***	0.007		0.077	0.815	***	0.036	***	-0.285 ***	0.753	***
[2,3]	0.021		0.454 ***	0.475	***	0.037	***	0.299 ***	0.384	***	0.044	***	-0.056	0.298	***
[3,4]	0.018		0.565 ***	0.453	***	0.059	***	0.316 ***	0.331	***	0.043	***	-0.055	0.166	**
[4,5]	0.028	**	0.477 ***	0.452	***	0.033	***	0.346 ***	0.316	***	0.048	***	-0.047	0.202	**
QTR 0	2.12		53.13	42.36		2.08		54.91	43.68		2.20		58.89	47.50	

This table reports the mean level of holding and change of holdings. All firms are divided into connected and unconnected firms depending on whether their shares are held by relationship institutions whose affiliated banks have lent or underwritten for the firms within 3 years prior to the earning announcements. Institutions holding the shares of fees paying clients are relationship institutions (REL). The remaining institutions are independent institutions (NON). Connected and unconnected firms are further sorted into Quintiles (Panel A) and Tertiles (Panel B) according to their SUE. The last row is the holding level in current quarter (quarter 0) when earnings are announced. Other rows are changes of holdings and corresponding windows are denoted in brackets. Earning surprises (SUE) is defined in Table 2.1. The symbols: *, **, and *** denote statistical significance at 10%, 5% and 1% respectively.

Table 2.7 Relationship Trading and Consecutive Earnings Surprises

	Pos. SUE followed by Neg. SUE (+, -)						Neg. SUE followed by Neg. SUE (-, -)						Neg. SUE followed by Pos. SUE (-, +)						Pos. SUE followed by Pos. SUE (+, +)					
	connected				unconnected		connected				unconnected		connected				unconnected		connected				unconnected	
QTR	REL		NON		NON		REL		NON		NON		REL		NON		NON		REL		NON		NON	
[-3,-2]	0.089	***	0.126		0.139		0.027	**	-0.380	***	-0.542	***	0.072	***	0.234	**	-0.073		0.100	***	0.651	***	0.635	***
[-2,-1]	0.092	***	0.177		0.027		0.033	**	-0.213	**	-0.654	***	0.077	***	0.411	***	-0.046		0.124	***	0.794	***	0.682	***
[-1,0]	0.049	**	-0.292	**	-0.461	***	0.050	***	0.153	**	-0.589	***	0.096	***	0.660	***	0.275	**	0.124	***	0.725	***	0.524	***
[0,1]	0.059	***	0.057		-0.676	***	0.069	***	0.532	***	-0.488	***	0.133	***	1.108	***	0.213	**	0.125	***	0.758	***	-0.071	
[1,2]	0.030	*	0.069		0.276	**	-0.003		0.161	**	0.585	***	0.013		0.088		0.916	***	0.025	***	-0.167	***	0.741	***
[2,3]	0.024		0.462	***	0.323	**	0.024		0.364	***	0.447	***	0.008		0.542	***	0.487	***	0.049	***	0.004		0.302	***
[3,4]	0.026		0.461	***	0.390	***	0.013		0.571	***	0.458	***	0.064	***	0.431	***	0.135		0.048	***	0.042		0.282	***
[4,5]	0.074	***	0.521	***	0.291	*	0.019		0.512	***	0.407	***	0.031		0.234	*	0.418	***	0.045	***	0.114	*	0.217	***
QTR 0	2.09		53.15		43.20		2.12		53.16		41.98		2.01		52.52		40.92		2.18		58.21		47.15	

This table reports the mean level of holding and change of holdings for consecutive earnings surprises. All firms are divided into four groups depending on the consecutive quarters' earnings surprise (SUE). Within each group, firms are further classified into connected and unconnected firms based on whether their shares are held by relationship institutions whose affiliated banks have lent or underwritten for the firms within 3 years prior to the earning announcements. Institutions holding the shares of fees paying clients are relationship institutions (REL). The remaining institutions are independent institutions (NON). The last row is the holding level in current quarter (quarter 0) when earnings are announced. Other rows are changes of holdings and corresponding windows are denoted in brackets. Earning surprises (SUE) is defined in Table 2.1. The symbols: *, **, and *** denote statistical significance at 10%, 5% and 1% respectively.

ranking the concurrent SUE for each quarter. Each stock is sorted into quartiles by its SUE and assigned a discrete value (-2, -1, 1 or 2) based on SUE. Although Shu (2007) sorts companies into deciles according to past stock returns, we simplify his method into quartiles. Finally, for each quarter, we multiply the $\frac{\Delta hold_{it}}{\sum_{t=-3}^{0}|\Delta hold_{it}|}$ by $SUEindex_{it}$ and sum up the product across past four quarters to obtain the price supporting measure (PS). A higher PS measure when SUE is positive means more buying. However, a smaller PS value when SUE is negative indicates a higher support from institutions because the SUE is a negative number and holding change is a positive number.

To study the trading impact of relationship and independent investors, we examine the changes of firm characteristics responding to different levels of PS measures. Table 2.8 and Table 2.9 report the findings for firms with positive earnings surprise and negative surprise respectively. This can be regarded as the univariate analysis. Specifically, we construct these tables from the following procedures. Every quarter, we sort firms into quintiles based on their PS measure. Then, we find firm characteristics prior to and following the PS measure computing period (4 quarters) and calculate the change. Panel A of Table 2.8 reports the characteristic change for different levels of PS measure from relationship investors. We are interested in the change of stock liquidity. It is obvious that the turnover and Amihud's price impact improve more for firms with strong buying from relationship institutions. Besides, the analyst following, market value and cash ratio also increase more for firms with stronger relationship buying.

Panel B of Table 2.8 reports the change of firm characteristic when we sort the firms with PS measure of independent investors. The stock liquidity of firms with strong buying improves more than that of firms with weak buying. Specifically, these firms have fewer non-trading days and the Hasbrouck trading cost reduce more.

The Table 2.9 reports the result for firms with current negative earnings shocks. In Panel A, we sort firms with their PS measure from relationship institutions. The stock liquidity worsens for every quintile when firms experience negative SUE. However, compared with firms with weak support, firms with strong support from relationship institutions deteriorate less in the Amihud's price impact, Liu's Lm3 measure and Hasbrouck trading cost. In the Panel B of Table 2.9, we also find that the stock liquidity declines in every quintile for firms surrounding negative earnings announcements. Similarly, firms with more buying from independent institutions exhibit smaller declines in Amihud's price impact and Hasbrouck's trading cost. To summarize, we find that both of the buying from relationship institutional and independent institutions help to improve the stock liquidity in this univariate analysis.

The previous univariate analysis shows a relationship between the stock liquidity and buying activities from institutional investors. However, the liquidity improvement may be caused by changes of other firm characteristics. To clarify this possibility, we run the regression model and control other firm characteristics to test the robustness of our findings. Table 2.10 reports the result. As in the second essay, we use Amihud's price impact, Liu's Lm3 measure and Hasbrouck trading cost as the dependent variables respectively in three different regressions. The main explanatory variables are the PS measure of relationship institutions (rela_ps) and that measure of independent institutions (nonrela_ps).

Panel A reports the regression result for firms with positive earnings surprise. The negative coefficient of rela_ps in Model 1 shows that the buying of relationship institutions reduces the Amihud's price impact and improves the stock liquidity. This is consistent with the previous finding in the Panel A of Table 2.8. Similarly, the negative coefficient of nonrela_pct also implies a lower price impact for firms with more buying from independent institutions. Although the magnitude of coefficient for nonrela_ps (0.0729) seems to be larger than that of rela_ps (0.0208),

Table 2.8 Price Support and Changes of Firm Characteristics (Positive Surprise)

This table reports the changes of firm characteristics responding to different levels of PS measures from the relationship institutions and independent institutions for firms with current positive earnings surprise. The focus is the change of stock liquidity. Each quarter, firms are sorted into quintile based on the relationship PS measure (rela_ps) and independent PS measure (nonrela_ps). Price supporting measure is calculated with four quarter interval by the following procedures. First, we calculate Δholdi,t for every quarter t and divide it by $\sum_{t=-3}^{0}\left|\Delta hold_{it}\right|$, the absolute value of institutional trading in the estimated period (4 quarters). Second, for each quarter t, we compute the $SUEindex_{it}$, a discrete index measuring the rank of SUE for firm i. Specifically, each stock is sorted by its SUE and assigned a discrete value (-2, -1, 1, 2) based on its SUE. Then, for firm i in each quarter t, we multiply the $\frac{\Delta hold_{it}}{\sum_{t=-3}^{0}\left|\Delta hold_{it}\right|}$ by $SUEindex_{it}$ and sum up the product across four quarters to obtain the price supporting measure (PS). The first column reports the initial firm characteristic of whole sample prior to PS estimated quarters and the rest columns report the characteristic changes. The definitions of variables are as followings: turnover is trading volume turnover; Amihud is AmiHud's (2002) illiquidity ratio rescaled by 10^7 and taken by logarithm; lm3 is the Liu's (2006) LM3 measure; Hasbrouck is Hasbrouck's (2009) effective trading cost measure; sue is the standardized unexpected earnings; err is actual earnings per share minus the consensus of analysts' forecast and is deflated by the stock price at the end of each quarter prior to the earnings announcement; numest is the number of analyst followings before the announcement; stdev is the standard deviation of analysts' earnings forecast; 3m_return is the accumulated stock return; var_return is the variance of return in previous quarter; EPS is the exact earnings per share, recorded by I/B/E/S; Capital_exp is the ratio of capital expenditures to lagged assets; ROA is income before extraordinary items divided by the lagged assets; held_pct is the aggregate institutional holding; rela_pct is the aggregate holdings of relationship institutions; num_institution is the total number of institutional investors; num_rela is the number of relationship institutional investors; herfin is the Herfindahl index; B/M is the book value divided by the market value; mkt_value is the market value (in millions); cashratio is the ratio of total cash to lagged assets; leverage is firm's total debt divided by market value of its equity plus the book value of debt and preferred stock minus deferred tax; advertising is advertising expense divided by total asset; div_yield is the yearly dividend yield. T-statistics are in parenthesis and the symbols: *, **, and *** denote statistical significance at 10%, 5% and 1% respectively.

Panel A: Sorted by relationship PS measure							
	Average initial value	Value change					
		1(Weak)	2	3	4	5(Strong)	S-W
turnover	0.348	0.040	0.064	0.038	0.058	0.051	0.011 **
Amihud	-2.630	-0.403	-0.441	-0.486	-0.421	-0.444	-0.042 ***
lm3	0.311	-0.027	-0.008	-0.166	-0.016	-0.028	-0.001
Hasbrouck (*100)	0.520	-0.030	-0.049	-0.047	-0.031	-0.030	0.000
sue	0.908	0.514	0.609	0.519	0.505	0.558	0.044
err	-0.274	0.000	0.000	0.004	0.001	0.002	0.003
numest	7.623	0.430	0.617	0.314	0.533	0.582	0.152 ***
stdev	0.029	-0.004	-0.003	-0.004	-0.001	-0.001	0.003 ***
3m_return	0.071	-0.018	-0.044	-0.014	-0.041	-0.029	-0.011 **
var_return (*100)	0.091	-0.007	-0.011	-0.006	-0.002	-0.002	0.006 **
EPS	0.221	0.122	0.137	0.096	0.116	0.116	-0.005
Capital_exp (*100)	1.745	0.001	-0.037	0.049	-0.022	0.008	0.007
ROA	0.011	0.002	0.003	0.002	0.003	0.003	0.001
held_pct	53.3%	2.6%	3.7%	3.0%	3.8%	3.3%	0.7% ***
rela_pct	1.1%	0.1%	0.3%	0.0%	0.7%	0.7%	0.6% ***
num_institution	152.6	22	27	17	29	31	9 ***
num_rela	2.4	0.505	0.581	0.052	0.980	1.108	0.603 ***
herfin	203	8.957	14.232	9.211	14.316	5.832	-3.124
B/M	0.545	-0.036	-0.040	-0.061	-0.025	-0.036	0.001
mkt_value	4813	955	856	783	1608	2310	1355 ***
cashratio	0.158	-0.004	0.003	0.001	0.007	0.008	0.012 ***
leverage	0.560	0.004	0.003	0.002	0.001	0.002	-0.003 ***
advertising (*100)	0.012	-0.025	0.012	-0.046	0.016	-0.033	-0.008
div_yield	0.016	-0.003	-0.009	-0.001	-0.001	-0.001	0.001

(table 2.8 continued)

