'Barbarians in Chains' - Takeover Regulation and Minority Shareholder Wealth

By

Ulrike Hoffmann-Burchardi

DISCUSSION PAPER 330

FINANCIAL MARKETS RESEARCH CENTRE

LONDON SCHOOL OF ECONOMICS

E·S·R·C
ECONOMIC
& SOCIAL
RESEARCH
COUNCIL

ISSN 0956-8549-330

'Barbarians in Chains' - Takeover Regulation and Minority Shareholder Wealth

By

Ulrike Hoffmann-Burchardi

DISCUSSION PAPER 330

LSE FINANCIAL MARKETS GROUP

DISCUSSION PAPER SERIES

July 1999

Ulrike Hoffman-Burchadi is a Research Assistant in the Department of Accounting and Finance and a member of the Financial Markets Group. The opinions expressed here are those of the author and not necessarily those of the Financial Markets Group.

'Barbarians in Chains' - Takeover Regulation and Minority Shareholder Wealth

Ulrike Hoffmann-Burchardi *
The London School of Economics
Financial Markets Group†

This Version: July 4, 1999

Abstract

This article proposes a model that formalises the trade-off minority shareholders of corporate raiders face with respect to the adoption of a mandatory tender offer after a shift in control. Under reasonable distributional assumptions about control and security benefits the model suggests that minority shareholders profit from the adoption of the mandatory bid rule. A subsequent empirical study supports this hypothesis by measuring the stock price effects after the acceptance of the German Takeover Code, which introduced the mandatory bid rule in 1995. A fully efficient maximum likelihood estimator is derived for a trivariate regression model that estimates characteristics of corporate acquirers, takes account of the endogeneity of the acceptance decision, and explains the abnormal event-period returns.

JEL Classification: G32, G34, G38

Keywords: Mandatory bid rule, minority shareholders, cross-sectional return studies

*I am greatly indebted to Vassilis Hajivassiliou for his invaluable advice regarding the estimation of the model. I would like to thank Sudipto Bhattacharya, Markus Brunnermeier, Mike Fishman, Glenn Hubbard, Markus Irngartinger, Hayne Leland, Christopher Lotz, Kristian Rydqvist, Clemens Sialm, David Webb, Dirk Willer and participants at the 1999 Western Finance Association meeting for helpful comments and suggestions. I am very grateful to Günter Müller-Stewens for granting me access to the M&A Review Database at the University of St. Gallen. Finally, I would like to thank Josef Tobien from the 'Übernahmekommission' of the Frankfurt Stock Exchange for insightful conversations and continuous updates of acceptance declarations of the Takeover Code. The usual disclaimer applies.

† London School of Economics, Financial Markets Group, Houghton Street, London WC2A 2AE, Tel.: +44-171-955-68 94, FAX: +44-171-242-10 06, e-mail: U.Hoffmann-Burchardi@lse.ac.uk

Non-technical summary

The debate on the welfare implications of takeover regulation has largely ignored the wealth effects for minority shareholders of companies with high acquisition activities ('barbarians'). The objective of this paper is to study the wealth effects of the mandatory bid rule (MBR) for minority shareholders of acquirers from both a theoretical and empirical perspective.

The article first proposes a model that formalizes the trade-off minority shareholders of corporate raiders face with respect to the adoption of a mandatory tender offer after a shift in control. On the one hand, minority shareholders of bidders are worse off because the MBR effectively grants a call option to the minority shareholders of the target, thus redistributing wealth from (minority) shareholders of the bidder to minority shareholders of the target. On the other hand, the MBR reduces the number of wealth-decreasing bids by preventing the bidding blockholder from acquisitions that do not sufficiently increase security benefits for its minority shareholders. Under reasonable distributional assumptions about the size of control and security benefits under the incumbent controller and acquirer the model suggests that minority shareholders profit from the adoption of the mandatory bid rule.

A subsequent empirical study tests this hypothesis by measuring the wealth effects for minority shareholders of acquirers in response to the acceptance of the German Takeover Code. The Code contains the mandatory bid rule as its core element and was introduced in Germany in 1995 as a self-regulatory initiative. The excess stock returns of signatory companies are regressed on variables proxying for the likelihood of becoming a prospective bidder. A fully efficient maximum likelihood estimator is derived for a trivariate regression model that estimates characteristics of corporate acquirers and takes account of the endogeneity of the acceptance decision. The empirical study confirms the hypothesis of the theoretical model that minority stockholders are better off with '*Barbarians in chains*'.

1 Introduction

Hitherto the debate on the welfare implications of takeover regulation (for an overview see Burkart [1997]) has largely disregarded the wealth effects for minority shareholders of 'barbarians', i.e., of companies with a high acquisition activity. Most studies on takeovers and their regulation portray the acquirer as a unified entity (the 'bidder' Grossman and Hart [1980], 'rival' (Harris and Raviv [1988]), 'outside buyer' Bebchuk [1994], etc.). Very frequently, however, acquirers are publicly traded corporations and subject to potential conflicts of interest between majority and minority shareholders. Inter-shareholder conflicts are especially acute in an institutional setting where ownership is concentrated. The presence of block ownership, a widespread characteristic of Continental European corporate governance, raises a number of unresolved welfare issues for minority shareholders of companies with acquisitive intentions. Is it, for example, in the interest of minority shareholders to adopt regulation that confines the company's acquisition activity, i.e., to '*lay the barbarian in chains*'? One regulatory measure to decrease takeover activity is to implement a mandatory bid requirement, which requires a tender offer to minority shareholders after a shift in control. Do minority shareholders of corporate acquirers fare better under this mandatory bid rule?

An answer to this question seems pressing as the mandatory bid rule (MBR) belongs to the core issues of takeover regulation and is currently subject to a controversial regulatory debate. Germany introduced a voluntary Takeover Code in 1995, which contains the mandatory bid rule as its core element. Its declared distributional objective is the protection of minority shareholders. This warrants a closer look at its wealth effects on minority shareholders of potential 'barbarians'. The mandatory bid rule (MBR) stipulates that a party that purchases more than $x\%$ of another listed company's voting equity is obliged to make an offer to the remaining target shareholders at a price not significantly smaller than the price paid in the original offer. The threshold of $x\%$ should reflect a controlling interest and usually varies between 20 and 50 percent of the company's voting equity. The MBR applies both in the case of dispersed ownership, where $x\%$ of shares are acquired via tender offer or open market purchases, and in a transfer of a controlling block of more than $x\%$. The unsettled theoretical debate on the wealth effects of the MBR is reflected in diverse regulatory implementations across different countries. The MBR is part of the UK City Code on Takeovers and Mergers and the proposed Thirteenth EU Company Law Directive. It is also present in the US state legislation of Pennsylvania and Maine. The Williams Act, the principal federal US legislation, however, abstains from the MBR and allows partial bids (market rule).

The objective of this paper is two-fold: it studies the wealth effects for minority shareholders of acquirers from both a theoretical and empirical perspective. The first objective of the paper is to model the wealth effects for minority shareholders of corporate bidders in the two alternative regulatory environments of the MBR and the market rule. On the one hand, the MBR restrains the 'control hungry' barbarian from acquisitions that do not sufficiently increase the security benefits of the target. On the other hand, it gives minority target shareholders the option to participate in the takeover, reducing the wealth of the shareholders of the acquiring company. Under reasonable distributional assumptions about control and security benefits under the incumbent controller and acquirer,

the model suggests that minority shareholders profit from the adoption of the mandatory bid rule. The second objective of the paper is to test the hypothesis by analysing the stock price reactions of companies in response to the acceptance of the German Takeover Code. The empirical study confirms the hypothesis of the theoretical model: Minority stockholders are better off with '*Barbarians in chains*'.

In the first part the paper develops a theoretical model that analyses the wealth trade-off for minority shareholders of corporate acquirers with respect to the MBR. At the same time, the model takes account of the institutional characteristics of Continental European corporate governance. A view on German corporate control transactions reveals that corporate rather than individual 'barbarians' are predominant. Out of the 85 transfers of share blocks of publicly traded companies (with a fractional equity ownership of at least 20%) during 1990-1995 a total of 54 (or 63%) of listed companies have been acquired by another listed company. Besides the prevalence of corporate raiders empirical evidence suggests that both bidder and target companies are likely to be controlled by a large blockholder. La Porta et al. [1998] report that only 36% of large (!) publicly traded companies in 27 industrialized economies are widely held without a major shareholder owning more than a 20% equity fraction. In Germany concentration of ownership is even more prevalent: the average free float of companies listed on the segments 'Amtlicher Handel' and 'Geregelter Markt' equals roughly 30% of the companies' equity capital and there are only 40% of companies without a dominant ultimate blockholder.

In this institutional setting the large blockholder of the bidder has two potential sources of preserving a takeover gain. The bidder can bargain with the blockholder of the target over the surplus resulting from the control transfer. If the security benefits under the management of the acquirer are higher than the negotiated takeover price, the blockholder of the bidder is better off compared to share purchases from atomistic shareholders. Secondly, and crucial to the argument of this paper, the costs of acquisition are partly passed on to the small shareholders who do not share any private benefits of control. The introduction of the MBR has two opposite effects on the welfare of small shareholders of the *bidder*. In the event of a control transfer the tender option of atomistic shareholders of the *target* company can lead to a welfare loss for the shareholders of the bidder. The expected welfare loss corresponds to the value of the call option embedded in the obligatory tender offer. This redistributes wealth from (minority) shareholders of the bidder to minority shareholders of the target. On the other hand, the amount of wealth-decreasing transfers is reduced under the MBR since the relative importance of future cash-flows increases in the overall takeover benefit. As the blockholder of the bidder will have to make an offer for the entire stock of the target, security benefits have to be higher, ceteris paribus, to warrant a takeover. The interests of small shareholders and blockholder of the bidding company are thus better aligned. In this respect the MBR is analogous to the 'one share-one vote' principle analysed in Grossman and Hart [1988]. In the same way in which 'one share-one vote' crystallizes more efficient bidders, the MBR sifts out targets with higher efficiency gains than the market rule.

