Available online at www.sciencedirect.com
SCIENCE DIRECT®
Finance Research Letters 1 (2004) 2–10
Finance Research Letters
www.elsevier.com/locate/frl

Shareholder activism is non-monotonic in market liquidity

Antonio S. Mello [a,*] and Rafael Repullo [b,c]

[a] *School of Business, University of Wisconsin–Madison, 975 University Avenue, Madison, WI 53706, USA*
[b] *CEMFI, Casado del Alisal 5, 28014 Madrid, Spain*
[c] *CEPR, London, UK*

Received 3 July 2003; accepted 18 November 2003

Abstract

Building on work of Maug [Journal of Finance 53 (1998)], we characterize the relationship between market liquidity and large shareholder activism when a minimum ownership share is required to change the management. We show that the sign of this relationship depends on whether the block constraint is binding. Specifically, the probability of intervention is decreasing in the liquidity of the stock when the constraint is binding (which happens in markets with intermediate liquidity), and it is increasing when it is not (which happens in highly liquid markets). We also show that the probability of intervention is zero in illiquid markets.

Keywords: Shareholder activism; Market liquidity; Corporate control

1. Introduction

Maug (1998) analyzes the relationship between market liquidity and shareholder activism. He considers a firm with a large shareholder and a continuum of small investors who are subject to liquidity shocks. The large shareholder can increase the firm's value if she changes the management and restructures it at a certain cost. The firm's stock is quoted in a secondary market by a risk neutral and uninformed market maker who sets the share price equal to the expected value of the firm conditional on the information contained in the order flow. The liquidity of this market is directly related to the size of the liquidity

* Corresponding author.
E-mail addresses: amello@bus.wisc.edu (A.S. Mello), repullo@cemfi.es (R. Repullo).

1544-6123/$ – see front matter
doi:10.1016/j.frl.2003.11.002

shocks of the small investors. Maug's main result is that an increase in the liquidity of the secondary market leads to an increase in the probability of intervention of the large shareholder. Exceptions can, however, occur if the minimum ownership share required for restructuring is high.

Maug's claim that the impact of market liquidity on large shareholder activism is in general positive contrasts with the commonly held view. For example, Bhide (1993, p. 31) argues that "active stockholders who reduce agency costs by providing internal monitoring also reduce stock liquidity by creating information asymmetry problems. Conversely, stock liquidity discourages internal monitoring by reducing the costs of 'exit' for unhappy stockholders." Hence, he concludes, "the benefits of stock market liquidity must be weighted against the costs of impaired corporate governance."

This paper reviews Maug's analysis in order to provide a complete characterization of the effect of market liquidity on large shareholder activism. Specifically, we show that if the size of the required control block is smaller than $\frac{2}{3}$, the probability of intervention is zero for low liquidity, there is a negative relationship between market liquidity and shareholder activism for intermediate liquidity, and the relationship is positive in highly liquid markets. Moreover, if the size of the required control block is greater than or equal to $\frac{2}{3}$ (i.e., a large supermajority requirement), the probability of intervention is always zero.

The intuition for the non-monotonicity result is the following. For any given majority requirement (smaller than $\frac{2}{3}$), the large shareholder has to acquire a sufficient block in order to be able to restructure the firm. When the secondary market is very liquid, this constraint will not be binding, in which case the probability of intervention is increasing in liquidity, because in a more liquid market it is easier to buy shares and profit from the subsequent restructuring. On the other hand, when the secondary market is not very liquid, the block constraint will be binding, which implies that the shareholder must have a larger initial toehold. In such case, an increase in market liquidity relaxes the constraint and reduces the size of the required toehold, which leads to a lower probability of intervention.

We conclude that the impact of market liquidity on corporate governance is ambiguous. Depending on whether block constraints are binding, liquid stock markets may impact negatively on effective governance, as Bhide argues, or facilitate shareholder intervention, as Maug claims. These results may be useful for formulating testable hypothesis on the determinants of large shareholder behavior, which we believe is an important topic for future research.