Panel B: Sorted by independent PS measure

	Average initial value	Value change					
		1(Weak)	2	3	4	5(Strong)	S-W
turnover	0.348	0.034	0.033	0.037	0.052	0.074	0.040
Amihud	-2.630	-0.367	-0.385	-0.417	-0.478	-0.592	-0.225
lm3	0.311	-0.063	-0.060	-0.069	-0.074	-0.109	-0.046 **
Hasbrouck (*100)	0.520	-0.037	-0.038	-0.032	-0.037	-0.046	-0.009 *
sue	0.908	0.477	0.485	0.546	0.567	0.587	0.110 ***
err	-0.274	0.002	0.003	0.000	0.001	0.003	0.001
numest	7.623	0.512	0.430	0.441	0.404	0.465	-0.048
stdev	0.029	-0.004	-0.003	-0.004	-0.002	-0.003	0.001
3m_return	0.071	-0.016	-0.018	-0.028	-0.030	-0.029	-0.013 **
var_return (*100)	0.091	-0.005	-0.006	-0.006	-0.006	-0.003	0.002
EPS	0.221	0.099	0.113	0.111	0.116	0.120	0.021 ***
Capital_exp (*100)	1.745	-0.060	-0.003	0.028	0.033	0.062	0.122 ***
ROA	0.011	0.003	0.002	0.002	0.003	0.003	0.001
held_pct	53.3%	0.7%	2.4%	2.7%	4.4%	5.7%	5.0% ***
rela_pct	1.1%	0.4%	0.4%	0.3%	0.3%	0.2%	-0.2% ***
num_institution	152.6	22	22	23	23	26	4 ***
num_rela	2.4	0.648	0.578	0.503	0.480	0.465	-0.184 ***
herfin	203	1.545	6.541	6.757	14.639	18.844	17.298 ***
B/M	0.545	-0.027	-0.031	-0.050	-0.049	-0.064	-0.038 ***
mkt_value	4813	1538	1204	1014	1221	1263	-276 **
cashratio	0.158	-0.005	-0.001	0.004	0.009	0.005	0.011 ***
leverage (*100)	0.560	0.403	0.116	0.148	0.202	0.372	-0.031
advertising (*100)	0.012	-0.039	-0.027	-0.016	-0.015	-0.029	0.011
div_yield	0.016	-0.001	-0.005	-0.002	-0.001	-0.003	-0.002

Table 2.9 Price Support and Changes of Firm Characteristics (Negative Surprise)

This table reports the changes of firm characteristics responding to different levels of PS measures from the relationship institutions and independent institutions for firms with negative earnings surprise. The focus is the change of stock liquidity. Each quarter, firms are sorted into quintile based on the current relationship PS measure (rela_ps) and independent PS measure (nonrela_ps). The first column reports the initial firm characteristic of whole sample prior to PS measures and the rest columns report the characteristic changes of firms under different PS measures. The definitions of variables are as followings: turnover is trading volume turnover; Amihud is AmiHud's (2002) illiquidity ratio rescaled by 10^7 and taken by logarithm; lm3 is the Liu's (2006) LM3 measure; Hasbrouck is Hasbrouck's (2009) effective trading cost measure; sue is the standardized unexpected earnings; err is actual earnings per share minus the consensus of analysts' forecast and is deflated by the stock price at the end of each quarter prior to the earnings announcement; numest is the number of analyst followings before the announcement; stdev is the standard deviation of analysts' earnings forecast; 3m_return is the accumulated stock return; var_return is the variance of return in previous quarter; EPS is the exact earnings per share, recorded by I/B/E/S; Capital_exp is the ratio of capital expenditures to lagged assets; ROA is income before extraordinary items divided by the lagged assets; held_pct is the aggregate institutional holding; rela_pct is the aggregate holdings of relationship institutions; num_institution is the total number of institutional investors; num_rela is the number of relationship institutional investors; herfin is the Herfindahl index; B/M is the book value divided by the market value; mkt_value is the market value (in millions); cashratio is the ratio of total cash to lagged assets; leverage is firm's total debt divided by market value of its equity plus the book value of debt and preferred stock minus deferred tax; advertising is advertising expense divided by total asset; div_yield is the yearly dividend yield. T-statistics are in parenthesis and the symbols: *, **, and *** denote statistical significance at 10%, 5% and 1% respectively.

Panel A: Sorted by relationship PS measure							
	Average initial value	Value change					
		5(Strong)	4	3	2	1(Weak)	S-W
turnover	0.413	-0.033	-0.032	-0.034	-0.036	-0.034	0.001
Amihud	-2.492	0.049	0.107	0.179	0.240	0.221	-0.172 ***
lm3	0.271	-0.014	0.020	0.086	0.034	0.028	-0.042 ***
Hasbrouck (*100)	0.006	-0.001	-0.006	0.006	-0.002	0.023	-0.023 ***
sue	0.573	-1.105	-1.127	-1.011	-1.162	-1.196	0.091 **
err	0.003	-0.008	-0.022	-0.015	-0.010	-0.009	0.001
numest	7.248	-0.090	-0.001	-0.210	-0.328	-0.165	0.075
stdev	0.036	0.007	0.010	0.012	0.011	0.008	-0.001
3m_return	0.000	0.041	0.041	0.040	0.042	0.066	-0.025 ***
var_return (*100)	0.111	-0.001	-0.005	0.007	-0.003	0.009	-0.010 **
EPS	0.332	-0.197	-0.193	-0.180	-0.217	-0.216	0.018
Capital_exp (*100)	0.020	-0.493	-0.447	-0.403	-0.528	-0.467	-0.026
ROA	0.008	-0.008	-0.007	-0.009	-0.011	-0.011	0.003 ***
held_pct	53.50%	1.47%	0.92%	-0.35%	-0.20%	-1.23%	2.71% ***
rela_pct	1.33%	0.86%	0.54%	0.02%	-0.17%	-0.53%	1.39% ***
num_institution	140.5	-1.142	-1.403	-3.326	-4.350	-6.617	5.474 ***
num_rela	2.7	0.957	0.794	0.066	0.283	0.085	0.873 ***
herfin	214	27.444	28.225	18.431	27.389	20.748	6.696 *
B/M	0.593	0.093	0.140	0.097	0.182	0.150	-0.057 ***
mkt_value	3798	-348	-542	-445	-707	-616	268 *
cashratio	0.188	-0.015	-0.032	-0.020	-0.052	-0.035	0.020 ***
leverage	0.531	0.013	0.009	0.005	0.014	0.010	0.003 *
advertising (*100)	0.010	-0.018	-0.021	-0.049	0.041	-0.012	-0.006
div_yield	0.016	0.111	-0.547	0.105	0.152	0.127	-0.016

(table 2.9 continued)

Panel B: Sorted by independent PS measure

	Average initial value	Value change					
		5(Strong)	4	3	2	1(Weak)	S-W
turnover	0.413	-0.038	-0.028	-0.036	-0.036	-0.031	-0.007
Amihud	-2.492	0.037	0.072	0.132	0.214	0.350	-0.312 ***
lm3	0.271	0.021	0.034	0.052	0.037	0.049	-0.028
Hasbrouck (*100)	0.006	-0.004	0.004	0.004	0.003	0.020	-0.024 ***
sue	0.573	-1.171	-1.028	-1.016	-1.076	-1.220	0.049
err	0.003	-0.006	-0.004	-0.017	-0.018	-0.019	0.014 ***
numest	7.248	0.021	-0.136	-0.119	-0.174	-0.418	0.439 ***
stdev	0.036	0.007	0.005	0.011	0.010	0.015	-0.007 ***
3m_return	0.000	0.044	0.040	0.035	0.044	0.065	-0.021 **
var_return (*100)	0.111	-0.007	0.000	-0.001	0.004	0.018	-0.025 ***
EPS	0.332	-0.164	-0.161	-0.188	-0.204	-0.268	0.105 ***
Capital_exp (*100)	0.020	-0.494	-0.386	-0.439	-0.439	-0.526	0.033
ROA	0.008	-0.008	-0.008	-0.009	-0.009	-0.013	0.005 ***
held_pct	53.50%	4.07%	2.29%	0.57%	-1.65%	-5.40%	9.47% ***
rela_pct	1.33%	0.02%	0.11%	0.15%	0.23%	0.13%	-0.11% *
num_institution	140.5	-1.222	-1.380	-2.834	-4.251	-7.462	6.240 ***
num_rela	2.7	0.388	0.421	0.385	0.406	0.296	0.092 **
herfin	214	50	34	21	13	-4	54 ***
B/M	0.593	0.065	0.075	0.112	0.152	0.223	-0.157 ***
mkt_value	3798	-499	-493	-636	-375	-536	36
cashratio	0.188	-0.026	-0.027	-0.025	-0.022	-0.040	0.014 *
leverage	0.531	0.009	0.006	0.009	0.009	0.015	-0.006 ***
advertising (*100)	0.010	-0.043	-0.020	0.028	-0.034	-0.032	-0.011
div_yield	0.016	-0.003	0.001	0.001	0.001	0.002	-0.005

it doesn't mean the influence of relationship institutions is lower. We need to consider that the average number of relationship institutions is about 2.4 and that number of independent institutions is about 150.2 for firms with positive SUE (see Table 2.8). If we divide the coefficients by the average number of relationship and independent institution respectively, the marginal effect of per relationship institution is much higher than that of independent institution[5].

Panel B of Table 2.10 reports the regression result for firms with negative earnings surprises. We should remember a smaller PS measure (more negative value) when firms with negative SUE indicates more buying from relationship institutions. Also, lower Amihud's price impact measure, LM3 measure and Hasbrouck's trading cost mean improvement of stock liquidity. Therefore, the positive and significant coefficients of rela_ps in all three models show that the stock liquidity improves when firms receive more support from relationship institutions. Similarly, firms with more buying from independent institutions also have smaller price impact and lower trading cost.

For firms with negative SUE, the average number of relationship institutions is about 2.7 and that number of independent institutions is 137.8 institutions for firms with positive SUE (see Table 2.9). Therefore, the marginal effect of per relationship institution is much higher than that of independent institution[6]. If we compare the coefficient of rela_ps in Model 1 between Panel A and Panel B, we can find the marginal effect is higher when firms with negative earnings surprise. For example, compared to marginal effect in Panel A (0.0208), one additional unit PS reduces the Amihud's price impact by 0.0508 in Panel B.

To sum up, we find two interesting conclusion. First, both buying of relationship institution and independent institution improve the stock liquidity. The marginal effect per relationship institution is much higher than the effect per independent institution. Second, the trading impact

[5] 0.0208/2.4=0.0087 vs. 0.0729/150.2=0.00048

[6] 0.0508/2.7=0.0188 vs. 0.0944/137.8=0.000685 for Amihud's price impact
0.0000889/2.7=0.000033 vs. 0.000162/137.8=0.0000012 for Hasbrouck's trading cost

of relationship institution is higher when their client firms have negative earnings surprise than positive surprise. These findings are consistent with the relationship insurance hypothesis.

2.4.5 Price Support and Preceding Firm Characteristics

In this section, we try to examine what types of firms will attract more buying from relationship institutions and independent institutions around earnings announcements. In the previous sections, we find some evidences supporting relationship insurance hypothesis. If relationship institutions really support their client firms to maintain the future business opportunity, we should expect that relationship institutions support their client firms more aggressively when their clients suffer from liquidity problems.

We run the Fama-Macbeth regression of PS measures on preceding firm characteristics and report the result in Table 2.11. Panel A provides the finding for firms with positive SUE. We only find a positive relation between relationship PS measure and Amihud's price impact in Model 1. Hence, relationship institutions tend to buy firms with higher price impact. The independent institution exhibits similar result in Panel B. Furthermore, both institutions tend to buy firms with higher SUE and better stock performance since they don't need to support firms with positive earnings surprises.

We are particularly interested in firms with negative earnings surprises since firms should need more support with bad earnings. Panel C reports the regression result for relationship PS measure on firms with negative SUE. The negative and significant coefficients on illd (-0.0186) and lm3 (-0.0201) suggest that firms with higher price impact or more non-trading days tend to receive more buying from the relationship institutions. This is more consistent with relationship insurance hypothesis. Since negative earnings surprises usually induce selling pressures for stocks, relationship institutions will support their client firms when they face selling pressures and need more liquidity.

Table 2.10 Regression of Liquidity Changes on PS measures

This table provides the regression of different liquidity measures on price support measures and other firm characteristics. It examines the effect of the institutions' trading on stock liquidity around earnings announcements. The dependent variables are Amihud's (2002) illiquidity ratio, Liu's (2006) LM3 measure and Hasbrouck's (2009) effective trading cost measure. Panel A reports the subsamples with positive SUE and Panel B reports those with negative SUE. The main explanatory variables are relationship PS measure (rela_ps) and independent PS measure (nonrela_ps) described in Table 2.8. The definitions of other controlling variables are as followings: age is the logarithm of the year that the firm has record in the CRSP database; sue is the standardized unexpected earnings; err is actual earnings per share minus the consensus of analysts' forecast and is deflated by the stock price at the end of each quarter prior to the earnings announcement; numest is the number of analyst followings before the announcement; stdev is the standard deviation of analysts' earnings forecast; 3m_return is the accumulated stock return; var_return is the variance of return in previous quarter; eps is the exact earnings per share, recorded by I/B/E/S; capital_exp is the ratio of capital expenditures to lagged assets; roa is income before extraordinary items divided by the lagged assets; herfin is the Herfindahl index; bm is the book value divided by the market value; lnmkt_value is logarithm of firm's market value; cashratio is the ratio of total cash to lagged assets; leverage is firm's total debt divided by market value of its equity plus the book value of debt and preferred stock minus deferred tax; advertising is advertising expense divided by total asset; div_yield is the yearly dividend yield. T-statistics are in parenthesis and the symbols: *, **, and *** denote statistical significance at 10%, 5% and 1% respectively.