The subsequent empirical study measures the wealth effects for minority shareholders in response to the acceptance of the MBR, which was introduced in Germany as part of the voluntary Takeover Code in 1995. The wealth effects are analysed in two ways: by

measuring the abnormal returns of likely acquirers in a standard event study procedure and by conducting a cross-sectional return study where abnormal returns are regressed on firm-specific characteristics. The voluntary nature of the acceptance decision makes it necessary to take account of a potential selection bias in the cross-sectional return regression which surfaces because we only focus on excess stock returns of companies that signed the Code. Recent cross-sectional return studies have used consistent estimators by explicitly allowing for the selection bias in analysing excess stock returns following voluntary corporate events (Eckbo et al. [1990] and Acharya [1993]). This paper uses a maximum likelihood estimator to incorporate potential correlation between the error terms of the selection equation, i.e., the acceptance decision of the Code, and the continuous cross-sectional return regression. By incorporating the endogeneity of the Code's acceptance in the specification the estimation will cast light on the incentive structure of management with respect to the compliance decision.

The specification consists of a three equation system for which a fully efficient maximum likelihood estimator is derived. The theoretical model suggests that the likelihood of undertaking future acquisitions is crucial both for the acceptance decision and the magnitude of abnormal stock returns subsequent to acceptance. The specification therefore includes a first equation that determines the characteristics of corporate acquisition activity. The predicted future acquisition activity is used together with other firm-specific characteristics as an explanatory variable for the acceptance decision in the second equation. Finally the third equation which only incorporates the truncated observations of companies with a positive acceptance decision explains the excess returns in the wake of the compliance decision. The excess stock returns of signatory companies after the publication of the acceptance decision are regressed on firm characteristics including the number of predicted takeovers.

The paper proceeds as follows. Section 2 reviews the theoretical and empirical literature on the welfare effects of the mandatory bid rule. Section 3 develops a *model* that analyses the trade-off for minority shareholders of acquiring companies with respect to the introduction of the mandatory bid rule. The model allows us to derive *hypotheses* regarding the wealth effects for both minority and majority shareholders of 'barbarians' under the mandatory bid rule. The second half of the paper tests the hypotheses of the theoretical model and conducts an *empirical study* on the wealth effects minority shareholders of corporate acquirers experience following the acceptance of the Takeover Code in Germany. The empirical specification is developed in three steps. Because fundamental to both the acceptance decision and the wealth effects, Section 5 determines the characteristics of corporate acquirers. The following section then discusses the costs and benefits of compliance with the Code. Section 7 finally estimates the complete model including the cross-sectional return equation.

2 Literature

The *theoretical* contributions on the welfare effects of the mandatory bid rule can be subdivided into two classes according to the ownership structure of the target company: models where the target company is controlled by a large incumbent blockholder and

models of target companies with dispersed ownership. As part of the former category Bebchuk [1994] derives the aggregate welfare of target shareholders and bidding investor with and without the obligation to submit a tender offer to minority shareholders after a transfer in control. He first outlined the basic welfare trade-off between the market rule and the mandatory bid rule. Partial bids facilitate efficient transfers of control, but are inferior in discouraging inefficient transfers. If existing and new controllers draw their characteristics from the same distribution the paper shows that the market rule dominates the MBR. In a similar setting Burkart, Gromb, and Panunzi [1998] find that the MBR increases social welfare since it results in a larger stake held by the new controlling party, which implies less inefficient extraction of private benefits. Yarrow [1985] falls into the latter category of models of target companies with a dispersed ownership where control is acquired via tender offers. Under the MBR non-differentiated bids are not possible, since all target shareholders are to be offered a price not lower than the price at which the initial equity position was acquired. Yarrow [1985] focuses exclusively on the detrimental effects of the market rule. In his setting the MBR serves as means to protect target shareholders from being forced into a minority position subject to oppression from a large shareholder. Under the same ownership assumptions Bergström, Högfeldt and Molin [1995] find that the MBR only increases the welfare of target shareholders if the difference in private benefits of two contestants for control is significant. In this case the MBR puts relatively more weight on security benefits so that the relative willingness to pay for security benefits is similar and competition is as fierce as possible.

There are two ways in which *empirical* studies have directly or indirectly addressed the welfare effects of the MBR for atomistic shareholders of target and bidder companies. Karpoff and Malatesta [1989] have analysed the stock price reactions after the enactment of the MBR in Pennsylvania, Maine, Utah and New York[1]. They found negative, but insignificant average excess returns for the stocks of the companies incorporated in these federal states on the two-day interval of announcement and pre-announcement day. Whereas this study provides an estimate for the overall welfare implications of the MBR, it blurs the wealth effects for small shareholders for potential target and bidding companies[2]. In a different approach Holderness and Sheehan [1988] focus on the wealth effects for minority shareholders following sale-of-control transactions. They report that in cases in which a simultaneous offer was made to minority shareholders, abnormal event period returns for target company shareholders were significantly higher than for the complete sample. This finding lends support to the wealth-increasing effects of the MBR to target shareholders in the case of a takeover. However, it does not (and does not claim to) provide a direct test on the welfare effects of the MBR, since it disregards the potential of the MBR to hinder wealth-increasing bids for minority target shareholders.

The overview of the existing literature shows that although comparative studies on target shareholder or aggregate welfare effects are numerous, the wealth implications for minority shareholders of bidding companies have not yet been the focus of the welfare

[1]The MBR in New York and Utah was repealed in 1987; for details see Karpoff and Malatesta [1989].

[2]The market price reaction to the introduction of the MBR reflects a change in share value to the marginal investor. Since it is unlikely that the marginal investor is a controlling shareholder, the shareprices reflect the value of the shares to a small shareholder uninvolved in the control of the company.

analysis. Since the MBR originates in the distributional objective of protecting minority shareholders it seems equally important to analyse how minority shareholders of potential corporate raiders are affected by the rule.

3 Model

3.1 Assumptions

There are two publicly traded companies, R and T, both controlled by an existing blockholder. The set-up of the model is similar to Bebchuk [1994] with the main difference that the raider is another listed company with a dominant shareholder. The companies have n_T and n_R shares outstanding, of which k_T and k_R shares are owned by the incumbent blockholders respectively. Both k_T and k_R should be sufficiently large to grant control. The remaining $n_T - k_T$ and $n_R - k_R$ shares are dispersed among public investors. The blockholder of R, r, is a potential new controller of T. Under the control of its existing owner t, the value of firm T consists of its discounted future cash-flow stream, Y_t, and private benefits of control, B_t,

$$V_t = n_T Y_t + n_T B_t$$

of which $(n_T - k_T)Y_t$ accrue to the small shareholders and $k_T Y_t + n_T B_t$ to the controlling blockholder. Under the control of the new blockholder, r, the firm value of T corresponds to $V_r = n_T Y_r + n_T B_r$. The variables Y_r, B_r, Y_t, and B_t are common knowledge and B_r, $B_t > 0$. The bargaining game between t and r about the transaction price is modelled in the following fashion: In one round of bargaining one of the two randomly chosen parties will make a take-it-or-leave-it offer to the other party. The contender r will make a take-it-or-leave-it offer to t with probability θ, and t will make a take-it-or-leave-it offer to r with probability $(1 - \theta)$.

3.2 Transfers of control

First, we will compare the conditions under which transfers of control take place in the two regulatory environments. Under the market rule (MR) the seller is free to sell the control block to the acquiring party without being obliged to extend an offer to minority shareholders. Under the mandatory bid rule (MBR), however, the acquiring party has to make an offer to minority shareholders on the same terms as to the blockholder. In both instances a sale-of-control transaction will only occur if the parties agree on a price that will make both of them better off. This is the case if r has a higher reservation value for the share block than t.

Proposition 1. *Under the MR a transfer of control will occur if and only if*

$$\underbrace{Y_r + \frac{n_R}{k_R}\frac{n_T}{k_T}B_r}_{\text{per share value of block to } r} > \underbrace{Y_t + \frac{n_T}{k_T}B_t}_{\text{per share value of block to } t \text{ in absence of sale}}. \quad (1)$$

Since r can bargain with t about the price of control transfer his takeover gain is not completely dissipated[3]. Inequality [1] is more likely to be satisfied, the smaller the controlling equity position of r in R, k_R/n_R. The smaller his fraction of cash-flow rights, the more r can (mis)use the funds from minority shareholders in order to finance his private benefits of control. This result might explain why VW instead of BMW succeeded in the takeover bid for Rolls Royce. Assume that the blockholders of the two companies derived the same security and control benefits from an acquisition of Rolls Royce. The company which is controlled with a smaller equity block is in a position to make a higher bid. This was VW which is only controlled with a 25% equity stake by the Federal State of Lower Saxony, whereas the major shareholder of BMW, the Quandt family, owns just under 50% of the company's equity. Analogously, the higher the equity fraction r has to acquire of T, the smaller his reservation value for t's block. In the extreme case where $k_T/n_T = 1$, as is the case under the MBR, we obtain Proposition 2:

Proposition 2. *Under the MBR a transfer of control will occur if and only if*

$$\underbrace{Y_r + \frac{n_R}{k_R} B_r}_{\text{per share value of block to } r} > \underbrace{Y_t + \frac{n_T}{k_T} B_t}_{\text{per share value of block to } t \text{ in absence of sale}} . \tag{2}$$

The transaction price under the MBR has to be greater than $Y_t + (n_T B_t)/k_T$ to make t better off, but cannot be larger than $Y_r + (n_R B_r)/k_R$, since r would incur a welfare loss. The component of private benefits in r's reservation value for the share block shrinks because small shareholders of the target company have the option to tender their shares. The raider's willingness to pay is reduced and with an unchanged reservation value of t a transfer of control is less likely. A comparison of condition [1] and [2] shows that the circumstances in which transfers occur under MBR are a subset of circumstances in which transfers occur under MR. Whereas the analysis of control transfers has been independent of the surplus division between t and r, the study of the wealth effects will have to take account of the relative bargaining power of the two parties.

