The impact of institutional investors on equity markets and their liquidity

Dezelan, S.

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Chapter 5

Theoretical insights into the relationship between institutional investors and market liquidity

5.1 Introduction

In this chapter we discuss the main theoretical insights into the relationship between institutional investors and market liquidity. The chapter complements Chapter 4, in which we discussed empirical evidence on the impact of institutional investors on market liquidity. The models we discuss here provide theoretical underpinnings for the empirical analysis we conduct in the next two chapters.

We build the overview of the theory around the following issues. First, can liquidity enhance an institutional investor’s incentive to acquire information in markets that are characterized by informational frictions? Second, can free-riding by small investors lead to the loss of diversification benefits to the institutional investor and, hence, to less trading? Third, under what conditions are trading and monitoring by institutional investors not mutually exclusive? Fourth, what are the implications of the ownership structure of firms for the liquidity of their shares? Finally, how does a firm’s decision on whether or not to go public affect the liquidity of public securities markets? We discuss the relevant models from the literature and emphasize their implications for market liquidity more explicitly.

The theoretical models we consider in this chapter come from the market microstructure literature and the literature on corporate governance and ownership structure. This literature offers the following arguments with respect to the relationship between institutional investors and market liquidity. First, institutional investors need liquid markets in order
to monitor the management of the firm, gather information, trade on it, or intervene in the firm when needed. Liquidity provides an incentive for institutional investors to become informed and trade. Second, there may be a trade-off between liquidity and control.\footnote{Most of the issues concerning the liquidity-control trade-off are systematically presented by Coffee (1991) and Bhide (1993). Both had an important influence on the theoretical research that followed.} While the large equity stakes of institutional investors may suppress the market liquidity of shares (Coffee (1991), Bhide (1993)), sufficiently large ownership stakes are crucial to induce large shareholders to monitor the management when the stock market fails to perform the monitoring function efficiently (Maug (1998), Bolton and von Thadden (1998a, 1998b)). Third, the large ownership stakes of institutional investors make the ownership of companies more concentrated and reduce the liquidity of individual shares.

The chapter is organized as follows. In Section 2 we explain the structure of the literature review. Section 3 provides a discussion of the relationship between institutions and liquidity from the market microstructure perspective. In Section 4 we discuss the contributions of the literature on corporate governance and ownership structure to the analysis of the impact of institutions on market liquidity. We also discuss how liquidity and institutional activism may co-exist. In addition, we consider the implications of the theories of ownership structure for the liquidity of equity markets. Section 5 summarizes and concludes.

5.2 Structure of the literature review

Theoretical models that consider the relationship between institutional investors and equity market liquidity can be divided in two groups: the market microstructure model(s), and the corporate governance and ownership structure models. Most of the definitions of market liquidity we discussed in Chapter 3 originate from the former, i.e. the market microstructure literature. The analysis of trading costs and the effects of a particular market design on the formation of prices have been in the center of analysis in this strand of literature.

The growing literature on corporate governance deals with the ways in which stakeholders of the firm control decisions by the management. This strand of literature suggests that there is a trade-off between the control by large shareholders, such as institutional investors, and equity market liquidity. This trade-off, also known as the liquidity-control trade-off (see, e.g. Coffee (1991) and Bhide (1993)), implies that liquidity may not go hand in hand with control. In other words, the concentrated ownership that is needed for efficient control may hamper the liquidity of shares in the portfolios of large shareholders. The firm's ownership structure may therefore have important implications for the liquidity of its shares. For this reason, we look at the theoretical studies of the advantages and disadvantages of concentrated and dispersed ownership, and the studies of the 'going public/staying private'
decisions of firms (Pagano and Röell (1998), Bolton and von Thadden (1998a, 1998b)).

We discuss the relationship between institutional investors and market liquidity from the perspective of both strands of literature. We provide the essence of the models and discuss their implications for the relationship between institutional investors and market liquidity. The liquidity in these models typically refers to the amount of exogenous noise trading, which critically depends on the number of non-informed traders. The models we consider suggest that market liquidity is a function of information, the cost of information, probability of liquidity shocks and ownership structure. In Figure 5.1 we sketch how information comes into play.

Figure 5.1: Information and the role of institutional investors as traders in the equity market.

If one assumes that institutional investors are informed traders and that the level of noise trading can be used as an indication of how liquid a market is (as suggested by Kyle (1985)), then the impact of institutions on market liquidity is relatively straightforward. We illustrate this market-microstructure perspective of the impact using the results of Kyle (1985) and Holmström and Tirole (1993). The same models can be used if one believes that institutional investors are non-informed. In what follows, we discuss two models from the corporate governance literature in more detail. In the first model, Admati et al. (1994) illustrate how the free-riders problem affects the monitoring and trading activity of institutional, and other large investors. In the second model, Maug (1998) considers the trade-off between institutional control and market liquidity.

5.3 Market microstructure perspective

According to the market microstructure literature the arrival of relevant information and liquidity needs are the most important motives of institutional, and other, investors to
trade. The expected profit from trading on information gives institutional investors an incentive to become active traders. The acquisition of information is costly, however. Institutional investors can get information by monitoring companies themselves, or they can buy information from other sources. Trading on information pays off if the market is liquid enough. A liquid market in this case means that there are a lot of non-informed traders who trade only for their liquidity needs.

In this section we discuss the results of Holmström and Tirole (1993) who show how a liquid market induces an informed institutional investor to acquire information and trade on it.\(^2\) The original model of Holmström and Tirole (1993) consists of three parts: the agency problem of giving the right incentives to the manager, the trading part in which the informativeness of the market price, the informed investor’s incentives to collect information and the losses of liquidity traders are determined, and the decision on the fraction of the company to be held by insiders. We are only interested in the trading part, which includes the derivation of market equilibrium. In this part, Holmström and Tirole (1993) follow the standard market microstructure literature (see Kyle (1985)). We briefly discuss the setup of their model and focus on the results with respect to liquidity.