Panel A: positive SUE			
Model	(1)	(2)	(3)
	Amihud's ratio	Liu's lm3	Hasbrouck's trading cost
rela ps	-0.0208***	0.00231	0.00000195
	(-4.56)	(0.52)	(0.07)
nonrela ps	-0.0729***	0.0100	-0.0000497***
	(-10.40)	(1.32)	(-2.70)
age	0.00145	0.0145	-0.0000630*
	(0.17)	(1.34)	(-1.93)
sue	-0.0113***	-0.00870***	-0.000000208
	(-3.23)	(-2.98)	(-0.02)
err	-1.777***	-1.373	0.00496
	(-3.35)	(-1.58)	(1.63)
numest	-0.00263**	0.000234	0.00000522
	(-2.31)	(0.19)	(1.47)
stdev	0.635***	0.0348	0.00223***
	(4.67)	(0.37)	(4.36)
3m return	-0.439***	-0.0519	0.000407**
	(-10.99)	(-1.28)	(2.59)
var return	-51.20***	7.185	-0.419***
	(-2.79)	(0.35)	(-4.72)
eps	0.0290	0.0104	0.0000476
	(1.56)	(0.94)	(0.84)
capital exp	0.255	-0.919**	-0.000110
	(0.91)	(-2.13)	(-0.08)
roa	-0.519*	-0.602***	-0.000723
	(-1.75)	(-2.94)	(-0.63)
herfin	-0.0000257	0.0000246	0.000000333***
	(-1.34)	(0.75)	(3.89)
bm	-0.135***	0.0130	-0.000256**
	(-6.35)	(0.57)	(-2.40)
lnmkt value	0.0734***	0.0295*	0.0000424
	(6.45)	(1.73)	(1.46)
cashratio	0.0495	0.0619*	0.000217*
	(1.40)	(1.83)	(1.85)
leverage	-0.204***	-0.103**	0.00000980
	(-4.46)	(-2.33)	(0.06)
advertising	0.151	0.0765	-0.0000984
	(0.85)	(0.57)	(-0.21)
div yield	1.090**	-1.640***	-0.00278
	(2.22)	(-3.09)	(-1.22)
R^2	0.1696	0.0480	0.1082
N	33878	33861	29821

(table 2.10 continued)

Panel B: Negative SUE

Model	(1)	(2)	(3)
	Amihud's ratio	Liu's lm3	Hasbrouck's trading cost
rela ps	0.0508***	0.0156***	0.0000889***
	(6.41)	(3.55)	(2.85)
nonrela ps	0.0944***	-0.00990	0.000162***
	(10.60)	(-1.32)	(3.77)
age	-0.0238**	-0.00355	-0.0000534
	(-2.42)	(-0.26)	(-1.09)
sue	0.00343	-0.00915*	-0.0000308
	(0.64)	(-1.76)	(-1.19)
err	-4.001***	-0.937	-0.00542
	(-3.23)	(-0.93)	(-0.78)
numest	0.00576***	0.00372**	-0.00000127
	(3.08)	(2.07)	(-0.14)
stdev	0.919***	0.194	0.00426***
	(5.60)	(1.16)	(3.11)
3m return	-0.656***	-0.0505	0.000821***
	(-13.40)	(-0.91)	(2.83)
var return	68.92***	15.65	-0.307***
	(3.93)	(0.86)	(-2.77)
eps	0.0775***	0.0106	0.000587***
	(3.72)	(0.58)	(3.79)
capital exp	0.807**	-0.795**	0.00305*
	(2.19)	(-2.01)	(1.86)
roa	0.682	0.671*	0.00219
	(1.64)	(1.84)	(1.51)
herfin	-0.000142***	-0.0000683**	-0.000000442***
	(-3.86)	(-2.25)	(-2.93)
bm	-0.132***	0.0431	-0.000375***
	(-4.60)	(1.40)	(-2.71)
lnmkt value	-0.0674***	-0.0371*	-0.000114**
	(-5.23)	(-1.78)	(-2.57)
cashratio	-0.0368	-0.0284	0.000416
	(-0.82)	(-0.74)	(1.47)
leverage	-0.0431	-0.0734*	0.000326
	(-0.68)	(-1.86)	(1.34)
advertising	-0.307	-0.154	0.000662
	(-1.37)	(-0.54)	(0.64)
div yield	-4.369***	-0.646	-0.0104***
	(-7.38)	(-0.98)	(-3.55)
R^2	0.2273	0.0829	0.1239
N	16488	16473	14892

Table 2.11 Price Support and Preceding Firm Characteristics

Panel A: Positive SUE and dependent variable is relationship PS			
Model	(1)	(2)	(3)
illd	0.0121**		
	(2.03)		
lm3		-0.00218	
		(-0.38)	
hasbrouck			0.486
			(0.29)
age	0.0172**	0.0173**	0.0180**
	(2.17)	(2.16)	(2.21)
sue	0.0191***	0.0193***	0.0193***
	(3.35)	(3.37)	(3.28)
err	-0.620	-0.620	-0.585
	(-1.36)	(-1.36)	(-1.31)
numest	0.00161	0.00130	0.00107
	(1.30)	(1.12)	(0.93)
stdev	-0.243**	-0.250**	-0.247**
	(-2.10)	(-2.15)	(-2.11)
3m return	0.0806***	0.0693**	0.0721**
	(2.71)	(2.37)	(2.36)
var return	14.27*	13.75	12.49
	(1.72)	(1.60)	(1.23)
eps	0.0123	0.0128	0.0119
	(0.74)	(0.77)	(0.73)
capital exp	0.193	0.174	0.293
	(0.86)	(0.78)	(1.28)
roa	-0.377*	-0.383*	-0.321
	(-1.93)	(-1.98)	(-1.53)
herfin	-0.0000321*	-0.0000330*	-0.0000223
	(-1.81)	(-1.81)	(-1.23)
bm	-0.0195	-0.0168	-0.0190
	(-1.30)	(-1.14)	(-1.37)
lnmkt value	0.0290***	0.0146**	0.0145**
	(3.18)	(2.45)	(2.38)
cashratio	-0.0906***	-0.0956***	-0.0972***
	(-3.48)	(-3.73)	(-4.08)
leverage	0.0367	0.0370	0.0466
	(1.39)	(1.41)	(1.60)
advertising	0.218	0.223	0.239
	(1.41)	(1.43)	(1.60)
div yield	-0.737*	-0.686*	-0.542
	(-1.85)	(-1.73)	(-1.27)
R^2	0.0505	0.0496	0.0512
N	33902	33892	32468

(table 2.11 continued)

Panel B: Positive SUE and dependent variable is independent PS

Model	(1)	(2)	(3)
illd	0.0434***		
	(6.71)		
lm3		-0.00911	
		(-1.02)	
hasbrouck			-1.680
			(-0.86)
age	-0.0207**	-0.0218**	-0.0230**
	(-2.11)	(-2.24)	(-2.33)
sue	0.0184**	0.0187**	0.0174**
	(2.41)	(2.48)	(2.34)
err	0.354	0.313	0.310
	(0.71)	(0.65)	(0.60)
numest	-0.00175	-0.00285*	-0.00299*
	(-1.16)	(-1.94)	(-1.95)
stdev	-0.0333	-0.0785	-0.0515
	(-0.32)	(-0.75)	(-0.48)
3m return	0.0698**	0.0285	0.0172
	(2.05)	(0.84)	(0.51)
var return	-16.81	-20.33*	-12.77
	(-1.61)	(-2.00)	(-1.08)
eps	0.00835	0.00434	0.00468
	(0.59)	(0.30)	(0.33)
capital exp	-1.909***	-1.950***	-1.803***
	(-4.52)	(-4.65)	(-4.36)
roa	0.237	0.241	0.167
	(1.35)	(1.39)	(0.90)
herfin	-0.000121***	-0.000120***	-0.000132***
	(-5.01)	(-4.84)	(-5.21)
bm	0.00363	0.0102	0.0124
	(0.23)	(0.66)	(0.82)
lnmkt value	0.00597	-0.0473***	-0.0432***
	(0.57)	(-6.20)	(-5.54)
cashratio	-0.0816***	-0.105***	-0.119***
	(-2.97)	(-3.71)	(-3.96)
leverage	0.0417	0.0425	0.0356
	(1.21)	(1.24)	(1.06)
advertising	0.350**	0.347**	0.306**
	(2.49)	(2.43)	(2.08)
div yield	-0.967*	-0.722	-0.871*
	(-1.93)	(-1.42)	(-1.69)
R^2	0.0677	0.0669	0.0672
N	33902	33892	32468

(table 2.11 continued)

Panel C: Negative SUE and dependent variable is relationship PS

Model	(1)	(2)	(3)
illd	-0.0186**		
	(-2.25)		
lm3		-0.0201**	
		(-2.03)	
hasbrouck			0.631
			(0.22)
age	-0.0108	-0.00861	-0.0101
	(-0.73)	(-0.58)	(-0.66)
sue	0.00541	0.00619	0.00674
	(0.68)	(0.78)	(0.82)
err	0.195	0.143	0.186
	(0.19)	(0.14)	(0.18)
numest	0.00303	0.00385	0.00382
	(1.09)	(1.43)	(1.41)
stdev	-0.219	-0.195	-0.235
	(-1.20)	(-1.07)	(-1.22)
3m return	-0.130***	-0.118***	-0.109**
	(-3.03)	(-2.73)	(-2.43)
var return	26.31***	27.09***	28.98***
	(2.82)	(2.84)	(2.90)
eps	-0.00225	-0.00126	0.00719
	(-0.10)	(-0.06)	(0.32)
capital exp	-0.660	-0.636	-0.644
	(-1.67)	(-1.59)	(-1.61)
roa	0.362	0.353	0.358
	(1.31)	(1.28)	(1.31)
herfin	-0.0000153	-0.0000162	-0.0000168
	(-0.44)	(-0.47)	(-0.49)
bm	-0.00979	-0.0106	-0.00778
	(-0.42)	(-0.46)	(-0.33)
lnmkt value	-0.0609***	-0.0405***	-0.0419***
	(-4.38)	(-4.15)	(-4.03)
cashratio	-0.0253	-0.00716	-0.00798
	(-0.66)	(-0.19)	(-0.22)
leverage	0.00293	0.000241	0.00799
	(0.07)	(0.01)	(0.19)
advertising	-0.0748	-0.0453	-0.0517
	(-0.30)	(-0.19)	(-0.21)
div yield	-0.431	-0.540	-0.573
	(-0.78)	(-0.99)	(-0.99)
R^2	0.0807	0.0796	0.0838
N	16531	16528	16257

(table 2.11 continued)

Panel D: Negative SUE and dependent variable is independent PS

Model	(1)	(2)	(3)
illd	-0.0108		
	(-0.76)		
lm3		0.00962	
		(0.45)	
hasbrouck			12.53***
			(3.89)
age	-0.0279**	-0.0283**	-0.0271**
	(-2.14)	(-2.16)	(-2.07)
sue	0.00594	0.00640	0.00705
	(0.72)	(0.79)	(0.84)
err	-1.006	-1.169	-0.886
	(-0.99)	(-1.12)	(-0.89)
numest	-0.0000413	0.000859	0.0000610
	(-0.01)	(0.29)	(0.02)
stdev	-0.00922	0.00205	-0.0121
	(-0.05)	(0.01)	(-0.06)
3m return	-0.0879	-0.0836	-0.0634
	(-1.56)	(-1.41)	(-1.09)
var return	12.03	17.18	12.23
	(0.92)	(1.23)	(0.74)
eps	0.0347	0.0346	0.0421*
	(1.46)	(1.40)	(1.77)
capital exp	-1.254***	-1.219***	-1.120**
	(-2.88)	(-2.73)	(-2.39)
roa	-0.512	-0.506	-0.446
	(-1.21)	(-1.20)	(-1.10)
herfin	0.0000944***	0.0000941***	0.0000896***
	(3.45)	(3.28)	(3.20)
bm	0.0751**	0.0813**	0.0796**
	(2.43)	(2.64)	(2.56)
lnmkt value	-0.0491**	-0.0381***	-0.0261**
	(-2.61)	(-2.94)	(-2.02)
cashratio	0.0291	0.0371	0.0408
	(0.80)	(1.02)	(1.11)
leverage	0.149**	0.157**	0.150**
	(2.37)	(2.44)	(2.36)
advertising	0.765***	0.793***	0.752***
	(3.31)	(3.34)	(3.21)
div yield	-0.693	-0.680	-0.627
	(-0.88)	(-0.89)	(-0.83)
R^2	0.0981	0.0953	0.0996
N	16531	16528	16257

This table provides the regression of price support measures (PS) on preceding firm characteristics. Panel A and B show the results for positive SUE. Panel C and D show results for negative SUE. The definitions of all variables are the same as those in Table 2.10. T-statistics are in parenthesis and the symbols: *, **, and *** denote statistical significance at 10%, 5% and 1% respectively.