3.3 Aggregate Comparison of Wealth Effects

The analysis of the wealth differential between the MR and MBR follows two steps. First, we divide the possible states of nature into three subsets. We subsume under Case 1 all states of nature where transfers of control do not take place either under the MR or under the MBR. Since all transfers which occur under the MBR also occur under MR, it is sufficient to impose $Y_r + (n_R n_T B_r)/(k_T k_R) < Y_t + (n_T B_t)/k_T$ for no transfers to take place. For $Y_r + (n_R B_r)/k_R < Y_t + (n_T B_t)/k_T$ no sale-of-control transactions occur under the MBR, but condition [1] ensures that transfers occur under MR (Case 2). A transfer of control from t to r will take place under both regimes if inequality [2] is satisfied (Case 3).

In order to determine which of the two rules generates greater wealth to the minority shareholders of R, we derive the welfare differential between the two rules for each of the

[3]Proofs for propositions and lemmas that are not a straightforward result from the model set–up will be relegated to the Appendix.

three cases. We denote ΔW as the difference between the expected payoff for small R shareholders under MR and under MBR, i.e., $\Delta W > 0$ implies a welfare surplus of the MR over the MBR. In particular, ΔW_{TN} stands for the welfare effect of the MR in case 2, where no transfers occur under the MBR. The wealth differential ΔW_{TN} thus exclusively depends on whether transfers of the MR are wealth-increasing or wealth-decreasing for minority shareholders of R. When transfers occur under both rules, ΔW_{TT} captures the wealth difference between MR and MBR.

Lemma 1. *The aggregate expected welfare differential between MR and MBR to minority R shareholders, ΔW, equals*

$$\begin{aligned}\Delta W = Prob(Y_r + \tfrac{n_R}{k_R}B_r > Y_t + \tfrac{n_T}{k_T}B_t) \cdot E(\Delta W_{TT} \mid Y_r + \tfrac{n_R}{k_R}B_r > Y_t + \tfrac{n_T}{k_T}B_t) \qquad (3)\\ + Prob(Y_r + \tfrac{n_R}{k_R}B_r < Y_t + \tfrac{n_T}{k_T}B_t < Y_r + \tfrac{n_R}{k_R}\tfrac{n_T}{k_T}B_r)\\ \cdot E(\Delta W_{TN} \mid Y_r + \tfrac{n_R}{k_R}B_r < Y_t + \tfrac{n_T}{k_T}B_t < Y_r + \tfrac{n_R}{k_R}\tfrac{n_T}{k_T}B_r)\ .\end{aligned}$$

The first term on the right-hand side corresponds to the expected welfare differential between MR and MBR in cases where transfers occur under both regimes. The second term on the right-hand side corresponds to the expected welfare differential between MR and MBR in cases where transfers occur under MR, but not under MBR. When no transfers occur the wealth difference is zero.

Lemma 2. *If conditions are such that transfers occur both under the MBR and MR (Case 3), the differential welfare effect for minority R shareholders between MR and MBR corresponds to*

$$\Delta W_{TT} = -\theta\left[\tfrac{n_R - k_R}{n_R}(n_T - k_T)\left(Y_r - \max\{Y_r, Y_t + \tfrac{n_T}{k_T}B_t\}\right)\right]. \qquad (4)$$

Small shareholders of the bidding company are likely to incur an expected differential welfare loss under the regime of the MBR, i.e., $E(\Delta W_{TT} \mid .) \geq 0$.

The only difference in the payoffs between the two rules results from the tender offer the bidder has to submit under the MBR. The obligatory tender offer confers a call option with the payoff $\max\{Y_r, Y_t + (n_T B_t)/k_T\}$ to the small shareholders of the target. The wealth loss to small shareholders of the bidder under the MBR equals the value of the option to tender. It can be easily seen from [4] that the MR is superior for small R shareholders if $Y_r < Y_t + (n_T B_t)/k_T$, i.e., if small shareholders of T have an incentive to exercise their call option. Because of this wealth redistribution from bidder to minority shareholders of T it is always more profitable for R to only acquire the block of shares under the MR. Only if $Y_t + (n_T B_t)/k_T < Y_r$, are small R shareholders indifferent between the two rules ($\Delta W_{TT} = 0$). In this case small target shareholders are better off to refrain from tendering their shares and remain shareholders of T. The welfare differential is also zero if r never enjoys absolute bargaining power, i.e., $\theta = 0$. In this case t skims the surplus from r under both rules, so the wealth gain to r is zero. Small T shareholders, however, still have to finance r's private benefits in an order of magnitude of $-n_T B_r(n_R - k_R)/k_R$. The two regulations only differ in how the surplus is divided between the minority shareholders and blockholder of the target. Under the MR the blockholder of T obtains $Y_r + (n_R n_T B_r)/(k_R k_T)$ per share and minority shareholders receive security benefits of Y_r. Under the MBR all T shareholders receive a payoff of $Y_r + (n_R B_r)/k_R$ if t makes a take-it-or-leave-it offer to r.

Lemma 3. *If conditions are such that transfers occur under the MR, but not under the MBR (Case 2), the differential welfare effect between MR and MBR for the minority R shareholders corresponds to*

$$\Delta W_{TN} = \frac{n_R - k_R}{n_R} \left(\theta[k_T(Y_r - Y_t) - n_T B_t] - (1-\theta) n_T \frac{n_R}{k_R} B_r \right).$$

Small shareholders of the bidding company will always incur an expected differential welfare loss under the regime of the MR, i.e., $E(\Delta W_{TN} \mid .) < 0$.

In this case the welfare differential ΔW_{TN} equals the payoff small R shareholders receive from the acquisition of t's block of T shares. The first term in the inner square brackets corresponds to their share of the bargaining surplus which arises if r has absolute bargaining power. At the same time, small R shareholders still have to finance part of r's private benefits, $n_T B_t$. However, if t is the one making the take-it-or-leave-it offer, there will be no bargaining surplus for R and small R shareholders will have to finance the full value of private benefits $(n_R n_T B_r)/k_R$. The incremental term n_R/k_R takes account of the fact that r can spread the financing costs of the acquisition across its minority shareholders. In a sense, if t enjoys absolute bargaining power, t 'exploits' the fact that r can 'exploit' minority R shareholders in financing his private benefits of control.

If transfers occur under MR, but not under MBR this implies that $k_T(Y_r - Y_t) < n_T B_t$. The private benefits of the existing blockholder t, for which he has to be compensated, are larger than the increase in cash-flows from which small shareholders of R can profit. The only potential source of gain for small R shareholders are increased security benefits under the new management of r. Since these are smaller than the minimum outlays for private benefits of control, $n_T B_t$, small shareholders of R do incur a wealth loss. So far, we have seen that the MR implies higher welfare for small shareholders of 'barbarians' in situations where transfers of control would occur under both regulatory regimes. The MR, however, reduces minority shareholder wealth in control transactions which would not have taken place under the MBR.

Proposition 3. *If t makes a take-it-or-leave-it offer to r with a higher than 50% probability, then the ex post welfare of minority R shareholders is lower under the MR than under the MBR, i.e.,* $|E(\Delta W_{TN} \mid .)| > E(\Delta W_{TT} \mid .)$.

A smaller bargaining power of r makes the relative advantage of the MR over the MBR in Case 3 shrink. As discussed above, as r's bargaining power approaches zero, the small shareholders of the bidder fare equally well under the two rules. A smaller probability with which r is the one making the take-it-or-leave-it offer to t, however, does affect the expected loss of the MR in Case 2 in an opposite way. The worse r's bargaining position the higher the price t obtains and thus the higher the price which is the basis of the tender offer to minority shareholders of T. If the probability of t making a take-it-or-leave-it offer to r is greater than 50%, the former effect outweighs the latter.

So far we have exclusively focused on ex post welfare implications of the two rules. In order to derive the aggregate wealth impact of the regulations one has to take account of the ex ante expected values of the different cases. This requires distributional assumptions about the private control benefits and cash-flow generating power of the two

parties. We obtain an unambiguous result of the ex ante wealth effects under the following distributional assumptions:

Proposition 4. *If B_r and B_t are distributed on $[0;\alpha_r]$ and $[0;\alpha_t]$ respectively, and if $Y_r - Y_t$ is uniformly distributed on $[-\omega_0,\omega_1]$ with ω_0 and ω_1 sufficiently large, the MBR constitutes ex ante a welfare-increasing regime for small shareholders of R.*

With these general assumptions about the distribution of control and security benefits of the two parties, small shareholders of prospective acquirers will unequivocally profit from the introduction from the MBR. Note that the assumptions do not require symmetric characteristics of the incumbent controller and the control aspirant. The superiority of the MBR results from the fact that the probability of a welfare loss of the MBR in cases of transfers under both rules is smaller than the probability of a welfare gain in cases of transfers under only the MR. With transfers under both rules a wealth loss occurs in the presence of the MBR if $Y_r - Y_t$ ranges between $B_t n_T/k_T$ and $B_t n_T/k_T - B_r n_R/k_R$, i.e., in an interval length of $B_r n_R/k_R$. This is the case since the MBR only entails a wealth loss with respect to the MR if transfers occur under both rules *and* the small target shareholders decide to tender their shares. When transfers occur only under the MR, the welfare gain of the MBR occurs whenever $Y_r - Y_t$ ranges between $B_t n_T/k_T - B_r n_R/k_R$ and $B_t n_T/k_T - B_r n_T n_R/(k_R k_T)$, i.e., in an interval length of $B_r n_R/k_R(n_T/k_T - 1)$. Because of the uniform distribution of $Y_r - Y_t$ the frequency of welfare gains due to the MBR outweighs on average the frequency of welfare losses.

So far we exclusively focused on the welfare of minority shareholders of R. The model can also be used to study the wealth effects for the controlling blockholder of the acquirer. In fact, we find that the controlling blockholder of R will be unequivocally worse off under the MBR (Bebchuk [1994]).

Proposition 5. *The controlling blockholder of a corporate acquirer suffers a welfare loss under the MBR .*

For a formal proof see Bebchuk [1994]. Propositions 1 and 2 have shown that circumstances in which transfers occur under MBR are a subset of circumstances in which transfers occur under MR. Since r will only purchase a control stake in T if this makes him better off, it suffices to derive the wealth differential if transfers occur under both rules. In this case r suffers in a similar way as R's minority shareholders from the tender option of minority shareholders of T. It can be easily seen that r's wealth loss corresponds to the value of the call option to minority T shareholders.