2. Maug's model

Consider a model of a stock market with three dates ($t = 0, 1, 2$) and three types of risk neutral agents: a large investor, a continuum of small investors, and a market maker. There are two assets: a risk-free asset with return normalized to zero, and the shares of a firm whose value at $t = 2$ is either H, if the firm is restructured at $t = 1$, or $L < H$, if it is not. Only the large investor can restructure the firm at a cost c, but for this she must hold an ownership share of the stock of at least μ. It is assumed that $c < H - L$, so the minimum stake x that allows her to recover the cost of intervention, i.e., that satisfies $x(H - L) = c$, is smaller than 1.

At $t = 1$ the small investors are subject to correlated liquidity shocks: with probability $\frac{1}{2}$ a fraction ϕ of them will be forced to sell at $t = 1$ all their shares, and with probability $\frac{1}{2}$ they will not sell their shares. Also at $t = 1$, the large investor may decide to increase or decrease her ownership share. As in Kyle (1985), the market maker only observes the net order flow, and then sets a price equal to the expected value of the firm at $t = 2$ conditional on the information contained in it. Parameter ϕ measures the liquidity of the secondary market for the firm's shares, and it is the key exogenous variable in the analysis that follows.

At $t = 0$ the large investor buys an initial stake α at a price P_0, and the small shareholders buy the remaining $1 - \alpha$ shares at the same price subject to the constraint that their expected return from investing in the firm be equal to the return of the risk-free asset.

We first derive the equilibrium for $\mu = 0$, i.e., when the large investor is not required to have a minimum stake to restructure the firm, and then discuss how the results change when a minimum stake $\mu > 0$ is introduced.

3. Intervention requires no minimum control block

If intervention does not require a minimum stake, the equilibrium in the secondary market, given an initial shareholding α of the large investor, is characterized in the following result.

Proposition 1. *If $\mu = 0$, there is a unique (mixed strategy) equilibrium at $t = 1$ in which the large investor intervenes with probability*

$$q(\alpha) = \begin{cases} 0, & \text{if } \alpha \leqslant \alpha_0, \\ \dfrac{1}{2} - \dfrac{2(x-\alpha)}{\phi(1-\alpha)}, & \text{if } \alpha_0 < \alpha < \alpha_1, \\ 1, & \text{if } \alpha \geqslant \alpha_1, \end{cases} \tag{1}$$

where

$$\alpha_0 = \frac{4x - \phi}{4 - \phi} < \frac{4x + \phi}{4 + \phi} = \alpha_1.$$

The expected trading profits of the large investor are

$$(1 - \alpha)G(\alpha), \tag{2}$$

where

$$G(\alpha) = \frac{\phi}{2}(H - L)q(\alpha)\big[1 - q(\alpha)\big]. \tag{3}$$

Proof. With probability $\frac{1}{2}$ the small investors sell $2u = \phi(1 - \alpha)$ shares. The equilibrium mixed strategy for the large investor is to buy u shares (and restructure the firm paying the cost c) with probability q, and to sell u shares (and not restructure the firm) with probability $1 - q$. The net order flow can then take three values: u, $-u$, and $-3u$. In the first case the large investor buys, and in the third case she sells. In these two cases the market maker is able to perfectly infer the value of the firm at $t = 2$, and sets $P_1 = H$ and $P_1 = L$, respectively. In the second case, however, he does not know for sure whether the large investor is buying (when the small shareholders are selling $2u$) or selling (when they are not trading), and therefore sets $P_1 = qH + (1 - q)L$. Equating the expected payoff for the large investor from buying

$$u\left[H - \frac{1}{2}\left[H + \left(qH + (1-q)L\right)\right]\right] + \alpha H - c = \frac{1}{2}u(1-q)(H-L) + \alpha H - c$$

to her expected payoff from selling

$$u\left[\frac{1}{2}\left[\left(qH + (1-q)L\right) + L\right] - L\right] + \alpha L = \frac{1}{2}uq(H-L) + \alpha L,$$

and solving for q taking into account the constraint $0 \leqslant q \leqslant 1$ gives (1). Now using these expressions it is immediate to show that the expected trading profits of the large investor are equal to $u(H - L)q(1 - q)$, which gives (2). □

The only difference between this result and Proposition 1 in Maug (1998) is that here we explicitly take into account the limits on the range of variation of the probability of intervention by the large investor.