Panel D of Table 2.11 shows a different story for the independent institutions. The positive and significant coefficient on hasbrouck (12.53) indicates that independent institutions tend to choose firms with lower trading cost when these firms have negative earnings shocks. To sum up, the trading incentives for relationship and independent institutions are different.

We also use the Logit Model to examine what types of firms are more likely to become connected firms and by their relationship institutions. The dependent variable is 1 if firms are connected firms and 0 otherwise. We estimate the model with stock liquidity and firm characteristics. In Table 2.12, the coefficients on illd (-0.391), lm3 (-0.274) and hasbrouck (-34.64) indicate that relationship institutions hold firms with better liquidity.

This finding doesn't contradict with the previous finding (Table 2.11) that illiquid client firms receive more support from relationship institutions. They are two different concepts. Before institutional investors choose which firms to begin underwriting/ lending business and become their shareholders, they will prefer more liquid firms due to risk averse. After the institutions build up the relationship and those firms become connected firms, financial institutions will want to keep good relationship with their existing clients and support them when they need liquidity. The coefficients in Table 2.11 are all consistent with our forecasts.

From the Logit model, smaller firm age increases the likelihood of being a connected firm. This can be explained by the need of cash for younger firms in the early stage. It is obvious that institutions tend to have more underwriting/lending business with younger firms. Similarly, institutions tend to have underwriting/lending service and hold firms with higher capital expenditure ratios, lower cash ratio, higher leverage ratio and lower dividend yield. These firms should raise capital more often and need the service from the institutions.

In the Logit model, the coefficients only reveal the direction of association between the dependent variable and explanatory variables. To evaluate the economic relevance, we need to

Table 2.12 Determinants of the Connected Firms

Model	(1)	(2)	(3)
illd	-0.391***		
	(-29.29)		
lm3		-0.274***	
		(-13.15)	
hasbrouck			-34.64***
			(-11.76)
age	-0.174***	-0.167***	-0.164***
	(-10.57)	(-10.24)	(-9.96)
err	0.0427	0.0274	0.00331
	(0.33)	(0.21)	(0.03)
numest	-0.0277***	-0.0126***	-0.0120***
	(-9.71)	(-4.49)	(-4.18)
stdev	-0.0775	0.0362	0.0642
	(-0.81)	(0.38)	(0.67)
3m_return	-0.0396	0.238***	0.202***
	(-0.95)	(5.91)	(4.91)
var_return	217.6***	237.9***	265.6***
	(19.52)	(21.33)	(22.91)
eps	-0.0106	0.0198	-0.00305
	(-0.49)	(0.92)	(-0.14)
capital_exp	3.388***	3.696***	3.546***
	(6.96)	(7.57)	(7.21)
lnmkt_value	0.193***	0.634***	0.619***
	(9.59)	(49.69)	(46.51)
herfin	0.000127***	0.000173***	0.0000974**
	(2.86)	(3.56)	(2.10)
bm	0.490***	0.456***	0.455***
	(16.30)	(15.31)	(15.20)
cashratio	-0.277***	-0.144***	-0.120***
	(-7.39)	(-3.96)	(-3.24)
leverage	2.336***	2.253***	2.243***
	(38.26)	(37.28)	(36.64)
div_yield	-8.393***	-10.99***	-11.21***
	(-10.51)	(-13.80)	(-13.96)
N	48836	48825	47333
Pseudo R^2	0.1579	0.1489	0.1448

This table reports Logit model's estimation of the determinants of probability that a firm will be held by its relationship institution and become the connected firm. The definitions of all independent variables are the same as those in Table 2.10. T-statistics are in parenthesis and the symbols: *, **, and *** denote statistical significance at 10%, 5% and 1% respectively.

check Table 2.13 which provides the marginal effect for every explanatory variable. We are interested in the stock liquidity. On average, one unit increase in the firm's Amihud's price impact reduces the likelihood of being selected as the connected firm by 8.79% unit and one additional unit in LM3 reduces the likelihood by 6.19% unit.

2.4.6 Robustness Check: Sample Selection

The comparison between connected and unconnected firms above may suffer from sample selection problem. It is possible that the observed price support effect is driven not by the trading of relationship institutions but by different firm characteristics between connected and unconnected firms. To address this concern, we examine the effect of price support within connected firms and focus on negative earnings surprises.

Panel A of Table 2.14 reports the PS measure when connected firms are sorted into quintiles with their past four quarter's average SUE. Panel A shows that, when the average SUE is at the bottom quintile (lowest SUE), both relationship and independent institutions buys connected firms. However, there are more buying from relationship institutions than from independent institutions since the absolute value of relationship PS is higher. Relationship institutions provide more supportive activities than independent institutions, which is consistent with the relationship insurance hypothesis.

Panel B of Table 2.14 compares the trading behaviors of independent institutions on connected firms and unconnected firms. Compared to connected firms, unconnected firms receive more significant selling pressures from the independent institutions when they have negative earnings shocks.

2.4.7 Abnormal Stock Performance

To measure the stock return's impact of the trading behaviors from relationship institutions, we estimate cumulative monthly abnormal stock returns by applying event study technique. We

Table 2.13 Marginal Effect

Model	(1)		(2)		(3)	
	marginal	Z-value	marginal	Z-value	marginal	Z-value
illd	-0.0879	-29.1 ***				
lm3			-0.0619	-13 ***		
hasbrouck					-7.7660	-11.7 ***
age	-0.0391	-10.6 ***	-0.0377	-10.3 ***	-0.0369	-9.97 ***
err	0.0096	0.33	0.0062	0.21	0.0007	0.03
numest	-0.0062	-9.7 ***	-0.0029	-4.49 ***	-0.0027	-4.18 ***
stdev	-0.0174	-0.81	0.0082	0.38	0.0144	0.67
3m_return	-0.0089	-0.95	0.0537	5.91 ***	0.0453	4.91 ***
var_return	48.9394	19.6 ***	53.6580	21.4 ***	59.5463	23 ***
eps	-0.0024	-0.49	0.0045	0.92	-0.0007	-0.14
capital_exp	0.7620	6.96 ***	0.8335	7.57 ***	0.7949	7.21 ***
lnmkt_value	0.0435	9.62 ***	0.1430	50.7 ***	0.1387	47.3 ***
herfin	0.00003	2.86 ***	0.00004	3.56 ***	0.00002	2.1 **
bm	0.1103	16.3 ***	0.1027	15.3 ***	0.1020	15.2 ***
cashratio	-0.0623	-7.38 ***	-0.0325	-3.96 ***	-0.0269	-3.24 ***
leverage	0.5254	38.4 ***	0.5082	37.4 ***	0.5029	36.8 ***
div_yield	-1.8878	-10.5 ***	-2.4793	-13.8 ***	-2.5124	-14 ***

This table presents the marginal changes in the probability that the shares of a firm will be held by its relationship institutions. Estimations are from the Logit Model of Tables 2.12. The definitions of the variables are the same as those in Table 2.10. The symbols: *, **, and *** denote statistical significance at 10%, 5% and 1% respectively.

Table 2.14 Price Support within Connected Firms

Panel A: support for connected firms from relationship and independent institutions						
Rank of average 4 quarter's SUE		1(Low)	2	3	4	5(High)
Connected firm	Rela_PS	-0.193	-0.101	-0.002	0.224	0.450
Connected firm	Nonrela_PS	-0.091	-0.069	0.024	0.161	0.162
	Difference	-0.102**	-0.032	-0.026	0.064**	0.288***
		(-2.21)	(-1.08)	(-1.37)	(2.00)	(4.59)
Panel B: support for connected firms and unconnected firms from independent institutions						
Rank of average 4 quarter's SUE		1(Low)	2	3	4	5(High)
Connected firm	Nonrela_PS	-0.091	-0.069	0.024	0.161	0.162
Unconnected firm	Nonrela_PS	0.049	-0.036	0.067	0.192	0.262
	Difference	-0.139***	-0.033	-0.043**	-0.031	-0.100*
		(-3.41)	(-1.33)	(-2.14)	(-1.11)	(-1.94)

This table reports the price supporting behavior of institutions. Each quarter, companies are sorted into quintiles with their past four quarter's average SUE. Rela_PS measures the price supporting from relationship institutions and Nonrela_PS measures that from independent institutions. A smaller PS measure (more negative value) when SUE is negative indicates more buying from institutions. Panel A compares the price support from relational institutions and independent institutions within connected firms. Panel B compares the trading behaviors of independent institutions between connected and unconnected firms. T-statistics are in parenthesis. The symbols: *, **, and *** denote statistical significance at 10%, 5% and 1% respectively.

conduct Fama and French 3-factor model with momentum using CSRP value-weighted index. Different returns windows are reported in Table 2.15. For window (+1, +6) in Panel A, quintile 5 firms receiving more buying from relationship institutions have smaller abnormal returns than quintile 1 firms (1.08% vs. 4%) in the six month period. This is consistent with the previous results that connected firms receiving more support from relationship institutions experience less price declines than quintile 1 firms. The patterns are even more dramatic in window (-3, +6).

To illustrate the price impact between firms with and without support, we compute a pseudo price around earnings announcement. Suppose the market is efficient and the stock price in month 6 after the earnings announcement represents the true value of the company. If we assume the stock price in month 6 is \$100, we can use the abnormal return to infer the pseudo stock price[7] in month 1. Table 2.15 shows the pseudo price around earnings announcement (month 1) and one quarter earlier (month -3). Comparing the prices between quintile 1 and quintile 5, we can infer the price impact of institutional trading. The price impact of window (+1, +6) and (-3, +6) are \$2.78 (=98.93-96.15) and \$4.41 (=97.48-93.34) respectively. Similar price impacts are found in Panel B when the firms are sorted based on the buying of independent institutions. The corresponding price impacts are \$2.79 and \$2.54. The difference between \$4.41 and \$2.54 is economically substantial. It indicates that the buying of relationship institutions provides stronger price impact when firms experiencing negative earnings surprises. Furthermore, this support of relationship institutions is not explained by information since those supported firms have worse stock returns. This finding is consistent with the relationship insurance hypothesis.

2.5 Conclusion

Financial conglomerates have more information advantage after they are allowed to combine different business lines. When financial institutions hold their client firms' stocks, they

[7] The following equation for the pseudo price (P_0) of quintile 1 in month 1 should hold: $(100-P_0)/P_0=1.08\%$.

Table 2.15 Price Support Measure and Stock Abnormal Return

Panel A: Sorting by rela_PS						
rank	5(Strong)	4	3	2	1 (Weak)	S-W
Rela_ps	-1.617	-0.848	-0.179	0.525	1.424	
Nonrela_ps	-0.045	-0.088	-0.099	-0.130	-0.175	
[0, 0]	1.10%	0.37%	0.14%	1.03%	1.44%	-0.34%
[+1, +3]	0.63%	0.42%	1.33%	1.78%	1.68%	-1.05%
[+4, +6]	0.46%	0.24%	0.23%	1.01%	2.35%	-1.89%**
[+1, +6]	1.08%	0.66%	1.56%	2.78%	4.00%	-2.92%***
[-3, +6]	2.59%	1.41%	2.17%	4.67%	7.14%	-4.55%***
Pseudo price (month +1)	98.93	99.34	98.46	97.30	96.15	
Price impact (relative to rank 1)	2.78					
Pseudo price (month -3)	97.48	98.61	97.88	95.54	93.34	
Price impact (relative to rank 1)	4.41					
Panel B: Sorting by nonrela_PS						
Rank	5(Strong)	4	3	2	1 (Weak)	S-W
Nonrela_PS	-1.418	-0.681	-0.128	0.429	1.260	
Rela_PS	-0.040	-0.092	-0.167	-0.195	-0.199	
[0, 0]	0.19%	0.62%	0.63%	0.98%	1.65%	-1.46%***
[+1, +3]	1.32%	0.71%	0.20%	0.96%	2.67%	-1.35%*
[+4, +6]	0.46%	0.80%	0.49%	0.44%	2.12%	-1.66%**
[+1, +6]	1.77%	1.50%	0.69%	1.39%	4.74%	-2.97%***
[-3, +6]	3.85%	3.29%	1.30%	2.88%	6.67%	-2.82%*
Pseudo price (month +1)	98.26	98.52	99.31	98.63	95.47	
Price impact (relative to rank 1)	2.79					
Pseudo price (month -3)	96.29	96.81	98.72	97.20	93.75	
Price impact (relative to rank 1)	2.54					

This table reports the relationship between the PS measures and stock's cumulative abnormal return estimated from the Fama and French 3-factor model with momentum factor. The sample only includes connected firms whose previous 4 quarter's SUEs are negative. Firms are sorted into quintile based on the price support measure from relationship institutions (Panel A) and independent institutions (Panel B) over the previous 4 quarters. Month 0 is the month when earnings are announced and the corresponding windows are denoted in the brackets. Pseudo prices in month -3 and month 1 are computed by assuming the stock's price of month 6 is $100. The price impact measures the difference of pseudo stock price (in month +1 or -3) between quintile 5 and 1. The symbols: *, **, and *** denote statistical significance at 10%, 5% and 1% respectively.

may exploit the private information obtained from their affiliated banks to make profit or support their clients to maintain good relationships for future business opportunity. This paper studies this issue by examining the impact of institutions' trading activities on their client firms around earnings announcements periods.