3.4 Model conclusions and hypotheses

The model has highlighted the wealth effects for both controlling and minority shareholders of companies with acquisition intentions under the alternative regulatory designs of the MR and the MBR. The model has shown that a controlling blockholder of a publicly traded firm experiences a wealth loss under the MBR (Proposition 5). In case of an acquisition the blockholder has to compensate minority target shareholders on the same terms as the selling blockholder if they decide to sell off their shares. It is obvious that

this wealth loss only occurs when the blockholder faces profitable acquisition opportunities. Companies under blockholders which generally produce relatively high Y_r and B_r (so that [1] is frequently satisfied) will experience a greater wealth loss than companies which are unlikely to undertake acquisitions[4]. Proposition 5 thus translates into the following hypothesis[5]:

Hypothesis 1: *A controlling blockholder is reluctant to adhere to the mandatory bid rule. He is less inclined the larger his future acquisition agenda.*

The wealth effects for minority shareholders of corporate acquirers are less clear-cut. Whereas the MBR prevents wealth-decreasing acquisitions, it can incur a wealth loss because it imposes an obligatory tender to the small shareholders of the target. The superiority of either of the two rules for the minority shareholders of bidding companies depends on the size of the blockholder of both bidder and target, the relative bargaining power of the two parties and on the distributional assumptions about Y_r, Y_t, B_t and B_r. Proposition 4 finds that the MBR constitutes ex ante a welfare-increasing regime for the small shareholders of the acquiring company under reasonable distributional assumptions about control and security benefits of the two parties. Again, the wealth loss only occurs if the controlling blockholder is likely to engage in future acquisition activity. We therefore posit the following hypothesis:

Hypothesis 2: *Minority shareholders of potential acquirers experience a wealth increase upon the adoption of mandatory bid rule. The wealth increase is higher the more likely the company undertakes acquisitions in the future.*

The following empirical study will cast light on the validity of these hypotheses. In particular, the empirical analysis will depict the relation between the existence of a controlling blockholder, corporate acquisition activity and minority shareholder wealth following a change in corporate governance regulation in Germany in 1995.

4 Empirical analysis of wealth effects

4.1 The Takeover Code in Germany

In Germany a voluntary Takeover Code came into effect in October 1995 which (listed and unlisted) companies can decide to sign or not to sign. Drafted by an expert commission (consisting of representatives of banks, listed companies, small shareholders and the

[4]For companies that abstain from takeovers the wealth effect for minority shareholders upon the adoption of the MBR should be zero (see Table I). However, already a slight nonzero probability of future acquisitions yields a positive wealth effect in response to the MBR.

[5]We abstract here from agency problems between (controlling) shareholders and management. In the absence of a controlling blockholder, management is assumed to act in the interest of its dispersed shareholders. Since atomistic shareholders by definition derive no private benefits of control, management will only proceed with a takeover when the per share cash-flow value of the target block under their management exceeds the reservation value of the incumbent target blockholder, i.e. if $Y_r > Y_t + \frac{n_T}{k_T} B_t$. Management will be indifferent between MR and MBR, since, due to the free-riding behaviour of atomistic shareholders, minority target shareholders will always obtain Y_r.

Frankfurt stock exchange) the Code relies on the principle of self-regulation. A Takeover Commission ('Übernahmekommission) at the Frankfurt stock exchange supervises the adherence to the rules of the Code. If a company decides to abide by the Code, it is restrained both in the role of a potential target and as a potential bidder. First, if it purchases more than 50% of another listed company's equity, it is obliged to make an offer to the remaining shareholders within the next 18 months. The offer price must not be lower by more than 25% than the price at which the initial shareholding was acquired and should be in adequate relation to the current stock price (Articles 16 and 17). Following severe criticism regarding the laxity of its stipulations the Code was revised in the second half of 1997. Since already a much smaller blockholding can provide a majority at an AGM, the takeover commission has reduced the threshold of a controlling interest to 30%. The mandatory offer has to follow immediately after surpassing the critical equity participation of 30% and can no longer be postponed for 18 months. Finally the price of the tender must not be smaller than the price at which the initial controlling stake was acquired. The new regulations have been effective since 1 January 1998. Second, a signatory is obliged to abstain from any defensive measures in case it is itself the subject of a public tender offer. Such measures include issues of new shares or significant changes in the company's assets and liabilities (Article 19). Other stipulations regulate the length of the offer period, the appropriate disclosure of offer terms and of purchases of shares subsequent to the offer, and conditions for improved offers from the same bidder.

Approval of the Code is subject to a company's management board. So far the acceptance decision has not been delegated to shareholders' approval at an AGM. The immediate effect of the compliance declaration is a note of acceptance in the 'Börsenzeitung', the main stock exchange publication. It appears on average two days after the notification of acceptance has reached the Takeover Commission. The special symbol, Ü, next to the company's name and stock code designates compliance with the Code. Given the constraints the Code imposes on its signatories, what are the benefits of acceptance or, alternatively, what are the sanction mechanisms for non-acceptance? Sanction measures with moral suasion character include press articles which stress the importance of compliance to the attractiveness of Germany's financial system. These articles usually contain lists with the companies that officially abide by the Code, and a 'red list' with 'resistant insurgents'. An often articulated threat is the enactment of a legally binding code if an insufficient number of companies abide voluntarily. In addition, government officials use their influence to pressurize the largest German companies to accept the Code.[6] The only 'hard' form of penalty, however, is a possible non-admission of companies to the stock market indices DAX and MDAX.[7] Acceptance of the Code is also a prerequisite for a listing in Germany's new stock market segment for growth companies, 'Neuer Markt'. How companies are penalized if they de facto violate the Code in a sale-of-control transaction, is still largely untested ground. So far, the Takeover Commission has only issued a critical statement concerning a takeover bid of Glunz AG by Future Holding AG in 1996

[6] Someone no less prominent than Dr Theo Waigel, former German Finance Minister, personally wrote to four resistant major German companies including VW and BMW (in vain!) urging them to formally declare their compliance with the Code.

[7] This does not, however, extend to existing members of the DAX or MDAX. Even if they fail to abide, they are not removed from the indices.

which violated formal bid requirements of the Code (but not the lack of a mandatory tender offer). Potentially a result of the public criticism the tender offer only attracted minuscule acceptance among target shareholders. Apart from this case the provisions of the Code have been adequately followed in various transfers of control. In line with the assumptions of the model proposed under [3] the common feature of these cases has been a purchase of a controlling interest from an incumbent blockholder[8].

4.2 Some Conceptual Issues

The objective of the empirical study is to analyse the stock price reaction ensuing the acceptance of the Takeover Code. At first, however, some conceptual issues surrounding the implications of the acceptance decision have to be resolved. First, it is questionable whether the acceptance of the Code represents a credible long-term commitment. The fickleness of Metallgesellschaft which first acceded to the Code, but withdrew its signature after it lost its membership in the DAX might suggest that formal acceptance is of a quite discretionary quality. Metallgesellschaft has been, however, the only company with a capricious stance towards the Code.[9] Not any of the other 268 publicly traded companies which formally abide by the Code, have questioned their commitment to the rules since the implementation of the Code more than three years ago. Therefore we can reasonably assume that the signatories will comply with the provisions of the Code at least in the medium term, i.e., sufficiently long to make a difference in a future control transaction.

A second issue are the welfare effects of the Code which can derive from two potential sources. Firstly, the Code possibly restrains bidding activity through the mandatory bid requirement. Secondly, it prohibits defensive measures in the presence of public tender offers. In general, there are two competing hypotheses concerning the wealth effects of takeover defenses. On the one hand takeover defenses raise the cost of replacing inefficient management and reduce stockholder wealth of target companies[10]. On the other hand, shareholders might secure a higher control premium in the event of a takeover bid. Given the institutional characteristics of German corporate governance, however, it is very unlikely that these wealth effects blur the stock price reaction resulting from the mandatory bid component of the Code. Takeover defenses are only economically significant if there are possible hostile takeover attempts which the managements seeks to avert. The paucity of hostile takeover attempts in Germany (Edwards and Fischer [1994], Franks and Mayer [1997]), however, gives takeover defenses limited relevance. The virtual lack of hostile takeovers is due to the widespread presence of block ownership in Germany (Hommel [1998]). Also, tender offers are not a common means of acquiring control of companies with *dispersed* ownership. Virtually all acquisitions of listed companies with dispersed ownership during 1985-1995 took place through open-market purchases (e.g., Metro AG,

[8] Examples include the takeover of Rosenthal by Waterford Wedgwood, Hapag Lloyd by Preussag, AMB by Assicurazioni Generali, and Berlinische Lebensversicherung by Commercial Union.

[9] It might be argued that Metallgesellschaft was relatively immune to the negative public relation campaign which was launched by the stock exchange following its withdrawal from the Code. Due to Metallgesellschaft's massive derivative losses and management turmoil it already enjoyed a very moderate public relations profile.

[10] Malatesta and Walking [1988] find that poison pill defenses reduce stockholder wealth by a statistically significant amount.

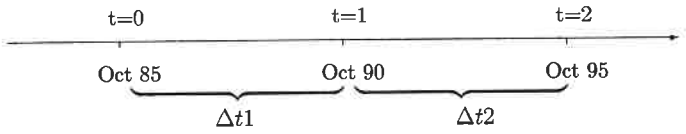
Hoesch AG, Otto Stumpf AG). The introduction of more stringent disclosure requirements of shareholdings in 1995 has certainly reduced the extent of share purchases in the open market. During 1995-1997, however, only 2 public tender offers were submitted with the objective to acquire control (see Appendix). In all other transfers of control an acquisition of a share block has preceded the mandatory tender offer. Finally, the range of takeover defenses is limited by German corporation law. Poison pill securities which are common as takeover defenses in the US are prohibited in Germany. These considerations suggest that the abstinence from takeover defenses should have a minor impact relative to the imposition of the mandatory bid requirement[11].

4.3 Data

The data used for estimation consists of variables measured during two time periods, $\triangle t1$ and $\triangle t2$, and at two distinct points in time, $t = 1$, and $t = 2$. The time line below depicts the different sample points and intervals.