It should be noticed from (2) and (3) that this investor only profits from her trading when the equilibrium probability of intervention $q(\alpha)$ is strictly between 0 and 1, that is for $\alpha_0 < \alpha < \alpha_1$. In this range, $q(\alpha)$ is increasing in the liquidity parameter ϕ if $x - \alpha > 0$, that is if the minimum stake x that is required to recover the cost of intervention is greater than the initial stake α. To see whether this condition is satisfied, we have to analyze the equilibrium allocation of shares in the primary market.

If a small investor is to buy shares at $t = 0$ his expected return must be equal to the return of the risk-free asset. The former is computed as follows. With probability $1 - \frac{\phi}{2}$ the small investor does not suffer a liquidity shock, in which case the expected return of his investment is $qH + (1 - q)L$. With probability $\frac{\phi}{2}$ the investor (together with a proportion ϕ of the other small investors) suffers a liquidity shock, in which case he gets $qH + (1 - q)L$ with probability q, and L with probability $1 - q$. Hence the price at $t = 0$ satisfies

$$\begin{aligned} P_0 &= \left(1 - \frac{\phi}{2}\right)\left(qH + (1-q)L\right) + \frac{\phi}{2}\left[q\left(qH + (1-q)L\right) + (1-q)L\right] \\ &= qH + (1-q)L - \frac{\phi}{2}(H-L)q(1-q). \end{aligned}$$

From here it follows that the large investor's expected profits from her initial purchase of α shares is given by

$$\alpha\left(qH + (1-q)L - P_0\right) = \alpha G(\alpha). \tag{4}$$

Adding the trading profits (2) to the profits from the initial purchase (4), and subtracting the expected restructuring costs, $q(\alpha)c$, yields the objective function of the large investor at $t = 0$:

$$\Pi(\alpha) = G(\alpha) - q(\alpha)c. \tag{5}$$

Maximizing (5) with respect to the initial shareholding α gives the following result.

Proposition 2. *If $\mu = 0$, the optimal initial shareholding of the large investor is*

$$\alpha^* = \begin{cases} 0, & \text{if } \phi < 2x, \\ \dfrac{x}{2-x}, & \text{otherwise}, \end{cases} \tag{6}$$

and the corresponding probability of intervention is

$$q^* = q(\alpha^*) = \begin{cases} 0, & \text{if } \phi < 2x, \\ \dfrac{1}{2} - \dfrac{x}{\phi}, & \text{otherwise.} \end{cases} \tag{7}$$

Proof. By (1) and (3) the function $\Pi(\alpha)$ satisfies $\Pi(\alpha) = 0$ for $\alpha \leqslant \alpha_0$ and $\Pi(\alpha) = -c$ for $\alpha \geqslant \alpha_1$. Moreover, for $\alpha_0 < \alpha < \alpha_1$ we have

$$\Pi'(\alpha) = \left[\frac{\phi}{2}(H-L)\big(1-2q(\alpha)\big) - c\right] q'(\alpha).$$

In this range, $q'(\alpha) > 0$ implies that the term in square brackets is decreasing in α, so $\Pi(\alpha)$ is quasiconcave. From here it follows that if $\Pi'(\alpha_0) < 0$ the optimal initial shareholding α^* can be anywhere in the interval $[0, \alpha_0]$, say $\alpha^* = 0$, and $q(\alpha^*) = 0$. But $\Pi'(\alpha_0) < 0$ if $\frac{\phi}{2}(H-L) - c < 0$, that is if $\phi < 2x$. On the other hand, if $\Pi'(\alpha_0) \geqslant 0$ the optimal initial shareholding α^* will be obtained by solving the first order condition $\frac{\phi}{2}(H-L)(1-2q(\alpha)) - c = 0$, which using (1) gives the result. □

Unlike Proposition 4 in Maug (1998), the preceding result takes into account that the probability of intervention cannot take negative values. This implies the existence of a critical level of liquidity ($\phi = 2x$) below which the probability of intervention q^* is zero. This happens in Region I of Fig. 1. In contrast, when liquidity ϕ is sufficiently high ($\phi \geqslant 2x$), the probability of intervention q^* is positive, and it is increasing in ϕ.