The empirical findings support the relationship insurance hypothesis, rather than the information advantage hypothesis. Relationship institutions, on average, support their client firms when these firms have negative earnings surprises. Such activities also discourage selling pressures from independent institutions. Furthermore, price support from relationship institutions can mitigate downward swing of their client firms' stock prices and the post-earnings-announcement-drifts are less pronounced. Finally, the price support from relationship institutions is more effective than that of independent institutions and relationship institutions tend to support their client firms when they need liquidity.

This study contributes to literature on financial institutions by studying the non-intermediary role of financial conglomerates in the capital markets. The findings can provide general implications for asset pricing literature. Inactive institutional relationship can be considered a risk factor because supportive institutional relationship can smooth out temporary negative shocks while firms without such relationship would have incurred the price swing. Moreover, financial institutions can also mitigate the noise in the market and enhance the stock prices of their clients.

CHAPTER 3 THE EFFECT OF FINANCIAL INSTITUTION'S DUAL HOLDINGS OF DEBT AND EQUITY SECURITIES ON STOCK LIQUIDITY

3.1 Introduction

Institutional investors play an important role and have a great impact on the U.S. equity market. According to Agarwal (2007), institutional investors held almost 65% of shares for firms listed in NYSE and AMEX in 2005 and their holdings grow at a 6.3% annual rate over the past 25 years. Although institutional investors help to improve corporate governance and enhance shareholders' benefit, they also bring some costs to the market. For example, large institutional investors, especially those financial conglomerates with investment banking and commercial banking divisions, have advantages in accessing and processing information of their client firms. Since these institutions own more private information, their counterparty market makers will ask for a wider bid-ask spread when they trade with these institutions. Hence, this higher adverse selection cost can reduce the liquidity of the stocks held by big institutional investors.

On the contrary, informed institutions can improve stock liquidity. When stocks are held by different informed institutions, stock prices should reflect information more quickly due to the competition among these informed institutions. Furthermore, increases in institutional ownership can also induce more subsequent analyst followings and create a better information environment. Thus, the financial analysts can provide more correct earnings forecast and prompt recommendation. Investors will be more willing to trade these stocks and improve the stock liquidity because of better information environment.

Stock liquidity is an important issue in the financial market and academic research. The effect of informed traders on stock liquidity and price efficiency has attracted many studies in the literature. Although many studies have examined the empirical relationship between total institutional holdings and stock's liquidity, the findings are mixed. Previous researchers usually

use small datasets or narrow time period to examine the effect of institutional investors on liquidity. The disadvantage of using shorter time frame is the difficulty to control for unobserved firm-specific effects that simultaneously influences institutional ownership and liquidity and the endogenous problems between them (Agarwal, 2007). In this paper, we use quarterly data from 1990 to 2004 with panel data regressions to examine the relation between the liquidity and institutional holdings. The panel data spanning 60 quarters helps to examine not only the variation of liquidity among firms, but also the relations between institutional holdings and liquidity at firm level over time.

Previous research only examines the relationship between total institutional holdings and stock's liquidity. To extend the study, we focus on the impact of relationship institutions on stock liquidity. Specifically, we study the impact on stock liquidity when firms are held by their relational institutions whose affiliated groups have lending or underwriting business with these firms. Compared to independent institutions, relationship institutions can obtain more private information of their clients from the lending/underwriting business. For example, in addition to screening during loan applications, banks can monitor the firms by sitting on the boards and gather more information (Santos and Rumble, 2006). Therefore, these relationship institutions are more likely to obtain private information about their client firms from the affiliated banks. When they trade the stock of their client firms, the counterparty market maker will request a higher bid-ask spread since these firms have higher probability of informed trading.

On the other hand, when relationship institutions are willing to hold shares of their client firms, they should have confidence in the prospect of these companies. This will provide a certification effect which signals the quality of these client firms and enhances investors' incentives to buy these stocks. Liquidity has many dimensions and it is not easy to use a single measure to capture all of its aspects. Previous studies focus on the bid-ask spread and quote

depth. In this chapter, we use three liquidity measures: Hasbrouck's (2009) effective trading cost, Amihud's (2002) illiquidity ratio, and Liu's (2006) illiquidity measure (LM3) to conduct the empirical study. In general, illiquid firms should benefit more from the certification effect of relational institutional investors.

The evidence in this chapter shows that consistent with information improvement hypothesis, firms with higher aggregated institutional holdings exhibit better liquidity. However, due to the adverse selection problem, firms with higher holdings of relationship investors will end up with lower liquidity. Specifically, these firms have higher trading cost, more non-trading days and larger price impact.

The rest of the chapter is organized as followings. Section 3.2 presents relevant literature and develops the hypothesis. Section 3.3 describes the sources of data. Section 3.4 discusses the empirical evidence and Section 3.5 concludes.

3.2 Literature Review and Hypothesis Development

3.2.1 Literature Review

The trading of institutional investors has direct and indirect impacts on the information environment and stock liquidity. For example, institutions are more "informed" and "sophisticated" than individual investors and their trading may convey superb information. They are likely to sell stocks when they know some bad news and buy stocks when they have good news in advance. This creates an adverse selection problem. Glosten and Milgrom (1985) propose a model to explain the effect of the presence of traders with superior information on the bid-ask spread. In their model, the competitive market makers will lose profit from trading with informed traders and make gains from trading with uninformed traders. Because market makers should have zero profit in a competitive market, this implies that the gains of the informed trader are at the expense of the uninformed trade. Market makers will charge a bigger spread when they

are more likely to trade with informed traders. From this point of view, market makers will request higher spreads when they trade firms with higher institutional holdings to compensate for the higher probability of trading with informed traders. As a result, this will reduce the stock liquidity. Easley and O' Hara (1987) also claim that in the presence of informed investors, the risk-neutral market maker will request a higher bid-ask spread due to the adverse selection risk.

However, informed institutions can play another role on stock liquidity. When stocks are held by multiple informed institutions, stock prices should reflect information more quickly due to the competition among these informed institutions. Brennan and Subrahmanyam (1995) also claim that increases in institutional ownership may induce subsequent increase in the number of analyst following and change the information environment. They document that the increase on institution holding may narrow stock spread indirectly since the increase in analyst following can reduce the information asymmetry. Because stock prices are more informational efficient now, investors will have more confident that the stock transactions are at a "fair price" and increase their interests to trade these stocks, thus improving stock liquidity. Previous research focuses on the relationship between total institutional holdings and stock's liquidity. For instances, Sarin, Shastri and Shastri (2000) document that higher institutional holding is associated with wider spreads and smaller quoted depth. Using a sample of 786 Amex and NYSE listed firms, they find that both higher institutional and insider ownership are positively related to wider spreads and smaller quoted depth. However, the reason is different. They claim that the loss of liquidity for higher insider trading is caused by higher adverse selection costs while the decrease in liquidity for higher institutions results from a higher inventory carrying costs.

In contrast, Tinic (1972) and Hamilton (1978) show a negative relationship between institutional holdings and bid-ask spread for NYSE and NASDAQ stocks respectively. Jenning, Schnatterly and Seguin (2002) empirically examine whether changes in institutional holding

adversely affect the quoted bid-ask spread of NASDAQ securities. Surprisingly, they find that the stock's spread is negatively associated with levels of institutional ownership and confirm that changes in institutional holding Granger-cause changes in spreads. They also show that the proportion of adverse selection in spread decreases when the institutional ownership increases. Rubin (2007) finds that liquidity is positively related to total institutional holdings but negatively related to institutional block holdings. He claims that the higher level of institutional ownership proxies for more trading activity which improves the stock liquidity while more concentration of ownership implies a higher adverse selection problem which reduces the liquidity.

There are other empirical studies which haven't found find any relationship between the spread and institutional holdings. For example, Fabozzi (1979) examines 239 OTC firms and finds no evidence of the relationship between spread and institutional holdings. Chiang and Venkatesh (1988) also fail to find any statistical relationship between spread and institutional ownership for 56 NYSE securities. Recently, Agarwal (2007) finds a U-shape relationship between the fraction of shares of a company held by institutional investors and its stock liquidity.

3.2.2 Hypothesis Development

Previous literature shows that the relationship between the institutional ownership and stock liquidity is still a puzzle and need to be solved. We can summarize the existing findings into the following hypotheses.

H_{1a}: All else are equal, firms with higher institutional holdings will have lower liquidity. (Adverse selection hypothesis)

H_{1b}: All else are equal, firms with higher institutional holdings will have better liquidity. (Information improvement hypothesis)

The total impact of institutional holdings on stock liquidity depends on the net effect of adverse selection and information improvement. We use panel data spanning 60 quarters to

examine the net effect. This method considers not only the variation of liquidity among firms, but also the relations between institutional holdings and liquidity at firm level over time.

In additional to overall institutional holdings, we also examine the effect when firms are held by their relationship institutions whose affiliated groups have lending or underwriting business with these firms. We expect two different effects on the stock liquidity. First, since relational institutions are more likely to obtain private information about their client firms from their affiliated banks, these client firms have higher probability of informed trading. Hence, market makers will request a higher bid-ask spread, thus reducing the liquidity of these stocks. This is similar to the adverse selection hypothesis mentioned above. This is can be regarded as the following hypothesis.

H_{2a}: All else are equal, firms with higher relationship institutions' holdings will have lower liquidity. (Adverse selection hypothesis)

On the other hand, when relationship institutions hold more shares of their client firms, they show confidence in the prospect of their client firms. This can signal the quality of these clients and provide a "certification effect", which will enhance investors' interests on these companies and improve their stock liquidity. This effect can be summarized as the following hypothesis.

H_{2b}: All else are equal, firms with higher relationship institutions' holdings will have higher liquidity. (Certification effect hypothesis)

The certification role of the financial institution has been widely documented in the literatures. For example, Puri (1996) shows that investors are willing to pay higher prices for securities underwritten by commercial banks than by investment banks since these securities are certificated by commercial banks. Therefore, it is an empirical question between certification effect and adverse selection problem.

Our study is related to the reseatch of Dass and Massa (2006). They argue that the privileged position of bank will increase information asymmetry and adverse selection for the stocks of borrowing firms. The information disadvantage reduces the incentive of other investors to trade the stocks. They find that a more intense relationship between financial conglomerates and borrowing firms increases the stock's illiquidity and the information asymmetry, thus lowering the stock's trading volume and the investment in the firm by institutional investors.

Liquidity has many dimensions and most previous studies focus on the bid-ask spread and quote depth. In this paper, we examine three liquidity measures: Hasbrouck's (2009) effective trading cost, Liu's (2006) illiquidity measure (LM3) and Amihud's (2002) illiquidity ratio to conduct the empirical study. Hasbrouck's (2009) effective trading cost measure is based on Roll's (1984) model while Hasbrouck uses the Gibbs sampling to estimate the effective trading cost. Liu's (2006) LM3 measure[8] is a new liquidity measure which captures multiple dimensions of liquidity. It uses infrequent trading information to proxy for illiquidity and effectively explains the cross-section stock return. Amihud's (2002) illiquidity ratio focuses on price impact and is related to Kyle's (1985) λ, the price change induced by order flow. The goal is to examine how relationship institutions affect stock liquidity of their clients in different dimensions.

3.3 Data and Sample Description

3.3.1 Data

The sample used in this study consists of all common stock listed in NYSE, AMEX and NASDAQ during the period 1990-2004. We eliminate Prime, closed-end fund, real estate investment trust (REIT), American Depository Receipt (ADR) and foreign companies from this study. There are more observations (332,383 firm-quarters) than the first essay since we do not

[8] Liu's measure has been used in other studies including Lin, Singh and Yu (2009), Liu (2008) and Lin, Sanger and Yang (2007).

require sample firms to have 8 consecutive quarter earnings as we did when constructing SUE in the chapter 2.

There are three liquidity measures. The first one is Hasbrouck's (2009) Gibbs estimates[9] for liquidity, which is obtained from Roll's (1984) model. The annual measure for the effective trading cost is highly correlated with effective spread measure based on intraday trading data. Compared to Roll's effective spread[10], this measure can overcome the estimation errors in the first-order serial covariance of returns.

The second one is Liu's (2006) illiquidity measure (LMx) defined as

$$\text{LMx} = [\text{Number of zero daily volumes in prior x months} + \frac{1/(x - \textit{month turnover})}{\textit{Deflator}}] \times \frac{21x}{\textit{NoTD}} \quad (3.1)$$

where x-month turnover is turnover over the previous x months, calculated as the sum of daily turnover over the previous x months; NoTD is the total number of trading days in the market over the prior x month. We choose LM3 to match the quarterly institutional holding data. LM3 is calculated at the end of each quarter for every stock. Infrequently traded stocks will have higher values for this measure. LM3 is the standardized turnover-adjusted number of zero daily trading volume over the 3 months. It captures multiple dimensions of liquidity (trading quantity, speed and cost) and places particular weight on trading speed, which most liquidity measures largely ignore. In practice, it is highly correlated with other liquidity measures such as bid-ask spread and turnover measures.