FIGURE I

TIME LINE FOR SAMPLING POINTS AND INTERVALS



The estimation presupposes that wealth effects from the acceptance of the Code differ between potential bidders and companies likely to be uninvolved in corporate control transactions. The pre-1995 data is used to determine the characteristics of corporate acquirers. Variables measured in October 1995 are included to proxy for factors which influence a company's acceptance decision of the Code. A subset of these variables and other firm-specific characteristics in 1995 are used to explain the stock price reactions subsequent to a firm's approval of the Code. A detailed description of the data sources can be found in the Appendix.

Table II lists the summary statistics of the sample at the different sampling points and intervals. The number of acquisitions during the two time intervals October 1985-October 1990 and October 1990-October 1995 are obtained from the M&A Review Database at the University of St. Gallen. The Database comprises all corporate transactions in which a German company has been involved since 1985. For purposes of this study all corporate acquisitions undertaken by domestic companies listed on German stock exchanges were retrieved. In terms of M&A Review Database notation this corresponds to transaction

[11] In fact, the majority of public statements about the reasons for a company's rejection of the Code has critizised the lack of leeway with respect to corporate control transactions. Georg Obermeier, CEO of VIAG AG, said the Code 'costs a lot of money' since his company pursues a 51% participation model with its non-energy subsidiaries (Süddeutsche Zeitung, 13 November 1997).

type 0 which designates equity participations in other companies. In addition, an increase of existing equity stakes (transaction type 6) and control contracts ('Beherrschungsvertrag' - transaction type 8) were taken into account[12]. All equity participations exceeding 25% in listed and unlisted companies (there is no indicator for a stock exchange listing) were included in the sample. Purchases of substantial parts of a company's long- or short-term assets do not fall into the category of equity participations and are therefore excluded from the number of acquisitions. The number of acquisitions during October 1985 and October 1990 is obtained for all companies which were listed in October 1990, while the number of acquisitions in the consecutive five year period is retrieved for all companies listed in October 1995. Since the database comprises acquisitions of listed and unlisted companies, acquisitions can be retrieved even if the company has not been listed for the entire preceding five years. In case a company has been subject to a merger, an equity carve-out, or a takeover with a change in business activities during this five-year period, the company is excluded from the sample, if its acquisition track-record in its current form is less than 2 years. For companies with an acquisition history of more than two but less than five years the number is extrapolated to a five-year acquisition figure. Nordag Immobilien AG, for example, has been listed since May 1995, but has been part of the liquor producer Doornkaat AG before it was carved out as a real estate business at the end of 1994. It is therefore excluded from the sample. The 'acquisition king' during 1985-1990 was Deutsche Bank AG with 25 acquisitions replaced by Siemens AG in the subsequent period 1990-1995 with 34 purchases of equity stakes.

Authorized capital is the maximum amount of equity capital by which the management board can increase the current amount of subscribed capital without consent of the company's shareholders. A prerequisite is an authorization by shareholders at the AGM, where a 75% majority is needed for a decree to increase authorized capital. The amount of authorized capital, however, must not exceed half of the current share capital and is only valid for 5 years (§§ 202-206 AkG). The frontrunners in terms of authorized capital have changed between the two sampling points from companies in the chemical sector to companies in telecommunication related industries. Whereas in 1990 BASF was the company with the highest authorized capital (750m DM), Deutsche Telekom AG takes the lead in 1995 with 1431.5m DM of authorized capital, followed by Siemens AG with 800m DM.

The ratios capital gearing and net current assets over total assets are only meaningful for non-financial institutions (including insurance groups). This explains the reduced sample size in both periods. The net current asset ratio can turn negative if short-term liabilities exceed short-term assets. Bluthardt AG and Köln-Düsseldorfer AG with a NCR of -0.52 and -0.32 respectively were two examples of companies in 1995 where short-term debt could not be covered by short-term assets. The capital gearing ratio is greater than 1 if a company is in financial distress with a negative equity position. This was the case with K&M Möbel AG in 1995 where liabilities account for more than 130% of total assets corresponding to a negative nominal equity value of 30%. Overall, the leverage of German companies has slightly increased from 1990 to 1995, though not at the expense of NCR

[12]Other categories of corporate transactions include foundations of new subsidiaries, mergers, strategic alliances, cross-holdings and management (resp. leveraged) buy-outs.

which has equally risen from 22% to 23%.

Despite the criticism of the Takeover Code, an average of 38% of listed companies formally acceded to the regulation by 31 December 1997. Of the 13% of companies included in one of the major stock exchange indices a more substantial fraction of 61% signed the Code. The DAX consists of the 30 stocks with the highest liquidity and market capitalization. The mid-cap index MDAX covers the next 70 securities in terms of turnover and market value. The market capitalization of listed companies averages 1.3bn DM in October 1995, with Allianz worth 63bn DM way up in the lead before Siemens follows with a market value of 43bn DM. Daimler Benz stock has the highest average daily turnover in October 1995 where shares worth about 140m DM change hands each day. Banks only represent 6% of listed companies, but are represented on the supervisory board of 22% of other publicly traded companies in October 1995.

As discussed in the introduction, the ownership structure of German listed companies is characterized by a predominance of blockholdings. As opposed to the US where about 80% of publicly traded companies are widely held (La Porta et al. [1998]) the average free-float in Germany only equals 32% and 71% of companies are directly majority controlled. A more substantial 89.3% of listed companies have an immediate blockholder with a more than 25% shareholding. The widespread presence of direct block ownership, however, does not imply that there is an ultimate controlling individual shareholder. If a company is controlled by another firm it is necessary to identify the owners of the holding company and potential higher-level holding companies. We define companies as 'owner-controlled' if there is an ultimate individual blockholder and the ownership links between the intermediate holding companies exceed 25% shareholdings respectively. In Germany shareholdings of more than 25% confer significant control rights, enabling the holder to block major corporate decisions such as changes in the articles of association, increases in share capital, or mergers. Vereinigte Deutsche Nickelwerke AG, for example, classifies as 'owner-controlled', since it is majority-controlled by Langbein-Pfannhauser Werke AG which in turn is majority-controlled by Michael Schröer. Other companies like Deutsche Centralbodenkredit AG or Frankfurter Hypothekenbank AG are not 'owner-controlled' since despite blockholdings of more than 25% on the first level, their ultimate owner, Deutsche Bank, does not have a controlling shareholder. Controlling shareholders are strictly individuals or families which in addition to a controlling influence possess significant fractional cash-flow rights of more than 20%[13]. Ownership by the State, large cooperatives and trade unions on the ultimate level are not considered controlling blockholdings, since governing officials -likewise managers in companies with dispersed ownership- do not directly possess significant cash-flow rights in the company. With this definition only 59% of listed companies qualify as 'owner-controlled'. This findings are comparable to the results of a study conducted by Schreyögg and Steinmann [1981] which analyses the ownership structure in the 300 largest industrial enterprises in Germany in 1972. They found that 89.7% of companies were owner-controlled at the first level of ownership (i.e., where the sum of block shareholdings exceeded 25%), but only 49.7% were owner-controlled at the ultimate ownership level. The comparatively lower

[13] Control and cash-flow rights can be separated through the issuance of non-voting equity and a pyramiding structures of subsidiaries.

percentage of companies with ultimate owner control can be attributed to a size effect, since the Schreyögg and Steinmann [1981] sample only includes the largest 300 industrial companies, whereas this sample comprises all listed German companies.

4.4 Estimation

4.4.1 'Once a barbarian - always a barbarian': Characteristics of corporate acquirers

Since the objective of the paper is to analyse the welfare implications of the MBR for small shareholders of potential raiders, we first have to determine the characteristics of corporate bidders. Like other studies before (Malatesta and Thompson [1985], Schipper and Thompson [1983]) we conjecture that firms carry out continuous acquisition programs. It seems likely that once firms have reached a certain stage of development acquisitions become relatively more important than internal development in ensuring growth. The number of acquisitions during the 5 year-period 1985-1990, $y_{i,\Delta t1}$, is therefore included as an explanatory variable for the acquisition activity in the subsequent period 1990-1995, $y_{i,\Delta t2}$. Further, we assume that the amount of available financing means determines the extent to which firms are able to engage in corporate acquisition activity. We include three variables to capture possible existing and future financing sources for acquisitions. The ratio of existing net current assets to total assets, NCR, in October 1990 should capture the extent to which *currently* available short-term funds can finance future purchases of equity stakes. Authorized capital, AC, and the capital gearing ratio, CGR, are both included to proxy for *future* means of financing. The degree of leverage should proxy for possible constraints to incur new debt given that a high debt ratio makes credit rationing more likely. We would therefore expect highly indebted companies to undertake fewer acquisitions. Authorized capital limits the amount of seasoned equity offerings which can be issued at management's discretion. A large amount of authorized capital gives the management flexibility in the timing of equity issues to finance a takeover. It can raise new equity capital without calling an AGM and obtaining shareholders' approval. This can be particularly important in the case of takeovers where information leakage can undermine an acquisition attempt because of rising share prices and possibly new competition. The amount of authorized capital should therefore be positively correlated with the number of subsequent takeovers. From the above considerations we obtain the following empirical specification:

$$y^*_{1i,\Delta t2} = \beta_1 y_{1i,\Delta t1} + \beta_2 \mathrm{AC}_{i,t=1} + \beta_3 \mathrm{NCR}_{i,t=1} + \beta_4 \mathrm{CGR}_{i,t=1} + u_{1i,t=1} \qquad (5)$$

where $y_{1i,\Delta t2}$ denotes the number of acquisitions during 1990-1995 and

$$\begin{aligned}
y_{1i,\Delta t2} &= 0 \quad \text{if } y^*_{1i,\Delta t2} \leqslant 0 \\
y_{1i,\Delta t2} &= 1 \quad \text{if } 0 < y^*_{1i,\Delta t2} \leqslant \theta_1 \\
y_{1i,\Delta t2} &= 2 \quad \text{if } \theta_1 < y^*_{1i,\Delta t2} \leqslant \theta_2 \\
&\vdots \\
y_{1i,\Delta t2} &= N \quad \text{if } \theta_N \leqslant y^*_{1i,\Delta t2}.
\end{aligned}$$

The number of ordered categories, N, is set equal to 6, where categories 1 to 4 denote the actual number of acquisitions during the 5-year period, category 5 subsumes five to nine acquisitions and 6 captures all observations with ten or more acquisitions[14]. Equation [5] is estimated with maximum likelihood as an ordered probit model. Table III below presents the estimation results of alternative specifications with different variable combinations. The estimation results confirm the conjecture 'once a barbarian - always a barbarian', i.e., that firms pursue continual acquisition programs. The regression coefficient β_1 is positive and significantly different from zero at the 99.99% level in all four specifications[15]. Furthermore, we find that access to present and future means of financing has a significant impact on bidding activity. The coefficient estimate β_2, which represents the impact of authorized capital on acquisition activity, is positive and significantly different from zero at the 99.99% level in specification I. Whereas authorized capital is included as an absolute value, leverage and also net current assets are both related to the amount of total assets. This is done to avoid that a size effect is picked up in more than one variable which might lead to multicollinearity.