Holmström and Tirole (1993) consider a two-period model with risk neutral investors, a risk-neutral market maker, and a risk-averse manager of a publicly traded firm. They distinguish three categories of investors: informed traders, liquidity traders, who are uninformed, and the inside owners, who hold a constant fraction of shares in each period. We will assume that an institutional investor is the informed trader. Initially, insiders sell shares to the general public. In the next period, the firm earns its first period’s profit, the institution observes a signal and invests in information precision. If the institution invests more, it receives a more precise signal. Trading takes place and the payout of dividends follows.

The institution acquires information about the firm’s liquidation value, represented by the firm’s earnings in the next period. Excluding the noise, the liquidation value of the firm is nothing but the fundamental value of the firm in the first period. The institution has to pay for the information on the firm’s earnings. The more precise the information (i.e. the signal), the higher its cost. The institution will only gather information if its costs are lower than the expected profits from trading on it. The liquidity traders and the market maker cannot observe the institution’s signal, or its choice of precision of the signal.\(^3\)

\(^2\)Holmström and Tirole (1993) demonstrate that market liquidity may have a positive impact on the decision of large shareholders to gather information and monitor the management of firms. Their paper is an elegant demonstration of how a market microstructure, information-based model can be incorporated into the analysis of agency problems within a firm. It also emphasizes the advantages of having the stock market as an additional monitor of the manager’s actions.

\(^3\)However, the liquidity traders know the distribution of the expected earnings of the firm. They cannot observe it directly, but they know the parameters of the manager’s incentive contract, so they can correctly infer it. See Röell (1997) for a discussion of this point.
5.3. Market microstructure perspective

After acquiring the signal, the institution submits a market order together with the liquidity traders. The orders are independent of each other. The institution will follow a linear order strategy and maximize its expected trading profit. The variance of liquidity trades measures the liquidity of the market.\(^4\) The higher the variance, the higher the liquidity of the market.

Given the total demand for the firm's shares, a risk neutral and competitive market maker sets the market price that is linear in the total order flow and equals the expected (liquidation) value of the firm.\(^5\) The following results concerning market liquidity follow from Holmström and Tirole (1993).

1. The institution's expected revenue increases with market liquidity. The institution makes its money at the expense of liquidity traders.\(^6\) Hence, the higher the variance of liquidity trades, the stronger the institution's incentives to acquire information.

2. The institution will trade on its information more aggressively when market liquidity increases. With increased liquidity the price becomes less sensitive to institutional trades and thus provides a better disguise for the institution's superior information.

3. The institution's demand will adjust in response to changes in market liquidity in such a way that its relative share in the trading volume remains the same (if liquidity doubles, its order doubles).

Within the framework of Holmström and Tirole (1993), market liquidity increases with the proportion of the firm's shares initially sold to the outsiders. If the proportion of the firm held by insiders decreases, there are more outside equity holders and hence more liquidity traders. Trading by liquidity traders provides an incentive for the institution to become informed. The initial owners will however sell off just enough shares to induce the institution to monitor. This means that the proportion to be sold is chosen in such a way that the monitoring cost is just covered. For any other stake, either the institution would not monitor, or the insiders would lose too much on the initial offering of shares.\(^7\)

The results of Holmström and Tirole (1993), as we interpret them, depend critically on the assumption that institutional investors can be characterized as informed traders. Profes-\(^4\)In this respect, Holmström and Tirole (1993) slightly depart from Kyle (1985). In a usual Kyle (1985) type of model parameter \(\lambda\) serves as a measure of liquidity, or better, as a measure of market depth. \(\lambda\) shows how much the market maker adjusts the price to reflect the information content of trades. Hence, \(\lambda\) measures the price impact of total orders.

\(^5\)Kyle (1985) demonstrates that under the linear strategies of the informed trader and the market maker, there exists one equilibrium price that is only partially revealing, but it incorporates information that cannot be extracted from the data on the company's current or future profits.

\(^6\)Within the model of Holmström and Tirole (1993), the insiders end up paying for the informed investor's returns in equilibrium - through a lower initial share price.

\(^7\)See Holmström and Tirole (1993) for a detailed analysis of this issue.
sional asset managers, who manage mutual and pension funds usually do describe themselves as informed investors. In the market microstructure literature, however, institutional investors are typically modelled as liquidity, i.e. non-informed traders. Their trades reflect the liquidity needs of their clients, so they trade for reasons that are not necessarily related to the future payoffs of financial assets. The impact of institutional investors on liquidity is then determined simply by the liquidity needs of their investors.

Unlike other liquidity traders, institutional investors may have a discretion with respect to the timing of their trades (Admati and Pfleiderer (1988)). Institutions can time their transactions strategically, subject to the constraint of trading a particular number of shares within a given period of time. This makes them strategic, although non-informed traders. Admati and Pfleiderer (1988) examine the interaction between strategic informed and strategic uninformed traders in a dynamic framework. They show that both types of traders prefer to trade when the market is liquid, in the sense that their trading has little impact on the market price.\(^8\)

To summarize, market liquidity itself might induce an informed institutional investor to monitor or gather more information and place larger orders. In a liquid market, the institution has an incentive to acquire information and monitor because it gets reimbursed for its monitoring service from the liquidity traders.\(^9\) The higher the liquidity of the market, the easier it is for the institution to 'hide' its information and trade on it. One implication of this liquidity analysis is that some level of ownership dispersion seems to be required for the monitoring and trading by the institutional investors to take place. Dispersed ownership of shares implies that the number of potential liquidity traders is higher. If all traders have rational expectations, the non-informed traders may free-ride on the benefits of monitoring by the informed traders.\(^10\) Because information is reflected in market prices and can be inferred from the trades by the informed investors (see, e.g. Kyle (1985)), the institutional investor may decide to play a passive role and not invest in information and monitoring at all. If there are frictions that prevent the institution from sufficiently realizing the benefits of its costly monitoring activities, this may also affect its trading behavior. In the next section we discuss how this might occur.