The third liquidity measure is Amihud's (2002) illiquidity ratio (price impact measure) which can be computed with the following equation:

$$illd = \frac{1}{Days_{i,q}} \sum_{d=1}^{Days_{i,q}} \frac{\left|R_{i,q,d}\right|}{price_{i,q,d} * Vol_{i,q,d}} \quad (3.2)$$

[9] We appreciate Joel Hasbrouck for providing the Gibbs estimate of effective trading cost on his website.
[10] We also use Roll's (1984) effective spread to test the relationship and the conclusion does not change.

In equation 3.2, $Days_{i,q}$ is the number of trading days for stock i in quarter q; $R_{i,q,d}$, $price_{i,q,d}$ and $Vol_{i,q,d}$ are the daily return, closing price and trading volume of stock i on day d of quarter q. This measure is the price response to one dollar of trading volume. Amihud (2002) and Hasbrouck (2009) claim that this measure is positively associated with high-frequency measures of price impact in microstructure data. Following the method of Dass and Massa (2006), we rescale this measure by a factor of 10^7 and take the logarithm.

3.3.2 Description of the Sample

Table 3.1 shows the firm characteristics of observations in this chapter, which do not require firms to have 8 consecutive quarter earnings. As shown in Panel A, firms held by relationship institutions tend to have better liquidity. For example, these connected firms have lower Roll's effective spread, Amihud's illiquidity ratio, Hasbrouck's trading cost measure and Liu's illiquidity measure. This is consistent with the "certification effect hypothesis". However, firms held by relational institutions also have more aggregate institutional holding. We can not rule out the possibility that this association may be caused by "information improvement hypothesis". We need to control other variables in the regression model if we want to extract the true relationship between the stock liquidity and relationship institutions.

3.4 Empirical Results

3.4.1 Fixed-Effects Regression Model

In this section, we examine the impacts of institutional ownership on different liquidity measure. We rank the samples into quintiles according to total institutional holding. In Table 3.2, there is a monotonic and positive relationship between stock liquidity and institutional ownership. For example, firms with higher institutional ownership tend to have a smaller Amihud's price impact measure, Hasbrouck's effective trading cost measure and Liu's illiquidity measure. This preliminary result suggests that although institutional investors have two different effects on the

Table 3.1 Summary Statistics

	Mean Value				Median Value			
	All	Connected	Unconnected	Difference	All	Connected	Unconnected	Difference
Prc	17.85	25.16	14.40	10.75***	12.63	20.20	9.88	10.33***
B/M	0.72	0.85	0.65	0.20***	0.52	0.45	0.55	-0.10***
Leverage	0.56	0.56	0.56	0.00	0.55	0.57	0.53	0.04***
Turnover	0.3194	0.4316	0.2648	0.1668***	0.1771	0.2659	0.1381	0.1278***
Cum_return	0.0558	0.0526	0.0574	-0.0048***	0.0194	0.0275	0.0156	0.0119***
Var_return	0.0021	0.0017	0.0024	-0.0007***	0.0010	0.0008	0.0012	-0.0004***
Herfin	171.54	224.18	145.22	78.96***	93.09	157.22	63.29	93.93***
Numest	2.61	5.18	1.39	3.79***	1.00	4.00	0.00	4.00***
Rollsp	0.0124	0.0074	0.0147	-0.0074***	0.0078	0.0038	0.0104	-0.0067***
Illd	0.2996	-2.0899	1.4252	-3.5151***	0.4513	-2.3954	1.6607	-4.0562***
LM3	5.1598	0.6719	7.2123	-6.5405***	0.0000	0.0000	0.0001	-0.0001***
hasbrouck	0.0134	0.0064	0.0166	-0.0103***	0.0075	0.0043	0.0108	-0.0065***
Number of observations	332,383	110,773	221,610		332,383	110,773	221,610	

This table presents the summary statistics for the sample of 332,383 firm-quarters for the liquidity study in chapter 3. All firms are divided into connected and unconnected companies, depending on whether their shares are held by relationship institutions whose affiliated banks have lending or underwriting relation with those companies. The definitions of variables are as followings: Prc is the stock price at the end of each quarter just prior to the earnings announcement; B/M is the book value divided by the market value; Leverage is firm's total debt divided by market value of its equity plus the book value of debt and preferred stock minus deferred tax; Turnover is the trading volume turnover over the previous quarter; Cum_return is the accumulated monthly stock return over the previous quarter; Var_return is the variance of daily stock return over the previous quarter; Herfin is the Herfindahl index, which is calculated from all institutions' holding and measures the concentration of ownership; Numest is the number of analyst following; Rollsp is the Roll's (1984) effective spread; Illd is the Amihud's (2002) illiquidity ratio which is rescaled by 10^7 and taken by logarithm; LM3 is Liu's (2006) illiquidity measure; hasbrouck is Hasbrouck's (2009) effective trading cost. The symbols: *, **, and *** denote statistical significance at 10%, 5% and 1% respectively.

Table 3.2 Relationship between Institutional Ownership and Liquidity

	1 (lowest)	2	3	4	5 (highest)	Difference (5-1)
held_pct	3.09%	13.29%	27.58%	46.82%	72.62%	69.53%***
illd	3.030	1.752	0.458	-1.301	-2.962	-5.992***
LM3	11.835	6.655	3.288	1.163	0.434	-11.401***
hasbrouck	0.025	0.017	0.012	0.007	0.005	-0.02***
rollsp	0.021	0.015	0.011	0.007	0.005	-0.016***
rela_pct	0.14%	0.60%	1.26%	2.33%	5.14%	5.00%***
nonrela_pct	2.96%	12.70%	26.33%	44.49%	67.48%	64.52%***
ih1	0.63%	2.05%	4.06%	7.29%	10.23%	9.60%***
ih2	0.13%	0.64%	1.60%	3.25%	5.55%	5.42%***
ih3	0.26%	1.91%	4.80%	9.02%	17.57%	17.31%***
ih4	1.92%	7.80%	15.06%	23.40%	32.96%	31.04%***
ih5	0.16%	0.89%	2.07%	3.85%	6.31%	6.15%***

This table reports the relationship between the institutional holding and stock liquidity. All samples are divided into quintile according to the aggregate institutional holdings. Variables are defined as the followings: held_pct is the total holding of institutional investors; illd is the Amihud's (2002) illiquidity which is rescaled by 10^7 and taken by logarithm; LM3 is Liu's (2006) illiquidity measure; hasbrouck is Hasbrouck's (2009) effective trading cost; rollsp is the Roll's (1984) effective spread; rela_pct and nonrela_pct are the holding of relationship and independent investors; ih1, ih2, ih3, ih4 and ih5 are the holding of banks, insurance companies, investment companies, investment advisors and other institutions in the firm. The symbols: *, **, and *** denote statistical significance at 10%, 5% and 1% respectively.

information environment, the effect of information improvement is greater than that of adverse selection. This preliminary result is consistent with previous work of Jenning, Schnatterly and Seguin (2002) although they only use the NASDAQ firms.

Next, we focus on the impact of relationship institutions on their clients' stock liquidity with the Fixed-effects regression. The advantage of Fixed-effects regression is its ability to consider the unobserved firm effects. The dependant variables (Liq_i) are Amihud's price impact measure, Hasbrouck's effective trading cost measure and Liu's illiquidity measure respectively.

The full model can be expressed as following:

$$\begin{aligned} Liq_i = {} & \beta_0 + \beta_1 held\_pct_i + \beta_2 dum\_rela_i + \beta_3 rela\_pct_i + \beta_4 leverage_i \\ & + \beta_5 cum\_return_i + \beta_6 prc_i + \beta_7 lnsize_i + \beta_8 (B/M)_i + \beta_9 turnover_i \\ & + \beta_{10} var\_return_i + \beta_{11} herfin_i + \beta_{12} numest_i + \beta_{13} advertising_i + e_i \end{aligned} \qquad (3.3)$$

The main independent variables are as followings:

held_pct: the aggregate percentage holding by all institutions.

dum_rela: equal to 1 when the firm is a connected firm and 0 when the firm is unconnected.

rela_pct: the aggregate percentage holding by relationship institutions.

Stock liquidity may be related to firm's other characteristics. Following the previous literatures, we also control the following variables in the regression: leverage level, past stock return, stock price, firm size, book-to-market ratio, stock trading volume turnover, return volatility, Herfindahl index, the number of analyst followings and advertising cost.

The definitions of these control variables are:

leverage: firm's total debt divided by market value of its equity plus the book value of debt and preferred stock minus deferred tax.

cum_return: the three-month cumulative return before the announcement.

prc: the stock price at the end of each quarter just prior to its earnings announcement.

lnsize: the log market value of each firm at the end of each quarter just prior to its earnings announcement.

B/M: the book value divided by the market value at the end of each quarter prior to the earnings announcement.

turnover: the trading volume turnover in the previous quarter.

var_return: the variance of return in previous quarter.

herfin: the Herfindahl index, which is calculated from all institutions' holding and measures the concentration of ownership.

numest: the number of analyst followings before the announcement.

advertising: the advertising expense divided by total asset.

Table 3.3 reports the correlation matrix between explanatory variables in the Fixed-effects regressions. It shows firm size is positively related to institutional holding, stock price and analyst followings. Also, whether firm is connected is positively related to the aggregate institutional holdings.

3.4.2 Regression of Hasbrouck's Effective Trading Cost Measure

Table 3.4 presents the result for Hasbrouck's trading cost measure. Panel A and B show the results for NYSE & AMEX firms and NASDAQ firms respectively. Since institutions tend to buy high liquidity stocks, potential endogenous problem may exist between liquidity and institutional holding. Following Kale and Loon (2008), we use Ranks[11] as the instrument variable for institutional holding (held_pct) to solve the potential endogenous problem between institutional holding and stock liquidity. The instrument variable needs to be valid and relevant. When we use Ranks, the F statistics of the joint significance in the first stage equation are all greater than 10, suggesting Ranks is a suitable instrument variable for institutional holdings.

[11] *RANK* is a dummy variable which equals 1 if a stock has an S&P stock ranking (Compustat item #282) and 0 otherwise.

Table 3.3 Correlation Matrix of Explanatory Variables

	held_pct	dum_rela	rela_pct	leverage	cum_return	prc	lnsize	B/M	turnover	var_return	herfin	numest	advertising
held_pct	1.00												
dum_rela	0.46	1.00											
rela_pct	0.22	0.31	1.00										
leverage	-0.03	0.00	0.01	1.00									
cum_return	-0.01	-0.01	0.03	0.00	1.00								
prc	0.39	0.24	0.09	0.03	0.10	1.00							
lnsize	0.66	0.51	0.17	0.02	0.05	0.59	1.00						
B/M	0.00	0.00	0.01	0.00	0.00	0.00	0.00	1.00					
turnover	0.18	0.14	0.06	-0.07	0.08	0.07	0.15	0.00	1.00				
var_return	-0.13	-0.05	-0.02	-0.03	0.13	-0.12	-0.17	0.00	0.12	1.00			
herfin	0.45	0.10	0.11	0.00	-0.01	0.11	0.12	0.00	0.00	-0.03	1.00		
numest	0.51	0.40	0.12	0.00	-0.02	0.38	0.67	0.00	0.17	-0.08	0.05	1.00	
advertising	-0.01	-0.01	0.00	0.07	0.00	-0.02	-0.01	0.00	0.03	0.02	0.00	-0.01	1.00

The table presents the correlation matrix of the explanatory variables in the regression analysis. The definitions of all variables are as follows: held_pct is the aggregate institutional holding; dum_rela is 1 if a firm's share is held by relationship institutions whose affiliated banks have lent or underwritten for the firm within 3 years and 0 otherwise; rela_pct is the aggregate holdings of relationship institutions; leverage is firm's total debt divided by market value of its equity plus the book value of debt and preferred stock minus deferred tax; cum_return is stock return over the previous quarter; prc is the stock price at the end of each quarter just prior to the earnings announcement; lnsize is the logarithm of market capitalization; B/M is the book value divided by the market value; turnover is trading volume turnover; var_return is the variance of return in previous quarter; herfin is the Herfindahl index; numest is the number of analyst following; advertising is advertising expense divided by total asset.

For NYSE & AMEX firms in panel A, the coefficients on held_pct in all models are negative and significant, indicating that effective trading cost decreases with institutional holdings. This is consistent with information improvement hypothesis: firms with higher institutional holdings will have better liquidity. On the contrary, the coefficient (0.000651) on the dummy variable (dum_rela) in model 1 is positive and significant, indicating that firms held by relationship institutions on average have higher trading cost. This is consistent with the adverse selection hypothesis. Market maker will request a higher spread when they have a higher probability to trade with informed relationship institutions. Because the mean value of Hasbrouck's estimate is 0.0134 (from table 3.1), connected firms have 4.86% higher trading cost than unconnected firms.[12]

In model 2, we examine whether stock liquidity decrease with the holding level of relationship institutions. Since the coefficient on rela_pct is positive and significant (0.000975), stock trading costs will be 0.073%[13] higher if relationship institutions increase 1% shares. This is also consistent with adverse selection hypothesis. In model 3, we add dummy variable (dum_rela) and relationship institution's holding (rela_pct) into the regression, both of the coefficients are positive and significant.