As noted by Maug (1998, p. 66), there are two opposite forces at work. On the one hand "in a more liquid stock market it is less costly to sell a large stake," which suggests that more liquid markets discourage large shareholders from being active in corporate governance. On the other hand, "a more liquid stock market... makes it easier for investors to accumulate large stakes without substantially affecting the stock price and to capitalize on governance-related activities." It is clear from (1) that the first effect dominates when $x - \alpha < 0$, while the second dominates when $x - \alpha > 0$. However, by Proposition 2, if the liquidity of the market ϕ is greater than or equal to the critical value $2x$, the ownership share α^* acquired by the large investor at $t = 0$ is such that $x - \alpha^* > 0$, so we get the same result as Maug (1998): the probability of intervention q^* is increasing in the liquidity ϕ of the secondary market.

4. Intervention requires a minimum control block

We now introduce the assumption that in order to restructure the firm the large investor needs a minimum stake $\mu > 0$. This is irrelevant when $\phi < 2x$, because in this case we

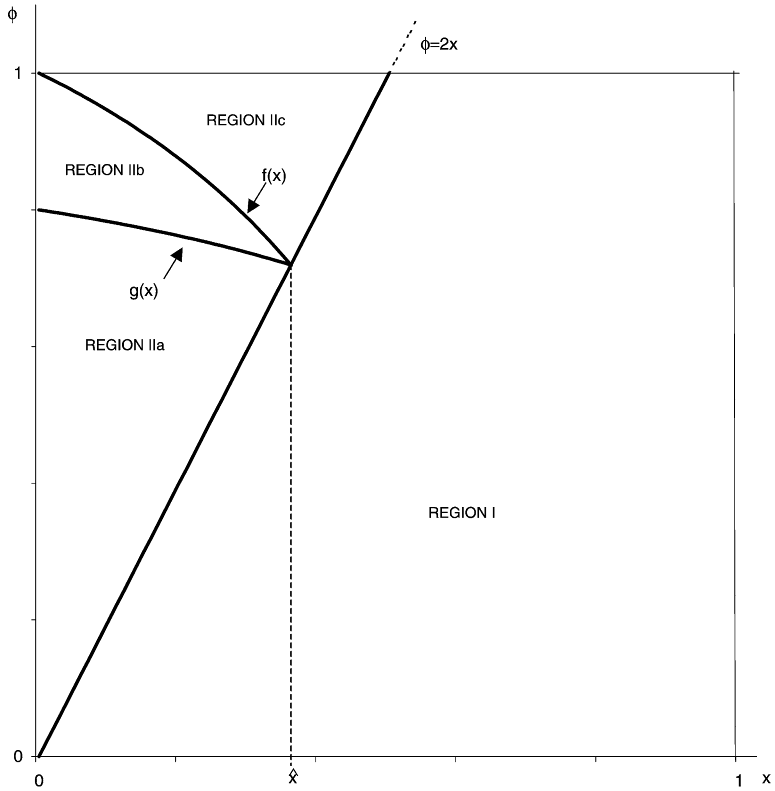

Fig. 1. Characterization of the regions of the parameter space.