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\(^8\)As a result of this preference for liquidity, trades tend to concentrate at particular times of the day (see Admati and Pfleiderer (1988)).

\(^9\)Within the framework of Holmström and Tirole (1993), monitoring is just a way of acquiring information and trading on it. However, trading and monitoring can also be considered as separate, or even mutually exclusive activities of the institutional investors (see Maug (1998)).

\(^10\)Bhide (1993) views the free-riding problem contained in the liquidity-control trade-off as follows. The benefits of increased market liquidity are not shared equally by all stockholders because active shareholders face greater restrictions concerning their trading while the passive (small) ones enjoy the benefits of a more level playing field. This might be another factor that discourages shareholder activism.
5.4 Corporate governance and ownership structure perspective

As large shareholders, institutional investors are among the most influential stakeholders of the firms. If they become actively involved in the management of the firms they can influence the corporate decisions in such a way that the value of the firm increases. However, any active role of institutions also brings costs with it. Less diversification possibilities and a reduced liquidity of their portfolios are considered the most important costs of shareholder activism. In this section, we illustrate these costs in more detail. We start with diversification costs, followed by liquidity costs.

Bhide (1993) was the first to point out that the active role of large shareholders and the liquidity of shares of their companies cannot go hand in hand. Bhide (1993) views liquidity as the amount of noise trading, which depends on the number of non-informed shareholders in the market. Through monitoring, large shareholders have access to information that is not available to other traders in the market. Informational asymmetry has important price effects and leads to a decrease in the level of noise trading, which reduces the liquidity of the market. Combined with the free-riders problem, informational asymmetries may force the informed traders to trade less. In Section 5.4.2, we discuss how sufficient liquidity may alleviate this problem.

The concentration of ownership in the hands of a few large investors reduces the number of remaining shareholders. As a result, the trading volume and overall liquidity of the market may decrease as well. In this way, liquidity is to some extent determined by the ownership structure of the firms. There exists a trade-off between concentrated and dispersed ownership of a firm. Ownership concentration guarantees monitoring by the large(est) shareholder(s), but some level of ownership dispersion is necessary for the monitoring to take place. We discuss this ownership structure trade-off at the end of this section.

5.4.1 Institutional monitoring, risk-sharing and liquidity

Institutional investors may have access to costly monitoring technologies that can positively affect the expected payoffs of securities in their investment portfolios. By monitoring, institutional investors provide a public good while incurring private costs. The question is whether large, portfolio-choice optimizing, risk-averse investors can sufficiently realize the benefits of being active. If small, risk-averse investors have rational expectations they take into account monitoring of the large one, so it gets reflected in the market price. In this way, small investors enjoy the benefits of monitoring without bearing any costs.

Trading among risk-averse investors determines how well their portfolios are diversified.
Admati et al. (1994) analyze the impact of shareholder activism on the portfolio allocation of a large (institutional) investor. They show that risk-sharing considerations lead to equilibria in which monitoring by the large investor occurs despite the free-rider problem. However, in certain conditions the monitoring activities by the large investor may reduce the diversification of its portfolio and, hence, its expected payoff. There seems to be a trade-off between a high level of monitoring which is promoted by concentrated ownership and realized risk-sharing gains, which usually require a more dispersed ownership of shares. Admati et al. (1994) focus on this trade-off.

In the model of Admati et al. (1994), the risk-averse institution chooses such a monitoring level whereby it maximizes its benefits from monitoring, net of the monitoring costs. Small shareholders, who are also risk-averse, anticipate the monitoring level chosen by the institution. The exogenously given stake by the institutional investor determines the amount of monitoring that occurs and hence the payoffs of the firm. After the institution buys additional shares it increases its monitoring level. However, it does not receive all the benefits from monitoring on the newly acquired shares, because the price it pays for them already reflects its higher monitoring level. This happens because small investors have rational expectations. The situation is similar when the institution is selling shares. The institution can only capture the full benefits of monitoring on its initial endowment of shares. Consequently, it trades less than it would in the case where its risk-sharing benefits would be the largest. Less trading, or a lower willingness to trade can be interpreted as indirect evidence of decreased market liquidity.

Admati et al. (1994) nicely illustrate how the problem of free-riding can lead to the diminished trading activity of active institutional investors under risk aversion. If shareholders are risk-averse, holding large ownership stakes is costly for them. The costs show in their less diversified portfolios. Only when the increase in cash-flows due to the positive impact of institutional monitoring activities is large enough does the lower portfolio diversification become acceptable. Institutions with lower risk aversion will be willing to hold larger ownership stakes since the resulting cost of lower diversification for them is smaller (see Admati et al. (1994)). The free-riding problem can generally be mitigated in such a way that monitoring and trading by the institutional investor still coincide. We analyze this situation in the context of the so-called liquidity-control trade-off.

### 5.4.2 The liquidity-control trade-off

Liquidity of shares guarantees continuous price setting in a market with a large number of dispersed shareholders/traders. The more liquid the shares, the better their price and the lower the cost of capital for the firm (see, e.g. Amihud and Mendelson (1986, 1991).  