If included separately, both NCR and CGR are significant and carry the expected signs. The higher the ratio of net current assets to total assets, the more intense the subsequent acquisition activity. Also, the smaller the gearing ratio, the more acquisitions are undertaken in the subsequent five years. Because of the collinearity between NCR and CGR the variables lose explanatory power if they are both included in regression IV. A likelihood ratio test of I vs. IV shows, however, that β_3 and β_4 are jointly different from zero at the 99.99% level. Therefore both NCR and CGR should be included in the model. The estimation results are also robust to alternative distributional assumptions governing the acquisition behaviour. Ordered logistic and Poisson regressions both produce very similar estimates to the ordered probit regression.

4.4.2 'To sign or not to sign': Determinants of compliance

The decision to sign the Takeover Code is subject to the company's board of directors. The management board will sign the Code if and only if it assesses the benefits of signing to be greater than its costs. Outside investors do not observe the discounted net benefit of the decision, but only whether the company submitted its acceptance declaration or not. The decision about compliance is determined both by observable firm characteristics, x_i^{95}, and latent information of the management ε_{2i}. Specifically, the board of company i will accede to the Code ($y_{2i} = 1$), iff

$$y_{2i} = \begin{cases} 1 & \text{whenever } \beta' x_i^{95} + \varepsilon_{2i} > 0 \\ 0 & \text{otherwise.} \end{cases} \tag{6}$$

The purpose of this section is to identify observable factors that might influence the decision to abide by the Code. Under [4.2] we identified the MBR as the core element

[14] The results are very similar if one assigns a separate category to each specific number of acquisitions. The used re-classification leads to a more equal distribution of observations across categories.

[15] It might be argued that the coefficient estimate is biased, since the sample includes the acquisition history prior to and/or after the stock market listing. The coefficient estimate, however, differs only marginally if the sample is restricted to companies that have been listed during the full ten year period.

of the Code. The model under [3] implied that a controlling blockholder of a bidding company will incur a wealth loss under the MBR. Hypothesis 1 therefore states that companies with dominant blockholders should be reluctant to accede to the Code. A dummy variable, OC_i, equal to unity if there is an ultimate controlling blockholder and zero otherwise, should capture the impact of the ownership structure on the compliance decision. Further, Hypothesis 1 posits that a potential 'barbarian' will be less inclined to sign the Code than a company with no acquisition intentions. One of the determinants of the compliance decision should therefore be the probability of becoming a bidder. We therefore create an interaction variable of the predicted acquisition activity and OC_i. The higher the predicted acquisition activity of an owner-controlled firm, the less likely the company will abide by the Code.[16] We use the estimates of the ordered probit model of acquisition activity and the respective firm characteristics in October 1995 to make out-of-sample predictions about the number of acquisitions during 1995-2000. The predicted scores, $\widehat{y}^*_{i,\Delta t2+1} = X_1^{95}\widehat{\beta}_1$ with X_1^{95} =[BID^{95}, AC^{95}, CGR^{95}, NCR^{95}], of owner-controlled companies are included as explanatory factors for the acceptance decision. It should be noted, however, that the MBR only applies in the case of takeovers of publicly traded companies. We therefore implicitly assume that the number of acquisitions of listed targets is proportional to the overall takeover activity of a company.

Whereas the costs associated with the acceptance of the Code directly derive from the MBR, the benefits are less evident. The benefits of compliance are mainly the absence of pressure from the stock exchange or the government, possibly also the non-admission to one of the major indices. We hypothesize that companies which are members of the DAX or MDAX or potential aspirants to membership are more susceptible to moral suasion from the stock exchange. Companies have an incentive to become an index constituent because this usually implies a higher valuation of their stock (Shleifer [1986]). Although current members of the DAX or MDAX are not directly threatened by expulsion from the index because on non-acceptance, they might be subject to a greater extent of pressure. In addition, one might suppose that banks exert influence on the management board of companies in which they are represented on the supervisory board. This might be the case since major universal banks such as Deutsche Bank and Dresdner Bank are members of the Takeover Commission (Übernahmekommission [1996]) and have also been involved in the draft of the Code. Two dummy variables, MDAX and BS, are therefore included to proxy for the degree of pressure to which a company is subject. Alternatively, we include the average daily turnover, TO, and the market value, MV, (as the two major 'hard' factors for index membership) to also capture the incentives of potential index aspirants to comply.

Another determinant for the acceptance decision might be the behaviour of other firms in the industry. If potential competitors for control comply with the Code, then it is less costly for a given company to accede as well. It is less disadvantaged in a potential contest for a share stake, since all bidders face the same constraint of the mandatory bid requirement. As the model under [3] has shown, adherence to the MBR reduces the maximum price the controlling blockholder of the raider is willing to pay for a target

[16] The predicted acquisition activity per se is not included as an explanatory variable, since the model only allows to make inferences about the acceptance decision of owner-controlled firms.

company share. The more companies in an industry abstain from the Code, the more likely they will outbid the blockholder of an abiding firm, and therefore the higher his wealth loss. These considerations might have guided VW and BMW, which have both not yet signed the Code. In fact, it can be seen that Code compliance is clustered according to industries. Table A.III presents the number of acceptance declarations per industry (divided according to the European NACE classification scheme). A sign test of the null hypothesis of an equal proportion of acceptances and rejections shows that the overall sample is significantly biased towards non-acceptance of the Code. A look at the cross-section of industry behaviour reveals that this seems to be the result of clustering phenomena in specific industries. In only seven of the thirty industries with more than 6 publicly traded companies is the behaviour significantly tilted towards non-compliance. From an industrial organization point of view it is interesting to note that these are mostly industries which are undergoing phases of major restructuring. Not only the food and beverage, but also the pulp and paper industry are currently undergoing a process of industrial concentration in Germany. On the other hand, the banking industry is 'significantly' determined to back the Code, with only nine out of forty banks omitting to sign. Also, the standard deviation of compliance equals 15% and thus highlights a quite substantial amount of cross-sectional variation by industries. As a crude measure of this clustering phenomenon we therefore include the percentage of *other* companies in the industry that accepted the Code, PAI, as an explanatory factor in the estimation of the compliance decision[17]. From the above considerations we obtain the following empirical specification:

$$y_1^* = X_1^{90}\beta_1 + \varepsilon_1 \quad (7)$$

$$y_2^* = X_2^{95}\beta_2 + \beta_3(X_1^{95}\beta_1)OC^{95} + \varepsilon_2 \quad (8)$$

where y_1^* is defined as in [5] above, $y_2 = 1$ if $y_{2i}^* > 0$ and 0 otherwise, $X_1^{90} = [\text{BID}^{90}, \text{AC}^{90}, \text{CGR}^{90}, \text{NCR}^{90}]$, $X_2^{95} = [1, \text{MDAX}^{95}, \text{PAI}, \text{OC}^{95}, \text{BS}^{95}]$ and $X_1^{95} = [\text{BID}^{95}, \text{AC}^{95}, \text{CGR}^{95}, \text{NCR}^{95}]$. The superscripts denote the sampling time of the observations. The disturbance terms are distributed $(\varepsilon_1, \varepsilon_2) \sim N(0, 0, 1, \sigma_2^2, \rho_{12})$ with ρ_{12} denoting the correlation coefficient between ε_1 and ε_2. The correlation coefficient should capture any time-invariant unobservable firm-or manager-specific factors in relation to acquisition activity, which influence the firm's decision about Code acceptance (e.g., M&A skills of managers). The maximum likelihood estimator for [7] is a simplified version of the estimator derived in the Appendix under [A.3]. For the likelihood function to be identified we impose $\sigma_2 = 1$. Table IV presents the estimation results of the bivariate (ordered) probit model.

As put forward in Hypothesis 1, owner-controlled companies are reluctant to adhere to the Code. The dummy variable for owner-control in the first specification carries a negative coefficient estimate which is significant at the 99.99% confidence level. This casts indirect evidence on the fact that firms under managerial control are more prone to abide by the takeover rules than owner-controlled firms. Specification II includes the interaction variable of owner-control and predicted future acquisition activity. The negative and statistically significant coefficient estimate implies that the higher the future

[17] This presupposes that there is some implicit understanding of future acceptance decisions by other companies.

takeover activity the less likely is an owner-controlled firm to accept the Takeover Code. The third specification comprises both the dummy variable for owner-control and its interaction with future acquisition activity. Both coefficient estimates are negative and statistically significant suggesting that independently of the predicted takeover activity owner-controlled firms are more hesitant to accept the Code[18]. This might be the case since each firm -independent of its predicted takeover activity during 1995-2000- might envisage an acquisition at some point in the future for which the owner does not want to restrict himself by accepting the Code today[19]. The estimation results further suggest that membership in the DAX or MDAX does have a significant and positive impact on the acceptance decision. A high market capitalization and high daily turnover (not reported) have a similar, but less significant, effect on the net benefits of compliance. The positive and significant coefficient estimate for the percentage of Code acceptance by other firms in the industry highlights the clustering behaviour among firms in the same industry. The costs of compliance are lower if other firms face the same bidding constraints. Finally, pressure from banks in a company's supervisory board does not seem to have been conducive to compliance. In fact, the sign of the coefficient estimate is negative (but statistically insignificant) suggesting -if at all- a contrary effect. The correlation coefficient ρ is negative, but not significant reflecting that unobservable management-specific factors of a company's acquisition activity do not seem to influence the firm's compliance decision.