have shown that the large investor never wants to restructure the firm. On the other hand, when $\phi \geqslant 2x$ we have to take into account the constraint

$$\alpha + \frac{\phi}{2}(1-\alpha) \geqslant \mu, \tag{8}$$

that requires that the total ownership share of the large shareholder when she buys $u = \frac{\phi}{2}(1-\alpha)$ additional shares at $t = 1$ be greater than or equal to μ. Solving for α in (8) then gives

$$\alpha \geqslant \hat{\alpha} = \frac{2\mu - \phi}{2 - \phi}. \tag{9}$$

The constraint (9) will be binding if $\alpha^* < \hat{\alpha}$. Using the definition (6) of α^* it is immediate to show that this will be the case if

$$\phi < f(x) = \frac{2\mu - (1+\mu)x}{1-x}.$$

When this condition holds, the large investor must increase her initial stake from α^* to $\hat{\alpha}$ to end up with the required control block at $t = 1$. But this reduces her total profits $\Pi(\alpha)$, so one has to check whether $\Pi(\hat{\alpha}) \geqslant 0$. By (1), (3), and (5), we have $\Pi(\hat{\alpha}) \geqslant 0$ if

$$\phi \geqslant g(x) = \frac{4\mu(1-x)}{3-\mu-2x}.$$

The relationship between the functions $f(x)$ and $g(x)$ is summarized in the following lemma, whose proof is straightforward.

Lemma 1. *The functions $f(x)$ and $g(x)$ are decreasing and intersect at a point*

$$\hat{x} = \frac{1}{4}\Big[3+\mu-\sqrt{\mu^2-10\mu+9}\Big] \tag{10}$$

such that $f(\hat{x}) = g(\hat{x}) = 2\hat{x}$. Moreover, $g(x) < f(x)$ for $0 \leqslant x < \hat{x}$.

The functions $f(x)$ and $g(x)$ are depicted in Fig. 1 for a case with $\hat{x} < \frac{1}{2}$. In Region IIa we have $\phi < g(x)$, so $\Pi(\hat{\alpha}) < 0$ and the large investor does not invest in the firm. In Region IIb we have $g(x) \leqslant \phi < f(x)$, and the large investor buys the initial stake $\hat{\alpha} > \alpha^*$. Finally, in Region IIc we have $\phi \geqslant f(x)$, and the large investor buys the initial stake α^*.

Using (10) one can show that $\hat{x}$ is increasing in μ, and satisfies $\hat{x} = 0$ for $\mu = 0$, and $\hat{x} = \frac{1}{2}$ for $\mu = \frac{2}{3}$. Hence, if the large investor is not required to have a minimum stake in order to restructure the firm, Regions IIa and IIb disappear, and we have the case analyzed in Section 3. When μ goes up, $\hat{x}$ increases, the functions $f(x)$ and $g(x)$ are shifted upwards, and we have the case shown in Fig. 1. Finally, when μ exceeds the critical value $\frac{2}{3}$, Region IIa encompasses entirely Region II.

We are now ready to state our main result that completes Propositions 5 and 6 in Maug (1998).

Proposition 3. *If $\mu \geqslant \frac{2}{3}$, the large investor does not invest in the firm. If $0 < \mu < \frac{2}{3}$, there are three cases to consider. If $\phi \geqslant \max\{2x, f(x)\}$ (in Region IIc), the large investor buys the initial stake*

$$\alpha^* = \frac{x}{2-x},$$

in which case the probability of intervention q^* is increasing in the size of the liquidity shock ϕ. If $g(x) \leqslant \phi < f(x)$ (in Region IIb), the large investor buys the initial stake

$$\hat{\alpha} = \frac{2\mu-\phi}{2-\phi},$$

in which case the probability of intervention $\hat{q}$ is decreasing in ϕ. Finally, if $\phi < \max\{2x, g(x)\}$ (in Regions IIa and I), the large investor does not invest in the firm.

Proof. It only remains to show that $\hat{q}$ is decreasing in ϕ. Substituting $\hat{\alpha}$ from (9) into (1) gives

$$\hat{q} = q(\hat{\alpha}) = \frac{1}{2} - \frac{1-x}{1-\mu} - \frac{2(x-\mu)}{\phi(1-\mu)},$$

which is decreasing in ϕ if $x - \mu < 0$. But in Region IIb we have $x < \hat{x}$, and using (10), one can show that $\hat{x} < \mu$, so the result follows. □