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11When investors are risk-neutral, trading does not provide any risk-sharing benefits. If monitoring technology is also risk-neutral, no trading takes place at all (Admati et al. (1994)).
Efficient control by a large shareholder may reduce the cost of capital for the firm. Hence, there seems to be a trade-off between liquidity and control that a large shareholder faces. Institutional investors are no exception.

Institutional investors may often have to decide whether to trade on the acquired, and potentially superior information, or to intervene in the firms in which they hold large stakes. In the first case, the institution can make a profit based on informed trading. By trading actively, it increases the trading volume of the market. In the second case, the value of the institution's stake in the company may increase if it is successful in its monitoring and control activities. The institution will intervene only if it can recover the costs of being active.

To analyze the relationship between market liquidity and the incentives of an institutional investor to monitor and trade we adopt Maug's (1998) noisy rational expectation model of the stock market. Maug (1998) shows how market liquidity may alleviate the free-riding of small shareholders that could undermine the monitoring benefits pertaining to the institutional investor. We consider this particular model because it combines both trading and control considerations by a large investor. This enables us to discuss the impact that the institutional investor has on liquidity in its role as a trader and as an active shareholder.

The model of Maug (1998)

Assume an economy with one firm, whose value at the end of the period is a random variable \( \bar{v} \). All agents in the economy know that the firm's assets are currently worth \( L \). The firm's value would be \( H \) if it were restructured, where \( H > L \). It is assumed that the incumbent management is not willing to restructure, because it would have to put costly extra effort in restructuring, for example. However, a large enough institutional investor may force the management to restructure, or fire the incumbent management and put a new management in place. Both actions would increase the firm's value to \( H \). The number of firm's shares is normalized to 1. Initially, all shares are equally divided among the continuum of households. The total measure of households is 1. The sequence of events is as follows.

In the first stage, the institutional investor trades a risk-free asset (with a return normalized to zero) for the shares of the firm. He buys \( \alpha \) shares at their initial price \( P_0 \). Households

\[ ^{12} \text{Kahn and Winton (1998) analyze the choice between monitoring and informed trading as mutually exclusive actions by the large investor. They show that its choice depends on the cost/benefit ratios of these actions.} \]

\[ ^{13} \text{If monitoring and intervention are value-enhancing, they have another important effect. They influence the institution's trading profits by increasing the value of its information relative to that of other shareholders (Kahn and Winton (1998)).} \]
own the rest of the shares of the firms, i.e. \((1 - \alpha)\). In the next stage, the institution decides whether to monitor or not, and chooses its trading strategy. We assume that with probability \(q\) the institution buys \(x_B > 0\) shares, intervenes and improves the management, so that the firm is worth \(H\). The cost of monitoring is \(C\), where \(C < (H - L)\). To be able to influence the management, the institution needs an ownership stake of at least \(\mu\), i.e. \(\alpha + x_B \geq \mu\), where \(\mu \in [0, 1]\). With probability \((1 - q)\) the institution sells \(x_S < 0\) shares and does not intervene, so the firm is worth \(L\). \(q\) is an endogenous probability of the mixed strategy played by the informed trader, i.e. the institution.

In the third stage, households experience liquidity shocks. The probability of \(\phi\) households \((0 < \phi < 1)\) experiencing a liquidity shock and selling is \(\frac{1}{2}\). This makes the ex-ante probability of any household facing a liquidity shock equal to \(\frac{\phi}{2}\). In stage 4, the market maker receives orders from the institution and from households. The market maker cannot distinguish the submitted orders. He observes only the net order flow \(y\), and sets the price \(P_1\), such that it equals the expected value of the firm, given the net order flow: \(P_1 = E[\bar{v}|y]\). In the last stage, the profits of the firm are realized and all parties are paid off.

We see the same trading structure as in Holmström and Tirole (1993). The households and the institution submit the orders simultaneously. If \(\phi\) households are subject to a liquidity shock, they sell \(\phi(1 - \alpha)\) shares to the market maker in total. The market maker cannot distinguish the case in which the institution sells shares and households are not exposed to liquidity shocks from the case where the institution buys shares and households are selling them. The following condition then follows:

\[
\begin{align*}
x_S + 0 &= x_B - \phi(1 - \alpha) \\
(5.1)
\end{align*}
\]

For simplicity, we further assume that the institution chooses symmetrical trading quantities, therefore \(x_S = -x_B = \frac{\phi(1 - \alpha)}{2}\). \(^{14}\) \(S\) denotes selling, and \(B\) buying. For convenience, we define \(x = \frac{\phi(1 - \alpha)}{2}\). Only the abovementioned cases with the order flow of \(-x\) are of our interest. There, the market maker cannot perfectly infer the value of the firm from the order flow. In the two other cases, the order flow is either \(-3x\) or \(x\), respectively, and the price is fully revealing in each case. \(^{15}\)

When the market maker observes the net order flow of \(-x\), he does not know whether

\(^{14}\)Maug (1998) shows that this assumption does not affect the results, since due to the structure of the model either the trading quantity or the randomizing probability of intervention \(q\) can be chosen arbitrarily.