We find similar results for Nasdaq firms in Panel B. The coefficients on held_pct in all three models are negative and significant, which is consistent with the information improvement hypothesis. Furthermore, the coefficients on dum_rela are all positive and significant, confirming the adverse selection hypothesis. From model 1, connected Nasdaq firms have 4.61%[14] higher trading cost than unconnected firms.

[12] 0.000651/0.0134=4.86%
[13] 0.000975/0.0134*1%=0.073%
[14] 0.00618/0.0134=4.61%

Table 3.4 Fixed-Effects Model of Hasbrouck's Effective Trading Cost Measure

Model	(1)	(2)	(3)
Panel A: NYSE & AMEX			
held_pct	-0.00782***	-0.00722***	-0.00806***
	(-5.07)	(-4.77)	(-5.05)
dum_rela	0.000651***		0.000634***
	(8.11)		(8.18)
rela_pct		0.000975***	0.000683***
		(3.81)	(2.87)
leverage	-0.000127***	-0.000114***	-0.000128***
	(-3.39)	(-3.03)	(-3.42)
cum_return	-0.00179***	-0.00182***	-0.00179***
	(-26.61)	(-26.33)	(-26.37)
prc	0.0000139***	0.0000132***	0.0000139***
	(11.98)	(11.51)	(11.98)
lnsize	-0.00136***	-0.00132***	-0.00135***
	(-14.50)	(-13.41)	(-14.18)
B/M	0.00000856***	0.00000889***	0.00000851***
	(2.64)	(2.74)	(2.62)
turnover	-0.000378**	-0.000396**	-0.000375**
	(-2.29)	(-2.42)	(-2.27)
var_return	0.348***	0.357***	0.348***
	(35.09)	(36.74)	(35.13)
herfin	0.00000116***	0.00000106***	0.00000119***
	(4.10)	(3.82)	(4.11)
numest	0.0000970***	0.0000974***	0.0000969***
	(11.53)	(11.55)	(11.52)
advertising	0.00236***	0.00204***	0.00236***
	(3.05)	(2.63)	(3.05)
firm-quarter	102752	102752	102752

(table 3.4 continued)

Panel B: NASDAQ			
held_pct	-0.197***	-0.206***	-0.208***
	(-28.09)	(-27.10)	(-26.98)
dum_rela	0.00618***		0.00535***
	(21.83)		(19.82)
rela_pct		0.0308***	0.0250***
		(21.03)	(19.18)
leverage	-0.00205***	-0.00242***	-0.00224***
	(-7.93)	(-8.89)	(-8.28)
cum_return	-0.00485***	-0.00520***	-0.00513***
	(-26.77)	(-26.35)	(-26.17)
prc	0.000114***	0.000112***	0.000117***
	(20.86)	(19.73)	(20.53)
lnsize	0.00970***	0.0107***	0.0104***
	(18.35)	(18.30)	(18.07)
B/M	0.00587***	0.00641***	0.00618***
	(25.76)	(25.30)	(25.04)
turnover	0.00129***	0.00144***	0.00141***
	(12.12)	(12.75)	(12.53)
var_return	0.0640***	0.0728***	0.0669***
	(6.71)	(7.40)	(6.76)
herfin	0.0000630***	0.0000657***	0.0000661***
	(27.01)	(26.11)	(26.02)
numest	0.00197***	0.00207***	0.00201***
	(29.53)	(28.56)	(28.45)
advertising	-0.000419	-0.000934	-0.000513
	(-0.31)	(-0.67)	(-0.37)
firm-quarter	158096	158096	158096

This table reports the Fixed-Effects Model of Hasbrouck's Effective Trading Cost Measure. The result of NYSE and AMEX firms is presented in Panel A, and the result of NASDAQ firms is shown in Panel B. Following Kale and Loon (2008), we use Rank as the instrument variable for institutional holding (held_pct) to solve the potential endogenous problem between liquidity and institutional holdings. *RANK* is a dummy variable which equals 1 if a stock has an S&P stock ranking (Compustat item #282) and 0 otherwise. The dependent variable is Hasbrouck's (2009) effective trading cost estimate. The definitions of independent variables are as followings: held_pct is the aggregate institutional holding; dum_rela is 1 if firms' shares are held by relationship institutions whose affiliated banks have lent or underwritten for the firms within 3 years and 0 otherwise; rela_pct is the aggregate holdings of relationship institutions; leverage is firm's total debt divided by market value of its equity plus the book value of debt and preferred stock minus deferred tax; cum_return is stock return over the previous quarter; prc is the stock price at each quarter; lnsize is the logarithm of market capitalization; B/M is the book value divided by the market value; turnover is trading volume turnover; var_return is the variance of return in previous quarter; herfin is the Herfindahl index; numest is the number of analyst following; advertising is advertising expense divided by total asset. Regression intercepts are suppressed for brevity. T-statistics are in parenthesis and the symbols: *, **, and *** denote statistical significance at 10%, 5% and 1% respectively.

3.4.3 Regression of Liu's LM3 Measure

Table 3.5 shows the Fixed-effects regression of Liu's LM3 measure. For the NYSE and AMEX firms in Panel A, the coefficients on held_pct in all models are negative but not significant. This can be explained by the fact that most NYSE and AMEX firms have trading everyday and institutional holding may not have much improvement for LM3, which focus on the number of non-trading days. Consistent with adverse selection hypothesis, the coefficient of dum_rela is positive and significant (0.27) in model 1. Because the average LM3 is 5.1598 (from Table 3.1) for all observations, connected firms on average have 5.23%[15] higher LM3 for NYSE and AMEX firms. In model 2 and model 3, the coefficients on rela_pct are positive and significant, indicating that firms with higher relationship institutions' holdings exhibit lower liquidity. These findings are consistent with the adverse selection hypothesis.

For Nasdaq firms in Panel B, the information improvement is more prominent since the coefficients on held_pct are all negative and significant. Because most Nasdaq firms are smaller and have more non-trading days, the prices of stocks with higher institutional holdings reflect the information faster, thus improving the non-trading problems. From model 1, the coefficient on dum_rela is positive and significant (1.226), which is consistent with the adverse selection hypothesis. It seems that higher information asymmetry for Nasdaq firms makes investors to be more cautious about trading stocks held by relationship institutions. On average, connected firms have 23.76%[16] higher LM3 than unconnected firms without holdings by relationship institutions. Furthermore, model 2 and model 3 show that higher relationship holdings result in more non-trading days for connected firms. All these findings indicate that the impact of adverse selection is greater in Nasdaq firms.

[15] 0.27/5.1598=5.23%
[16] 1.226/5.1598=23.76%

Table 3.5 Fixed-Effects Model of Liu's LM3 Measure

Model	(1)	(2)	(3)
Panel A: NYSE & AMEX			
held_pct	-1.097	-0.998	-1.378
	(-1.00)	(-0.93)	(-1.22)
dum_rela	0.270***		0.250***
	(5.00)		(4.80)
rela_pct		0.843***	0.725***
		(5.07)	(4.71)
leverage	-0.0204	-0.0162	-0.0218
	(-0.79)	(-0.63)	(-0.85)
cum_return	-0.549***	-0.565***	-0.560***
	(-11.90)	(-11.93)	(-11.93)
prc	0.00965***	0.00936***	0.00968***
	(12.34)	(12.14)	(12.36)
lnsize	-1.206***	-1.188***	-1.196***
	(-17.90)	(-16.99)	(-17.43)
B/M	-0.00161	-0.00150	-0.00165
	(-0.70)	(-0.66)	(-0.72)
turnover	-0.630***	-0.636***	-0.628***
	(-5.89)	(-5.99)	(-5.86)
var_return	-42.12***	-40.35***	-42.25***
	(-9.36)	(-9.10)	(-9.38)
herfin	0.000646***	0.000613***	0.000675***
	(3.12)	(3.06)	(3.20)
numest	0.0944***	0.0945***	0.0946***
	(16.06)	(16.06)	(16.05)
advertising	2.886***	2.779***	2.885***
	(5.70)	(5.47)	(5.70)
firm-quarter	113635	113635	113635

(table 3.5 continued)

Panel B: NASDAQ			
held_pct	-42.21***	-44.04***	-44.72***
	(-19.91)	(-19.87)	(-19.72)
dum_rela	1.226***		0.997***
	(14.31)		(12.44)
rela_pct		7.168***	6.059***
		(17.28)	(16.41)
leverage	-0.215***	-0.287***	-0.266***
	(-2.69)	(-3.50)	(-3.24)
cum_return	-0.933***	-1.010***	-1.002***
	(-16.57)	(-16.94)	(-16.83)
prc	0.0557***	0.0555***	0.0565***
	(32.58)	(32.13)	(32.30)
lnsize	0.278*	0.457***	0.434***
	(1.85)	(2.86)	(2.72)
B/M	1.365***	1.446***	1.421***
	(24.55)	(24.32)	(24.28)
turnover	0.0983***	0.132***	0.126***
	(2.97)	(3.86)	(3.69)
var_return	-17.17***	-15.18***	-16.47***
	(-5.89)	(-5.15)	(-5.55)
herfin	0.0139***	0.0144***	0.0146***
	(20.21)	(20.13)	(19.99)
numest	0.558***	0.580***	0.572***
	(27.34)	(26.77)	(26.83)
advertising	-0.772*	-0.881**	-0.799*
	(-1.87)	(-2.11)	(-1.90)
firm-quarter	185707	185707	185707

This table reports the Fixed-effects model of Liu's LM3 Measure. The result of NYSE and AMEX firms is presented in Panel A, and the result of NASDAQ firms is shown in Panel B. Following Kale and Loon (2008), we use Rank as the instrument variable for institutional holding (held_pct) to solve the potential endogenous problem between liquidity and institutional holdings. *RANK* is a dummy variable which equals 1 if a stock has an S&P stock ranking (Compustat item #282) and 0 otherwise. The dependent variable is Liu's (2006) LM3 measure. The definitions of independent variables are as followings: held_pct is the aggregate institutional holding; dum_rela is 1 if firms' shares are held by relationship institutions whose affiliated banks have lent or underwritten for the firms within 3 years and 0 otherwise; rela_pct is the aggregate holdings of relationship institutions; leverage is firm's total debt divided by market value of its equity plus the book value of debt and preferred stock minus deferred tax; cum_return is stock return over the previous quarter; prc is the stock price at each quarter; lnsize is the logarithm of market capitalization; B/M is the book value divided by the market value; turnover is trading volume turnover; var_return is the variance of return in previous quarter; herfin is the Herfindahl index; numest is the number of analyst following; advertising is advertising expense divided by total asset. Regression intercepts are suppressed for brevity. T-statistics are in parenthesis and the symbols: *, **, and *** denote statistical significance at 10%, 5% and 1% respectively.

3.4.4 Regression of Amihud's Illiquidity Measure

Table 3.6 presents the result for Amihud's illiquidity ratio, which measures the price impact. The coefficients on held_pct in panel A are all negative and significant, supporting the information improvement hypothesis. On average, firms with more institutional holding have less price impact. From model 1, the coefficient on dum_rela is positive but not significant. The coefficient on rela_pct is negative and significant (model 2 and 3), which supports the certification effect. That connected firms with more relationship institutions have less price impact may also be related to price support behavior found in chapter 2. Firms with more relationship institutions can absorb the selling pressures and have smaller price impact.

On Panel B, the coefficients on held_pct are all negative and significant, consistent with information improvement hypothesis. The coefficient on dum_rela is positive and significant (0.0739), which supports the adverse selection hypothesis. Although the certification effect helps to reduce the price impact, the adverse selection problem has more influence on Nasdaq-listed firms, which are smaller and have higher information asymmetry.

3.4.5 Robustness Check: Different Size Levels

To examine whether the findings of liquidity are robust, we divide the whole sample firms into tertiles based on the average asset during the research period to control the firm size. We run the Fixed-effects regression as in Table 3.4-3.6 for every size tertile and collect the results in Table 3.7. For brevity, only the coefficients on held_pct, dum_rela and rela_pct are presented. From Panel A, all coefficients on held_pct are negative and significant in every size tertile, which strongly supports the information improvement hypothesis. Furthermore, the finding that all coefficients on dum_rela and rela_pct are positive and significant confirms the adverse selection hypothesis. On average, connected firms whose shares are held by relationship institutions will have higher trading cost.