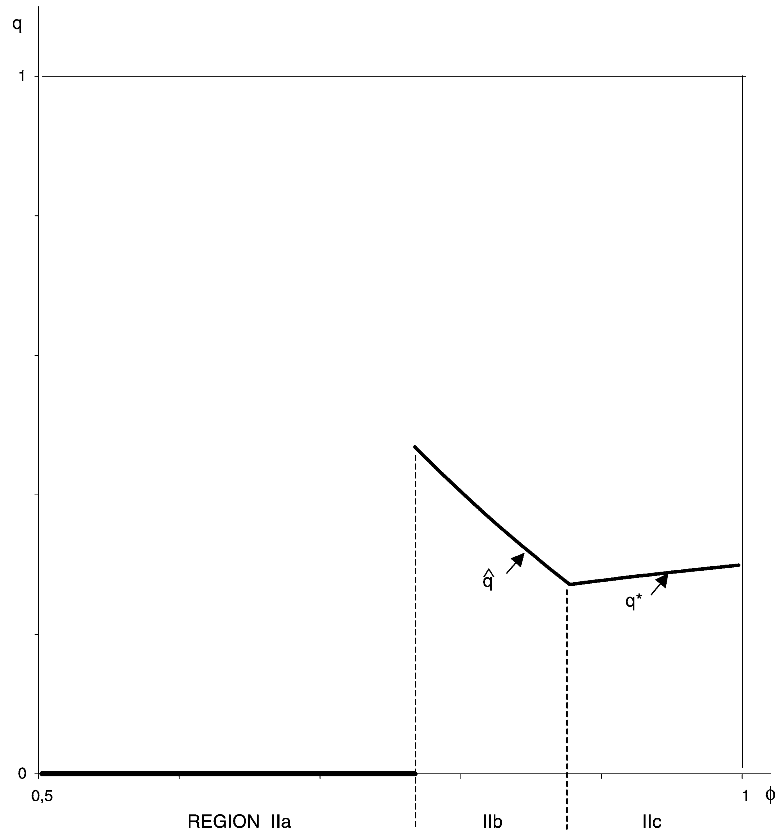

Fig. 2. The effect of liquidity on shareholder activism.

In Region IIb increases in the liquidity ϕ of the secondary market decrease the probability of intervention by the large investor, while in Region IIc increases in ϕ increase it. Hence we conclude that *the relationship between market liquidity and large shareholder activism is not monotonic*. This is illustrated in Fig. 2 for the case $\mu = \frac{1}{2}$ and $x = \frac{1}{5}$. Furthermore, in Regions IIa and I, the large investor does not invest in the firm, so we also conclude that *large shareholder activism requires a sufficient level of market liquidity*.

5. Conclusion

We have shown that the effect of market liquidity on large shareholder activism is not monotonic: the effect is positive in highly liquid markets and negative in markets with intermediate liquidity. We have also shown that in markets with low liquidity or when there is a large majority requirement the probability of intervention is zero.

A possible criticism of our results is that they rely on the existence of a majority requirement which may be irrelevant, since the large shareholder can always make a takeover bid (at, say, $t = 1 + \varepsilon$) for the required shares at a price that fully reflects the post-takeover value of the firm. However, if the takeover involves an additional fixed cost (as in Grossman and Hart, 1980) and the shortfall from the required majority is small, it is clear that the large shareholder will prefer to save this cost and buy more shares at the initial date, so the negative relationship between market liquidity and shareholder activism will still hold for some range of the parameter values.

Acknowledgment

We thank Ernst Maug, Jorge Padilla, and especially Denis Gromb for helpful comments.

References

Bhide, A., 1993. The hidden cost of stock market liquidity. Journal of Financial Economics 34, 31–51.

Grossman, S.J., Hart, O.D., 1980. Takeover bids, the free-rider problem, and the theory of the corporation. Bell Journal of Economics 11, 42–64.

Kyle, A.S., 1985. Continuous auctions and insider trading. Econometrica 53, 1315–1335.

Maug, E., 1998. Large shareholders as monitors: Is there a trade-off between liquidity and control? Journal of Finance 53, 65–98.