\(^{15}\)If the order flow is \(x\), only the institution might be buying (households are not selling anything). Then the price set by the market maker will be \(H\). The order flow of \(-3x\) may be a result of the institution selling \(x\) and the households selling \(2x\). In this case, the market maker will set the price at \(L\). See Maug (1998) for details.
the institution is selling \(x(= x_S)\), or whether the households are selling \(2x\) shares and the institution is buying \(x(= x_B)\) of them. Hence, the market maker sets the price at the expectation:

\[
P_1 = qH + (1 - q)L
\]  

\[P_1 = qH + (1 - q)L \]  

(5.2)

This means that when the institution is buying, its order will be executed either at \(P_1 = H\), or at \(P_1 = qH + (1 - q)L\), with equal probabilities. The price equals \(H\) when the net order flow is \(x\), and the market maker knows that the institution is buying shares on the market. If the institution is selling, it will receive either \(P_1 = L\), or \(P_1 = qH + (1 - q)L\), with equal probabilities. The price will be \(L\) when everybody in the market is selling. With all this in mind we can now write down the expected price per share at which the institution buys or sells:

\[
E(P|B) = \frac{1}{2}(H + (qH + (1 - q)L))
\]

\[
E(P|S) = \frac{1}{2}(L + (qH + (1 - q)L))
\]

(5.3)  

(5.4)

Knowing the expressions for prices, we can write the expected payoffs of the institution when it is buying and monitoring \((ER_B)\) and when it is selling shares \((ER_S)\), respectively:

\[
ER_B = x[H - E(P|B)] + \alpha H - C
\]

\[
 = \frac{\phi(1 - \alpha)(1 - q)}{2}(H - L) + \alpha H - C
\]

\[
ER_S = -x[L - E(P|S)] + \alpha L
\]

\[
 = \frac{\phi q(1 - \alpha)}{2}(H - L) + \alpha L
\]

(5.5)  

(5.6)

The market maker sets the price so as to make the institution indifferent to selling and buying, i.e. such that \(ER_S = ER_B\). After rearranging, we get the following expression for the equilibrium randomizing probability of monitoring, \(q\):\(^{16}\)

\[
q = \frac{1}{2} - \frac{2(C - \alpha(H - L))}{\phi(1 - \alpha)(H - L)}
\]

\[q = \frac{1}{2} - \frac{2(C - \alpha(H - L))}{\phi(1 - \alpha)(H - L)} \]

(5.7)

\(^{16}\)Maug (1998) shows that this is a unique equilibrium and that all other possible strategies of the large shareholder are dominated by the two considered here.
A couple of results follow:

**Result 1:** The size of the institution's stake in the firm, \( \alpha \), has two opposite effects on its probability of monitoring: a positive *lock-in effect* and a negative *liquidity effect*.\(^{17}\)

The liquidity effect is easy to explain if one notices that the liquidity parameter \( \phi \) is multiplied by \( (1 - \alpha) \) in the denominator of the expression for \( q \). A large initial stake held by the institution reduces the number of potential traders. If households hold a smaller amount of shares fewer shares are traded and the probability of monitoring decreases. The positive effect of the initial stake \( \alpha \) can be seen if we look at the expression for the institution's expected returns from buying and selling. A high initial stake in the company makes the return on existing shares very important for the institution, hence the institution tries to increase the value of its stake and it intervenes with a higher probability.

**Result 2:** The institution's expected trading profits increase with liquidity, measured by the amount of uninformed trading, \( \phi (1 - \alpha) \).

\[
\frac{\partial ER}{\partial (\phi (1 - \alpha))} > 0, \text{ where } \quad (5.8)
\]

\[
ER = qER_B + (1 - q)ER_S
\]

\[
= (1 - \alpha) \left[ \frac{\phi q (1 - q)}{2} (H - L) \right]
\]

\[
= \frac{1}{2} \phi (1 - \alpha) \left[ q(1 - q)(H - L)^2 \right]
\]

\[
= \phi (1 - \alpha) (1 - \lambda) \frac{Var(\overline{v})}{(H - L)}
\]

\(^{17}\)In a similar analysis of the institutional investor's choice between trading on information and intervention, Kahn and Winton (1998) also identify two effects of an institution's initial stake in the company: a direct and an indirect effect. The *direct effect* is identical to Maug's (1998) *lock-in effect*, while the *trading effect* brings some additional considerations to the *liquidity effect* mentioned in this section. The magnitude and importance of the trading impact of the institution's stake in the company depends on the characteristics of the firm (maturity, transparency of its activities etc.), and on the degree of competition among informed investors. Both factors determine the value of information acquired by the institution relative to the uninformed investors and other informed investors, respectively. As the institution's stake in a company increases, so does its direct impact of intervention: the value of its existing stake net of intervention costs increases. On the other hand, an increased level of institution's ownership decreases the expected liquidity trades. This effect can be exactly offset by the decrease in the number of other informed investors, since trading on information becomes less profitable for them. When the competition among informed investors is high and the costs of gathering information are low, the trading impact of a large investor's holdings becomes less important. Kahn and Winton (1998) treat trading on information and intervention of the institution as mutually exclusive activities. These activities become complementary only in the case when intervention provides the institution with better information (relative to other traders), which makes its trading profits high enough.
The larger the expected proportion of households that sell, the larger the size of transaction that the institution can undertake. Expected trading profits of the institution are also increasing in market depth \((1 - \lambda)\), and in the variance of the value of the firm, \(\text{Var}(\tilde{v})\), where \(\text{Var}(\tilde{v}) = (q(1 - q)(H - L)^2)^2\). \(^{18}\) \(\lambda\) is defined by the difference between the expected buying and the expected selling price obtained by the institution, relative to the spread between the fully revealing prices. When \(\lambda\) is one, trades always move prices to the fully revealing level and the institution’s trading profit is zero. As defined by Maug(1998), \(\lambda\) reflects the probability that the price is fully revealing, and amounts to \(\frac{1}{2}\) in this case. \(^{19}\) Market depth \((1 - \lambda)\) is then the probability that the market price is not fully revealing.

Note that Result 2 is identical to the first result of Holmström and Tirole (1993) in Section 5.3, only liquidity is defined different here. Hence, Maug (1998) derives a standard market microstructure result in a less standard, corporate governance setting.