4.4.3 Wealth effects: Excess returns and cross-sectional return regression

In order to measure the absolute size of the wealth effects associated with the acceptance of the Takeover Code we calculate the cumulative abnormal returns from event window $t0 = -2$ to $t1 = 7$:

$$\begin{aligned} \widehat{CAR}10_i &= \sum_{t=t_0}^{t_1} \widehat{\varepsilon}_{it} \\ \widehat{\varepsilon}_{it} &= r_{it} - \widehat{\beta}_{0i} r_{mt} \end{aligned} \tag{9}$$

where $\widehat{\beta}_{0i}$ of the market model is estimated with return data from day -280 to day -30 prior to the acceptance of the Code. We use the broad based MDAX with seventy index constituents as an approximation to the market portfolio. The event window covers seven post-event days to allow for publication of the acceptance declaration in the 'Börsenzeitung' and its dissemination by the stock exchange. The event day is the day at which the notification of acceptance reaches the Takeover Commission. In order to avoid the non-trading bias we restrict the analysis to the segments 'Amtlicher Handel' and 'Geregelter Markt' which exhibit higher liquidity than stocks in the 'Freier Markt'. The average cumulative abnormal return across securities during the 10-day event interval is 0.53%. The variance of cumulative abnormal returns equals

$$Var(\widehat{CAR}_i) = \sum_{t=t_0}^{t_1} \widehat{\sigma}_i^2$$

[18] Note, however, that because of the non-linearity of the probit model, the effect of the dummy variable for owner-control is not a constant shift in the intercept, but that the shift in the intercept varies according to the level of the other explanatory variables.

[19] This indirectly confirms that there are costs associated with withdrawing from an earlier acceptance.

where $\widehat{\sigma}_i^2$ denotes the MSE of the market model regression. Under the null hypothesis of zero abnormal returns the test statistic J is distributed as follows:

$$J = \frac{\overline{CAR}}{[Var(\overline{CAR})]^{1/2}} \overset{a}{\sim} N(0,1). \tag{10}$$

where $\overline{CAR}$ and $Var(\overline{CAR})$ denote the cross-sectional means of $\sqrt{Var(\widehat{CAR}_i)}$ and $\widehat{CAR}10_i$. With a value of 1.46 the test statistic is not significant at conventional confidence levels so that we cannot reject the hypothesis of zero abnormal return for the whole sample. This is not surprising since the $\overline{CAR}$ averages the stock price effect of potential bidders and companies that are likely to be uninvolved in corporate control transactions. The J-statistic becomes significant in both economic and statistical terms if the sample is restricted to owner-controlled firms. On average minority shareholders of companies under owner-control experience a 3.21% wealth increase in the ten-day event interval around the acceptance of the Code. For minority shareholders of prospective bidders the wealth increase is higher than for the whole sample (1.80%) and significantly different from zero at the 99.9% confidence level. This finding suggests that minority shareholders of companies with a high predicted takeover activity profit from the Code acceptance independent of their control structure. This further implies that investors anticipate the possibility that prospective bidders under management-control might revert to owner-control in the future. Finally, when restricting the focus to companies that are both owner-controlled and future bidding candidates, we find a statistically significant abnormal return of 5.40%! This finding lends support to Hypothesis 2. Minority shareholders of owner-controlled companies with high acquisition activity profit most from the acceptance of the mandatory bid rule. One might argue that the positive wealth effect might result from the abstinence from takeover defenses to which the signatories commit. This argument can, however, be refuted since the average $CAR10$ of majority-controlled companies, which are immune to takeover threats, equals 1.18% (not reported in Table V) and is significantly higher than for the rest of the sample.

In the following we focus on the explanation of the cross-sectional variation in excess returns. This allows us to extend the above preliminary evidence on the relation between excess returns and the bidding activity of owner-controlled firms. At the same time we will take account of the potential selection bias which arises from the voluntary acceptance decision. Since outside investors can infer the management's latent information ε_2 by observing the event indicator in [6], the disturbance term in the cross-sectional return regression is truncated. This can provoke a bias in the cross-sectional return regression

$$CAR10 = X^{95}\beta_3 + \varepsilon_3 \tag{11}$$

where $CAR10$ denotes the cumulative excess returns during the 10-day event interval and $X^{95} = [X_3^{95}, (X_1^{95}\beta_1)]$. The explanatory variables X_3^{95} contain variables from X_2^{95} which are used as factors for a firm's compliance decision. Since outside investors recognize management's incentives, the conditional expectation of ε_3 at the time of the announcement

of the acceptance decision equals[20]

$$E(\varepsilon_{3i} \mid y_{2i} = 1) = E\left(\varepsilon_{3i} \mid \frac{\varepsilon_{2i}}{\sigma_2} > -\psi_i\right) = \rho_{23}\sigma_3 \frac{\phi(\psi_i)}{\Phi(\psi_i)}$$

where $\psi_i = [x_{2i}^{95}\beta_2 + \beta_3(x_{1i}^{95}\beta_1)]/\sigma_2$, and $\phi(\cdot)$ and $\Phi(\cdot)$ denote the standard normal density and the cumulative density functions respectively. The ratio $\phi(\psi_i)/\Phi(\psi_i)$ equals the expectation of a standardized normal variate that is truncated below at ψ_i. If $\rho_{23}\sigma_3\phi(\psi_i)/\Phi(\psi_i)$ is ignored in [11], the residual of the cross-sectional return regression is correlated with the independent variables X^{95} and OLS and GLS estimators of the explanatory variables are inconsistent. In order to take account of the selection bias we formulate a model which incorporates the model under [7] as the selection mechanism of the cross-sectional return regression. In particular, we specify[21]

$$\begin{aligned} y_1^* &= X_1^{90}\beta_1 + \varepsilon_1 && (12)\\ y_2^* &= X_2^{95}\beta_2 + \beta_3(X_1^{95}\beta_1)OC^{95} + \varepsilon_2 && (13)\\ CAR10 &= X_3^{95}\beta_4 + \beta_5(X_1^{95}\beta_1) + \varepsilon_3 \text{ observed only if } y_{2i} = 1 && (14) \end{aligned}$$

with the disturbance terms distributed as follows:

$$\begin{bmatrix} \varepsilon_1 \\ \varepsilon_2 \\ \varepsilon_3 \end{bmatrix} \sim N\left(\begin{bmatrix} 0 \\ 0 \\ 0 \end{bmatrix}, \begin{bmatrix} 1 & \rho_{12}\sigma_2 & \rho_{13}\sigma_3 \\ \rho_{12}\sigma_2 & \sigma_2^2 & \rho_{23}\sigma_2\sigma_3 \\ \rho_{13}\sigma_3 & \rho_{23}\sigma_2\sigma_3 & \sigma_3^2 \end{bmatrix}\right).$$

The first two equations [12] and [13] correspond to the set-up analysed in Section 4.4.2. The last equation explains the cumulative abnormal event period returns for companies which signed the Code, i.e., it only includes return observations if $y_{2i} = 1$. The explanatory variables in [14], $X_3^{95} = [1, \text{PAI}, \text{MDAX}^{95}, \text{OC}^{95}]$ are a subset of the variables determining the acceptance decision of the Code. In particular, variables proxying for the degree of moral pressure from banks in supervisory boards are not included, since they should not affect the variation in excess stock returns. According to Hypothesis 2, both the prospective acquisition activity, $X_1^{95}\beta_1$, and the presence of a blockholder, OC^{95}, should have a positive effect on the size of abnormal returns. Both characteristics are included independently as well as through an interaction term, $\text{OC}^{95} \cdot X_1^{95}\beta_1$, in order to draw comparisons between 'owner-' and 'manager-controlled' companies. We also include the percentage of Code acceptance of other firms in the industry, since shareholders should profit if all firms in the industry face the same bidding constraints. For the likelihood function to be identified we impose $\sigma_2 = 1$ and also $\rho_{13} = 0$ since a potential correlation between latent information of acquisition activity and the change in firm value is captured indirectly via ρ_{23}. The problem of cross-sectional dependence should be minor in the present context. First, because of the endogenous timing of the acceptance decision most

[20] In the set-up of Eckbo et al. [1990] this expression corresponds to a situation where outside investors are completely surprised by the event.

[21] The estimation primarily aims at identifying the impact of firm-specific variables on cumulative abnormal returns. We use a truncated regression model to correct for the selection bias instead of the latent variable model proposed by Acharya [1993] which is shown to consistently estimate the value of latent information.

event dates are sampled from different time periods. Secondly, Bernard [1987] finds that the bias due to cross-sectional dependence is less pronounced for short return intervals. Since daily return data is used for the calculation of excess returns problems in inference should not be serious.