Table 3.6 Fixed-Effects Model of Amihud's Illiquidity Measure

Model	(1)	(2)	(3)
Panel A: NYSE & AMEX			
held_pct	-4.346***	-4.176***	-4.214***
	(-20.28)	(-20.15)	(-19.18)
dum_rela	0.0142		0.0243**
	(1.36)		(2.45)
rela_pct		-0.312***	-0.324***
		(-10.20)	(-11.47)
leverage	-0.0110**	-0.00980**	-0.0103**
	(-2.18)	(-1.97)	(-2.08)
cum_return	-0.302***	-0.298***	-0.297***
	(-33.57)	(-32.52)	(-32.73)
prc	-0.000651***	-0.000689***	-0.000659***
	(-4.26)	(-4.62)	(-4.34)
lnsize	-1.097***	-1.101***	-1.102***
	(-83.03)	(-81.33)	(-82.55)
B/M	-0.000284	-0.000252	-0.000265
	(-0.64)	(-0.57)	(-0.60)
turnover	-0.856***	-0.857***	-0.856***
	(-41.52)	(-42.35)	(-41.86)
var_return	13.55***	13.84***	13.65***
	(15.44)	(16.16)	(15.65)
herfin	0.000931***	0.000910***	0.000916***
	(23.02)	(23.44)	(22.42)
numest	0.00421***	0.00392***	0.00393***
	(3.64)	(3.40)	(3.40)
advertising	0.297***	0.288***	0.298***
	(3.02)	(2.94)	(3.05)
firm-quarter	114393	114393	114393

(table 3.6 continued)

Panel B: NASDAQ			
held_pct	-6.619***	-6.602***	-6.665***
	(-20.04)	(-19.46)	(-19.14)
dum_rela	0.0739***		0.0697***
	(5.59)		(5.75)
rela_pct		0.179***	0.100*
		(2.94)	(1.86)
leverage	-0.0706***	-0.0725***	-0.0716***
	(-5.72)	(-5.81)	(-5.74)
cum_return	-0.361***	-0.362***	-0.362***
	(-41.00)	(-39.48)	(-39.51)
prc	0.00388***	0.00382***	0.00389***
	(14.51)	(14.37)	(14.48)
lnsize	-1.051***	-1.048***	-1.048***
	(-45.29)	(-43.09)	(-43.11)
B/M	0.172***	0.175***	0.173***
	(20.54)	(19.81)	(19.89)
turnover	-0.280***	-0.280***	-0.280***
	(-54.27)	(-53.10)	(-53.25)
var_return	8.650***	8.764***	8.660***
	(19.03)	(19.33)	(19.03)
herfin	0.00218***	0.00218***	0.00219***
	(20.34)	(19.81)	(19.53)
numest	0.0225***	0.0233***	0.0228***
	(7.06)	(6.97)	(6.93)
advertising	-0.234***	-0.241***	-0.235***
	(-3.64)	(-3.74)	(-3.64)
firm-quarter	186592	186592	186592

This table reports the Fixed-effects model of Amihud's Illiquidity Measure. The result of NYSE and AMEX firms is presented in Panel A, and the result of NASDAQ firms is shown in Panel B. Following Kale and Loon (2008), we use Rank as the instrument variable for institutional holding (held_pct) to solve the potential endogenous problem between liquidity and institutional holdings. *RANK* is a dummy variable which equals 1 if a stock has an S&P stock ranking (Compustat item #282) and 0 otherwise. The dependent variable is AmiHud's (2002) illiquidity ratio rescaled by 10^7 and taken by logarithm. The definitions of independent variables are as followings: held_pct is the aggregate institutional holding; dum_rela is 1 if firms' shares are held by relationship institutions whose affiliated banks have lent or underwritten for the firms within 3 years and 0 otherwise; rela_pct is the aggregate holdings of relationship institutions; leverage is firm's total debt divided by market value of its equity plus the book value of debt and preferred stock minus deferred tax; cum_return is stock return over the previous quarter; prc is the stock price at each quarter; lnsize is the logarithm of market capitalization; B/M is the book value divided by the market value; turnover is trading volume turnover; var_return is the variance of return in previous quarter; herfin is the Herfindahl index; numest is the number of analyst following; advertising is advertising expense divided by total asset. T-statistics are in parenthesis and the symbols: *, **, and *** denote statistical significance at 10%, 5% and 1% respectively.

Table 3.7 Fixed-Effects Model (Different Size Levels)

	Small Size			Median Size			Large Size		
Model	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
Panel A: Hasbrouck's effective trading cost measure									
held_pct	-0.548***	-0.577***	-0.578***	-0.0684***	-0.0691***	-0.0705***	-0.0451***	-0.0456***	-0.0465***
	(-13.01)	(-12.46)	(-12.42)	(-28.51)	(-28.30)	(-28.09)	(-27.27)	(-27.00)	(-26.82)
dum_rela	0.00847***		0.00261***	0.00240***		0.00212***	0.00187***		0.00176***
	(8.21)		(3.03)	(17.05)		(15.56)	(21.37)		(20.62)
rela_pct		0.114***	0.107***		0.0102***	0.00803***		0.00523***	0.00426***
		(10.43)	(10.18)		(15.04)	(12.49)		(18.70)	(16.69)
Panel B: Liu's LM3									
held_pct	-66.86***	-71.18***	-71.14***	-5.397***	-5.698***	-5.651***	-43.98***	-44.36***	-45.76***
	(-8.84)	(-8.83)	(-8.78)	(-4.74)	(-4.97)	(-4.81)	(-27.66)	(-27.56)	(-27.22)
dum_rela	0.783***		-0.0498	-0.0213		-0.0590	1.959***		1.831***
	(4.38)		(-0.33)	(-0.33)		(-0.96)	(23.82)		(22.67)
rela_pct		14.43***	14.56***		0.886***	0.949***		5.857***	4.867***
		(8.50)	(8.97)		(3.02)	(3.44)		(22.84)	(20.69)
Panel C: Amihud illiquidity measure									
held_pct	-6.381***	-6.305***	-6.370***	-3.927***	-3.794***	-3.832***	-8.155***	-8.073***	-8.170***
	(-5.98)	(-5.67)	(-5.68)	(-19.13)	(-18.44)	(-18.11)	(-30.92)	(-30.71)	(-29.91)
dum_rela	0.0467*		0.0491**	0.0307***		0.0446***	0.119***		0.118***
	(1.87)		(2.43)	(2.69)		(4.10)	(8.86)		(9.14)
rela_pct		0.0868	-0.0375		-0.270***	-0.318***		0.103***	0.0367
		(0.38)	(-0.17)		(-5.35)	(-6.72)		(2.59)	(1.02)

This table reports the Fixed-effects model for all observations in different size tertiles. The regression model specification is the same as in Table 3.4-3.6. Following Kale and Loon (2008), we use Rank as the instrument variable for institutional holding (held_pct) to solve the potential endogenous problem between liquidity and institutional holdings. For brevity, we only present the coefficients on held_pct, dum_rela and rela_pct. The dependent variables in Panel A, B, and C are Hasbrouck's effective trading cost measure, Liu's LM3 measure and Amihud's illiquidity measure. Numbers in parentheses are t-value. The symbols: *, **, and *** denote statistical significance at 10%, 5% and 1% respectively.

We find similar results in Liu's Lm3 illiquidity measure in Panel B. The coefficients on rela_pct are positive and significant in all size tertiles, which shows a positive relationship between illiquidity and relationship institutions' holding levels. Investors tend to avoid trading stocks held by more relationship institutions. In Panel C, we still find a strong evidence for adverse selection hypothesis in Amihud's illiquidity measure since most of the coefficients on dum_rela and rela_pct are positive and significant.

3.4.6 Robustness Check: Different Institutional Holding Levels

In Table 3.8, we run the Fixed-effects regression for observations in different institutional holding levels. We use the same regression models as in Table 3.4-3.6 and only present the coefficients on held_pct, dum_rela and rela_pct. There is still a negative relation between illiquidity and institutional holding levels (held_pct) in all holding levels, which supports the information improvement hypothesis. Our interest is the impact of relationship institutions on liquidity. For Hasbrouck's trading cost in Panel A, the coefficients on dum_rela and rela_pct in different holding groups are positive and significant, which supports the adverse selection hypothesis. For Liu's LM3 measure in Panel B, most of them are also positive and significant. For Amihud's illiquidity measures, we still find evidences that support adverse selection hypothesis. When the total institutional holding increases to median and high levels, the adverse selection problem for relationship institutions get some relief since prices should incorporate information more quickly when firms are held by more institutions.

3.5 Conclusion

Institutional investors play an important role in the stock liquidity. Stock liquidity can be improved when firms are held by more institutional investors since the competition among institutions can create better information environment and attract more investors. On the

Table 3.8 Fixed-Effects Model (Different Institutional Holding Levels)

	Low Holding			Median Holding			High Holding		
Model	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
Panel A: Hasbrouck's effective trading cost measure									
held_pct	-0.999***	-1.039***	-1.040***	-0.128***	-0.132***	-0.134***	-0.0271***	-0.0273***	-0.0277***
	(-12.74)	(-12.36)	(-12.31)	(-25.83)	(-25.35)	(-25.14)	(-26.20)	(-26.02)	(-25.92)
dum_rela	0.00729***		0.000305	0.00332***		0.00231***	0.00100***		0.000952***
	(6.80)		(0.32)	(16.66)		(12.74)	(16.46)		(15.95)
rela_pct		0.172***	0.171***		0.0288***	0.0250***		0.00239***	0.00186***
		(9.63)	(9.43)		(18.60)	(17.12)		(12.62)	(10.46)
Panel B: Liu's LM3									
held_pct	-272.0***	-287.6***	-284.7***	-23.39***	-24.43***	-24.64***	-4.029***	-4.259***	-4.264***
	(-13.02)	(-12.72)	(-12.69)	(-12.53)	(-12.69)	(-12.56)	(-8.14)	(-8.55)	(-8.36)
dum_rela	1.925***		-0.907***	0.463***		0.218***	0.0265		0.00815
	(6.16)		(-3.44)	(6.15)		(3.24)	(0.94)		(0.30)
rela_pct		66.19***	70.68***		5.956***	5.578***		0.607***	0.603***
		(10.64)	(11.12)		(10.62)	(10.64)		(7.21)	(7.67)
Panel C: Amihud illiquidity measure									
held_pct	-11.61***	-11.79***	-11.86***	-6.136***	-6.159***	-6.177***	-4.788***	-4.651***	-4.657***
	(-6.51)	(-6.23)	(-6.29)	(-18.46)	(-17.95)	(-17.67)	(-30.38)	(-29.69)	(-28.99)
dum_rela	0.0713***		0.0182	0.0248*		0.0170	-0.00178		0.00885
	(2.69)		(0.85)	(1.87)		(1.45)	(-0.20)		(1.02)
rela_pct		1.354**	1.265**		0.190**	0.160*		-0.308***	-0.313***
		(2.53)	(2.27)		(1.98)	(1.78)		(-12.17)	(-13.28)

This table reports the Fixed-effects model for all observations in different institutional holding tertiles. The regression model specification is the same as in Table 3.4-3.6. Following Kale and Loon (2008), we use Rank as the instrument variable for institutional holding (held_pct) to solve the potential endogenous problem between liquidity and institutional holdings. For brevity, we only present the coefficients on held_pct, dum_rela and rela_pct. The dependent variables in Panel A, B, and C are Hasbrouck's effective trading cost measure, Liu's LM3 measure, Amihud's illiquidity measure. Numbers in parentheses are t-value. The symbols: *, **, and *** denote statistical significance at 10%, 5% and 1% respectively.

contrary, the higher adverse selection cost can reduce the liquidity of stocks owned by more informed institutional investors.

In this chapter, we study the influence on the stock liquidity when firms are held by their relationship institutions. Consistent with information improvement hypothesis, firms with higher aggregated institutional holdings exhibit better liquidity. However, due to the adverse selection problem, firms with higher relationship institutions' holdings exhibit lower liquidity. Specifically, these firms have higher trading cost, more non-trading days and larger price impact. The deterioration of the stock liquidity can result from the fact that market makers will charge a wider bid-ask spread when facing a higher probability of trading with informed relationship institutions.

CHAPTER 4 CONCLUSION

This dissertation examines the impacts on the stock markets when financial institutions hold their clients' stocks. Analyzing the earnings announcements of NYSE/AMEX/NASDAQ stocks from 1990 to 2004, we find that relationship institutions (that have lent/underwritten and hold shares of client firms) significantly support client firms when their clients have negative earnings surprises. Such price supports effectively reduce the negative price swings and the earnings momentum. Furthermore, we find a negative relationship between stock liquidity and relationship institutional holdings. Firms with higher relationship institutions' holdings suffer more from the adverse selection problem and have lower stock liquidity in terms of higher trading cost, more non-trading days and larger price impact.

This dissertation contributes to literature on financial institutions by studying the non-intermediary role of financial institutions in the capital markets with a broad sample of firms and a regular earnings announcement event. The finding provides general implications not only for the financial institution literature but also for the asset pricing literature. Firms without active institutional relationships can be considered a risk factor because supportive institutions can effectively convey a positive signal to mitigate clients' negative earnings surprises through their stock buying activities. Such supports alter stock return profiles and smooth temporary negative shocks. By reducing unnecessary price movements, financial institutions mitigate the noise in the market. However, they may also impose a negative effect on client firms' stock liquidity because of the higher adverse selection costs.

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VITA

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