**Result 3:** The probability of an institution’s monitoring is increasing in market liquidity (measured by \(\phi\)) if and only if \(\alpha(H - L) < C\). When \(\alpha(H - L) > C\) the probability of an institution’s monitoring is decreasing in market liquidity.

\[
\frac{\partial q}{\partial \phi} = \frac{2(C - \alpha(H - L))}{\phi^2(1 - \alpha)(H - L)} > 0 \quad \text{iff} \quad \alpha(H - L) < C
\]  

(5.10)

When \(\alpha(H - L) = C\), the gains on the institution’s initial stake just cover its monitoring costs. \(\alpha(H - L) > C\) implies that the institution has already recovered its monitoring costs through gains on its initial stake, so it monitors even if it cannot trade. Higher liquidity in this case reduces the lock-in effect and the institution’s probability of monitoring. If \(\alpha\) is not big enough to cover the monitoring costs, the institution would never monitor in the absence of trading opportunities. The extent to which monitoring costs can be compensated through informed trading is crucial in this case. The institution makes a profit from trading on its private information against liquidity traders, and by purchasing shares initially at a price below their intrinsic value. The ability to purchase additional shares in the stock market at a price that does not reflect improvements in the profits of the monitored firm provides an additional incentive for the institution to monitor. The larger the amount of liquidity trading, the higher the trading gains of the institution, and the greater the opportunity for additional gains from monitoring. In this way, liquidity helps alleviate the problem of non-informed traders free-riding on the monitoring benefits.

**Result 4:** When the institution maximizes the total payoff from its investment, i.e. the sum of net trading profits and the gain on its initial stake, its equilibrium probability of

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\(^{18}\)In calculating the variance, one has to keep in mind that with probability \(q\) the value of the firm is \(H\), and with probability \((1 - q)\) its value is \(L\).

\(^{19}\)Maug (1998) calculates \(\lambda\) as follows: \(\lambda = \frac{E(P | B) - E(P | S)}{H - L} = \frac{1}{2}\). The result follows from the expressions for \(E(P | B)\) and \(E(P | S)\) in Equation 5.3.
monitoring, \( \hat{q} \) is strictly increasing in stock market liquidity (measured by \( \phi \)).\(^{20}\)

\[
\frac{\partial \hat{q}}{\partial \phi} = \frac{C}{\phi^2 (H - L)} > 0,
\]

where

\[
\hat{q} = \frac{1}{2} - \frac{C}{\phi (H - L)} \quad (5.11)
\]

To maximize the total payoff from its investment, the institution chooses a stake in the company that is smaller than \( \frac{C}{H - L} \), i.e. smaller than that which would maximize its gains from trading only.\(^{21}\) The institution anticipates that a higher stake means a commitment to costly monitoring in the future, therefore it buys less shares and in this way retains the option of an easy exit in the future.

The results of Maug (1998) suggest that market liquidity induces the institution to monitor more, and hence improves the corporate governance of the firm. The institution becomes an active shareholder because market liquidity makes holding a large stake in a firm less costly and it provides opportunities for additional gains from monitoring. According to Maug (1998), there is a positive relationship between the monitoring by the institution and market liquidity, hence the two do not have to be mutually exclusive.

What implications does this analysis have for the impact of institutions on market liquidity? Institutional investors require market liquidity to become active traders and active shareholders. Although derived within a different framework, the results with respect to liquidity here are very similar to Holmström and Tirole (1993). One big difference between the two models is in the role of ownership concentration of a firm in the analysis. We look at the implications of ownership structure for market liquidity next.

### 5.4.3 Ownership structure and market liquidity

The ownership structure of a firm is important for the liquidity of its shares. Most obviously, there are more potential traders in the market if ownership is dispersed. The situation is reverse when the firm has a very concentrated ownership. However, when shares are concentrated in the hands of active large shareholders such as institutional investors, who gather information, monitor the management and intervene when necessary, the incentives of owners and managers get better aligned. This may result in a higher

\(^{20}\)To derive the equilibrium probability of monitoring, we maximize the sum of trading profits and the gain on the initial stake w.r.t. \( q \), i.e. \( \max \left[ (1 - \alpha) \left( \frac{\alpha (1 - q)}{2} (H - L) \right) - qC + \alpha \left( \frac{\alpha (1 - q)}{2} (H - L) \right) \right] = \max \left[ \frac{\alpha (1 - q)}{2} (H - L) - qC \right] \). From the F.O.C. we then get \( \hat{q} \).

\(^{21}\)To derive the institution’s equilibrium ownership stake when it maximizes its total payoff, i.e. \( \hat{\alpha} \), we have to equate \( \hat{q} \) with the equilibrium randomizing probability of monitoring, \( q \) and rearrange. Then we get the following expression: \( \hat{\alpha} = \frac{C}{2(H - L) - C} \).
value of a firm. Note that institutional activism comes at a cost. In addition to the direct costs of monitoring and taking action, there is also an indirect cost that shareholder activism might inflict on the liquidity of the equity market. Larger equity stakes and more concentrated ownership could imply fewer trades and a lower liquidity of shares. While large shareholdings may suppress liquidity, a certain level of liquidity is needed to induce large investors to monitor in the first place (see previous section).

The contemporary theory of ownership structure provides important implications for the analysis of equity market liquidity. We will discuss the relationship between ownership concentration and market liquidity, and the implications of different methods of equity offerings for the liquidity of shares.

i) Concentrated versus dispersed ownership

The issue of ownership concentration lies in the center of the liquidity-control discussion. Concentrated ownership may lead to a situation in which large shareholders effectively control the management and hence increase the value of the firm. However, concentrated ownership reduces the overall trading opportunities and may lead to lower liquidity of the company's shares. Dispersed ownership, on the other hand, may enhance market liquidity. Let us illustrate this point.

Imagine that there are two types of traders in the market for shares of a company: institutional investors and individual investors. Assume that the company issued \( N \) shares. Part of the shares have been purchased by \( M \) institutional investors, who together hold \( B \) shares (in blocks). \( B = \sum \alpha_i \), where \( \alpha_i \) denotes the ownership stake of institutional investor \( i \). This leaves \( N - B \) shares available for trade for individual investors. For simplicity, assume that each of the individual investors holds \( 1/N \) shares. The probability of trade, \( P \), then depends on the proportion of shares not held in blocks, information and the liquidity needs of the traders:

\[
P(\text{trade}) = f\left(\frac{N - B}{N}, \text{information, liquidity needs}\right)
\]

If the number of shares held by institutions increases, the probability of an individual investor finding a trading partner and trade (and hence also market liquidity) decreases:

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22 One factor that might prevent institutions from becoming active are rules governing the exit from firms they have invested in. Unlike most individual investors, institutions are usually not able to exit their investments without costs (Coffee (1991)).

23 See, e.g., Bolton and Von Thadden (1998a,b).
Chapter 5. Theoretical insights

\[ \frac{\partial P}{\partial B} = -\frac{1}{N} < 0 \] (5.12)

The probability of trade increases if the number of shares outstanding (or the number of individual investors) increases:

\[ \frac{\partial P}{\partial N} = \frac{B}{N^2} > 0 \] (5.13)

The value that liquidity adds in terms of a lower cost of capital can be viewed as proportional to the number of shareholders, or the number of outstanding shares. The more trade there is in a share, the larger the liquidity of this particular share. Each additional shareholder-trader in the market adds to liquidity, so a patient shareholder will never sell. If patient traders value liquidity in such a way, then the value of the firm will be the highest when ownership is most dispersed. The control of individual shareholders is weaker under dispersed ownership, but the value of the firm increases due to better liquidity. If shareholders are impatient and only interested in the daily value of the share, a concentrated ownership would improve the value of the firm. The benefits of control in this case are larger. This is also the logic behind the model of Bolton and von Thadden (1998a).

In a setting similar to Maug’s (1998), Bolton and von Thadden (1998a) demonstrate that the trade-off between dispersed and concentrated ownership exists. This trade-off depends crucially on the average demand by liquidity traders, the total number of shares outstanding, and the size of the efficient controlling stake of the large shareholder.\(^{24}\) The findings of Bolton and von Thadden (1998a) can be summarized as follows.

If a firm has a dispersed ownership of shares, there are more shareholders to trade with, but the probability of efficient corporate control is smaller due to free riding by small shareholders. In the case of concentrated ownership, corporate control is provided by the large shareholder. However, because of reduced trading opportunities shareholders benefit from corporate control with reduced probability. Consequently, the presence of a large blockholder among the firm’s shareholders can either reduce or increase the value of the firm.\(^{25}\) In addition, there exists an optimal level of liquidity that is required for the efficient

\(^{24}\)Bolton and von Thadden’s (1998a) analysis is based on the assumption that the large shareholder, who monitors management and restructures the firm in a bad state, is the only possible mechanism of exercising control.

\(^{25}\)Kahn and Winton (1998) find that ownership concentration generally increases the firm’s value. They see the initial distribution of shares among the large investor and small shareholders as the decision of the entrepreneur during the initial placement, and exclude the possibility of later reallocation on the secondary market.
control by the large investors to take place. If liquidity trading is too low when the firm is doing badly, a controlling block may not emerge in a firm with dispersed ownership. More generally, when too few shareholders are impatient, i.e. subject to liquidity shocks, the efficient control will fail in the bad state. The same may happen when there is too much liquidity, i.e. when all owners are impatient. When average liquidity demand is high, the value of liquidity is high, and dispersed ownership is preferred. In the opposite case, concentration prevails.

Bolton and von Thadden (1998a,b) provide rationale for the relationship between the ownership concentration, market liquidity and the prevailing corporate governance regime we observe in many countries. In countries where dispersed ownership prevails, capital markets are usually liquid and can provide an effective corporate governance regime, known as the ‘arm’s length finance’. Countries with the arm’s length finance as the main source of capital usually have well developed and liquid equity markets (USA and UK are typically given as examples). The opposite holds for countries with more concentrated ownership and a control-oriented corporate governance regime, like Germany. The orientation of institutional investors, i.e. whether they are primarily portfolio- or control-oriented, is also related to the degree of ownership concentration. Institutional investors seem to be more control-oriented in the countries with concentrated ownership, and more portfolio-oriented where dispersed ownership is prevailing.

ii) Private versus public ownership

The way in which firms offer their shares may to some extent determine the liquidity of the secondary market for their shares. A public offering of shares may provide benefits, such as better liquidity for the company’s shares, a lower cost of capital relative to other sources, additional monitoring, diversification of risk for the initial owners etc. A public offering of shares may also generate positive externalities by increasing the size and informational efficiency of the market. Large markets generate more trading and can be considered more liquid.

The method of equity sale has implications for the trade-off between dispersed and concentrated ownership. Bolton and von Thadden (1998b) show that a public listing leads to the highest liquidity. When dispersed ownership of a privately held firm dominates concentrated ownership, going public dominates the dispersed private ownership, as long as high average liquidity demand may be a result of many small investors being exposed to liquidity shocks, for example.

27 Market liquidity can in this way be viewed as a form of economies of scale, and is strongly dependent on the number of firms that decide to offer shares publicly, and get listed on one, or multiple exchanges. Subrahmanyam and Titman (1999) show that since liquidity and the information generated in a stock market are determined by the number of stock market participants, the latter also determines whether being publicly financed is better for a firm or not.
Chapter 5. Theoretical insights

the listing costs are not too high. Furthermore, going public is typically optimal when the listing costs are sufficiently small and the trading of blocks of shares is not anonymous.\(^{28}\)

Going public and getting listed on the stock exchange or OTC market is costly for firms. Pagano and Röell (1998) analyze the initial owner’s decision about whether to stay private or go public. They show that there is a trade-off between the cost of excessive interference by outside shareholders (overmonitoring) in the former, and the cost of listing and losing the identity of outside owners in the latter. Their model implies that the firm’s incentives to go public increase with the amount of external finance needed, with the value of the private benefits of control, and with the inefficiency of monitoring. More stringent accounting and disclosure rules faced by the publicly traded companies, and the potential for cooperation among external shareholders also make going public a more attractive option.

Focusing on the corporate control issues, Zingales (1995) considers the loss of private benefits of control as a cost of going public. He argues that the majority control and dispersed ownership jointly determine whether the firm decides to go public or not. The initial owner is trying to capture the increase in cash flows and in the private benefits of control. Cash flow rights accrue to all shareholders proportionately, whereas the private benefits of control are only enjoyed by the controlling shareholder. When selling shares to dispersed shareholders, the initial owner maximizes his proceeds from the sale of cash flow rights. He can only maximize the proceeds from selling the control rights by directly bargaining with a potential buyer in a private placement.

Institutional investors may have an important role both in public and private equity offerings. Institutions appear as buyers of shares in public offerings, and as the ‘guardians’ of liquidity when companies decide to raise capital through private placements. Private equity placements enable institutional investors to more easily exert control when needed.

In summary, it is important for the liquidity of individual shares how the shares are sold, who their buyers are, and how large the ownership stakes of the shareholders are. A public offering of shares typically means more liquidity, but it is costly. The costs of going public determine whether more concentrated ownership is desirable or not. Institutional investors as large shareholders can have a crucial role both in the public offering of shares and in their private placement. If institutions acquire enough shares they can improve the corporate governance and hence the value of the firms in both cases. When there are enough non-informed traders in the market the institutional investor can cover its costs of being active. But large ownership stakes reduce the number of potential traders in the market. This may hamper the liquidity of shares and the incentives of institutions to monitor.

\(^{28}\)Bolton and Von Thadden (1998b).
5.5 Summary and concluding remarks

In this chapter we have reviewed the theoretical models that are relevant to the debate on the impact of institutional investors on market liquidity. The key insights from these models can be summarized as follows.

First, a liquid market provides an incentive for institutional investors to become informed and to trade on information (Kyle (1985), Holmström and Tirole (1993)). The more liquid the market, in the sense that there are more non-informed investors trading, the higher the potential trading profit for an informed institutional investors. Second, the more shares institutional investors own in a particular company, the smaller the pool of other potential traders in the market. The smaller the number of liquidity traders, the lower the liquidity of the market for a particular share. Third, there may be a trade-off between liquidity and institutional control. Higher liquidity of shares decreases the cost of capital for the firm. The cost of capital can also fall due to the institutional investor controlling the management so that the value of the firm increases. Sufficiently large ownership stakes are crucial to induce institutional investors to monitor the management (Maug (1998), Bolton and von Thadden (1998a, 1998b)), but large stakes may suppress the liquidity of shares. Fourth, if small shareholders free-ride on the benefits of monitoring by institutional investors the diversification opportunities and the trading intensity of institutions may decrease. The problem of free-riders reduces the incentives of institutions to engage in control in the first place.

In the models we discussed in this chapter, liquidity was typically represented by exogenous shocks that hit the uninformed traders and make them trade independently of the value of the shares. Alternatively, a certain level of liquidity was assumed, but not modeled explicitly. Such treatment of liquidity has consequences for the empirical research as there are few directly testable implications about liquidity that arise from the models. The following hypotheses from the models discussed in this chapter could, for example, be tested empirically (ordered randomly). First, ownership concentration reduces the market liquidity of shares. Second, there is a positive relationship between the ownership concentration and the value of a firm. Third, there is a negative relationship between the cost of capital and the degree of ownership concentration of a firm etc.

The theory we presented in this chapter generally supports the argument of Davis (1999), who claims that liquidity presents one of the institutional investors' key demands. According to Davis (1999), institutions require the ability to transact large volumes without moving the price against them, anonymously, and at low transaction costs. Institutional investors may mitigate capital market liquidity if they increase their ownership stakes in order to become active shareholders. Today, there are many ways of increasing secondary market liquidity without mitigating control. The most common mechanisms are the cross-

29Instefjord (1999), e.g., argues that there is a general lack of theoretical work on liquidity.
Theoretical insights

holdings of shares, pyramidal ownership structures, issues of shares with differentiated voting power and proxy votes (Berglöf (1996)).

The ownership structure that currently exists in most European countries (see e.g., Berglöf (1996)) seems to impede the liquidity of their secondary markets. Many Continental financial systems (e.g., the German one) can be characterized as control-oriented. In such systems, ownership is concentrated and markets are relatively illiquid (compared to the UK and the US). The situation in transition economies is similar. The process of ownership consolidation that is taking place in the post-privatization period of many transition economies may have important consequences for the liquidity of their equity markets. Whether it implies better monitoring or just the redistribution of wealth is a separate issue. Privatization and economic reforms may have given institutional investors in transition economies some specific features that also affect their impact on equity market liquidity. We address these issues in the next two chapters, where we study the impact of institutional investors on the domestic equity market in two transition economies: Hungary and Slovenia.