The maximum likelihood estimator of the trivariate limited dependent variable model [12]-[14] is derived in the Appendix under [A.3]. The empirical results in Table VII show that the significance of the correlation coefficient, ρ_{23}, justifies the use of the selection model, i.e., there is valuable inside information about the net benefits of compliance. The empirical findings also lend empirical support to Hypothesis 2. We find that excess returns in the wake of acceptance are higher for owner-controlled firms and for companies with high predicted future takeover activity. Specification II shows that minority shareholders of owner-controlled companies experience a wealth increase upon Code acceptance which is higher the greater their future acquisition agenda. This result clearly shows that the benefits of the MBR due to the prevention of wealth-decreasing acquisitions outweigh the costs of the mandatory bid requirement. The MBR indeed acts as a means to prevent the blockholder from (mis)using the funds of minority shareholders for the financing of his personal private benefits of control. These empirical results indirectly attribute a beneficent role to management under dispersed ownership which seems less prone to wealth-decreasing takeovers than management under the control of a dominant blockholder. However, the first specification highlights that the wealth increase of Code acceptance is positively related to future acquisition activity even if we control for differences in the control structure. As put forward in the analysis of the absolute wealth effects above, this reflects a nonzero probability of a change in the control structure from dispersed ownership to ultimate owner-control. Specification III includes the dummy variable for owner-control, the predicted takeover activity as well as their interaction term. Since all coefficient estimates are positive and significant, we conclude that the wealth increase is higher the higher the predicted takeover activity, but that the relation is even more pronounced for owner-controlled firms, i.e., there is both an *additional intercept* and an *additional slope* coefficient for firms under owner-control. Therefore, minority shareholders of companies under owner-control experience a fixed additional wealth effect independent of the firm's acquisition activity, but their gains also increase more strongly in relation to the firm's predicted acquisitions than the welfare gains for minority shareholders of companies with dispersed ownership. The percentage of Code acceptance of other firms in the industry has a positive effect on excess stock returns, which indicates that the costs of compliance are lower if the competitive dynamics in the market for corporate control are determined by a level playing field. Adherence to the MBR decreases the reservation value per target share of the controlling raiding blockholder (see Section 3). The fewer potential control contenders abide by the MBR, the smaller the likelihood of a successful takeover for an abiding blockholder. The positive coefficient estimate for the industry acceptance ratio therefore highlights that on average non-signatories take away wealth increasing acquisition opportunities from companies which have accepted the Code. Membership in one of the major indices, however, does not have a significant impact on abnormal returns suggesting a minimal potential wealth loss associated with pressure from the stock exchange and/or a marginal probability of losing the index status because of non-acceptance.

5 Conclusions

The paper has proposed a model that analyses the wealth effects of the adoption of the mandatory bid rule (MBR) on minority shareholders of acquiring companies. The model identifies two opposing wealth effects for minority shareholders of potential 'barbarians'. On the one hand, the MBR redistributes wealth from (minority) shareholders of the 'barbarian' to the minority shareholders of the target by imposing a mandatory tender offer requirement. On the other hand, it protects small shareholders of raiders from acquisitions that do not sufficiently increase the security returns from the takeover. Under reasonable distributional assumptions about control and security benefits under the incumbent controller and acquirer the model suggests that minority shareholders profit from the adoption of the mandatory bid rule. In addition, the model predicts that controlling blockholders of acquiring companies will incur a wealth loss under the MBR.

The introduction of the Takeover Code in Germany in October 1995 is used to study the incentive structure and wealth effects of compliance with the MBR. In line with the predictions of the model the empirical study on the compliance decision reveals that owner-controlled companies with a large number of predicted takeovers are more hesitant to accept the Code. The cross-sectional return study on stock price reactions following the acceptance decision gives evidence of positive wealth effects for companies under owner-control and with a high predicted future acquisition activity. The fact that 'barbarians' under the control of a dominant blockholder show stronger positive stock price reactions than companies under dispersed ownership suggests that inter-shareholder conflicts are potentially more acute than shareholder-management agency conflicts. Stockholders in manager-controlled firms seem to profit less from a restraint in acquisition activity than stockholders in blockholder-controlled firms. This implies that manager-controlled firms act more 'shareholder friendly' in their acquisition strategy than owner-controlled firms which undertake more takeovers out of pure control interests.

An interesting path for further empirical investigation would be to study the intra-industry effects of a firm's acceptance decision, i.e., to analyse the welfare effects for small shareholders of potential target companies in response to the acceptance decision of a potential bidder; or in more concrete terms: What is the effect of BMW's acceptance decision on the stock returns of publicly traded automotive suppliers that could be potential target companies for BMW? From a theoretical point of view it would be interesting to derive the aggregate wealth implications of the mandatory bid rule for both small shareholders of target and bidding companies. This aggregate welfare analysis could determine whether the MBR does justice to its distributional objective of strengthening the welfare of minority shareholders.

As outlined above, the paper as a whole sheds light on the importance of inter-shareholder conflicts in publicly traded corporations. In particular, the paper suggests that controlling blockholders are more 'barbaric' in their control pursuits than managers in companies under dispersed ownership. The paper therefore belongs to the growing corporate governance literature (La Porta et al. [1998], Bebchuck [1994]) that advocates a stronger focus on agency problems between minority and majority shareholders.

6 References

1. ACHARYA, S. (1993), "The value of latent information: Alternative Event Study Methods", Journal of Finance, 48(1), 363-385.

2. BEBCHUK, L. A. (1994), "Efficient and Inefficient Sales of Corporate Control", *Quarterly Journal of Economics*, 109, 957-993.

3. BARCLAY, M. J. AND C.G. HOLDERNESS (1991), "Negotiated Block Trades and Corporate Control", *Journal of Finance*, 165(3), 861-878.

4. BERGSTRÖM, C., HÖGFELDT, P. AND J. MOLIN (1995), "The optimality of the mandatory bid rule", Stockholm School of Economics, *Working Paper Series in Economics and Finance*, Working Paper No. 50.

5. BERNARD, V. L. (1987), "Cross-Sectional Dependence and Problems in Inference in Market-Based Accounting Research", *Journal of Accounting Research*, 25(1), 1-48.

6. BURKART, M. (1997), "Economics of Takeover Regulation", London School of Economics, Financial Markets Group Discussion Paper No. 256.

7. BURKART, M., GROMB, D. AND F. PANUNZI (1998), "Block premia in transfers of corporate control", London School of Economics, Financial Markets Group Discussion Paper No. 286.

8. ECKBO, B. E., V. MAKSIMOVIC AND J. WILLIAMS (1990), "Consistent estimation of cross-sectional models in return studies", *The Review of Financial Studies*, 3, 343-365.

9. EDWARDS, J. AND K. FISCHER (1994), "Banks, finance and investment in Germany", Cambridge University Press and CEPR.

10. FRANKS, J. AND C. MAYER (1997), "Ownership, Control and the Performance of German Corporations", London Business School and University of Oxford, mimeo.

11. GROSSMAN, S. J. AND O. D. HART (1980), "Takeover Bids, the Free-rider Problem, and the Theory of the Corporation, *Bell Journal of Economics*, 11, 42-64.

12. GROSSMAN, S. J. AND O. D. HART (1988), "One share - one vote and the market for corporate control", *Journal of Financial Economics*, 20,175-202.

13. HAJIVASSILIOU, V. A. AND D. L. MCFADDEN (1998), "The method of simulated scores for the estimation of LDV models", *Econometrica*, 66(4), 863-896.

14. HARRIS, M. AND A. RAVIV (1988), "Corporate Control Contests and Capital Structure", *Journal of Financial Economics*, 20, 203-35.

15. HOLDERNESS, C.G. AND D. P. SHEEHAN (1988), "The role of majority shareholders in publicly held corporations", *Journal of Financial Economics*, 20, 317-46.

16. HOMMEL, U. (1998), "Regulating the Market for Corporate Control", *International Journal of Business*, 3(1), 101-121.

17. KARPOFF, J. M. AND P.H. MALATESTA (1989), "The wealth effects of second-generation state takeover legislation", *Journal of Financial Economics*, 25, 291-322.

18. LA PORTA, R., LOPEZ-DE-SILANES, F. AND A. SHLEIFER (1998), "Corporate Ownership around the World", Harvard University, mimeo.

19. MALATESTA, P. H. AND R. THOMPSON (1985), " Partially Anticipated Events - A Model of Stock Price Reactions with an Application to Corporate Acquisitions", *Journal of Financial Economics*, 14, 237-250.

20. MALATESTA, P. H. AND R. A. WALKING (1988), " Poison Pill Securities - Stockholder Wealth, Profitability, and Ownership Structure", *Journal of Financial Economics*, 20, 347-376.

21. SCHIPPER, K. AND R. THOMPSON (1983), "The Impact of Merger-Related Regulations on the Shareholders of Acquiring Firms", *Journal of Accounting Research*, 21(1), 184-221.

22. SHLEIFER, A. (1986), "Do Demand Curves for Stocks Slope Down?", *Journal of Finance*, 61(3), 579-590.

23. SCHREYÖGG, G. AND H. STEINMANN (1981), "Zur Trennung von Eigentum und Verfügungsgewalt - Eine empirische Analyse der Beteiligungsverhältnisse in deutschen Großunternehmen", *Zeitschrift für Betriebswirtschaft*, 51, 533-556.

24. ÜBERNAHMEKOMMISSION (1996), Anmerkungen zum Übernahmekodex der Börsensachverständigenkommission, Deutsche Börse AG.

25. YARROW, G. K. (1985), "Shareholder protection, compulsory acquisition and the efficiency of the takeover process, *Journal of Industrial Economics*, 34, 3-16.

7 Tables

TABLE I
CONDITIONS FOR TRANSFERS OF CONTROL

Case	MBR	MR	Parameter conditions	ΔW
1	no	no	$Y_r + \frac{n_R}{k_R}\frac{n_T}{k_T}B_r < Y_t + \frac{n_T}{k_T}B_t$	0
2	no	yes	$Y_r + \frac{n_R}{k_R}B_r < Y_t + \frac{n_T}{k_T}B_t < Y_r + \frac{n_R}{k_R}\frac{n_T}{k_T}B_r$	ΔW_{TN}
3	yes	yes	$Y_r + \frac{n_R}{k_R}B_r > Y_t + \frac{n_T}{k_T}B_t$	ΔW_{TT}

TABLE II

SUMMARY STATISTICS

Variable	Description	Time	Mean	SD	Min	Max	Obs
y^*_{1i}	number of acquisitions	$\triangle$t1	2.68	4.03	0	25	467
		$\triangle$t2	2.30	4.74	0	34	652
AC_i	authorized capital (in m DM)	t=1	18.69	72.34	0.00	750	478
		t=2	29.72	104.73	0.00	1431.5	589
NCR_i	net current assets/total assets (%)	t=1	0.22	0.22	-0.63	0.85	427
		t=2	0.23	0.23	-0.52	0.91	548
CGR_i	liabilities/total assets (%)	t=1	0.30	0.22	0.00	1.05	429
		t=2	0.31	0.24	0.00	1.32	566
y^*_{2i}	=1, if firm signed Code	t=2	0.38	0.49	0	1	708
$MDAX_i$	=1, if member in DAX or MDAX	t=2	0.13	0.34	0	1	705
MV_i	market value (in '000 m DM)	t=2	1.23	4.58	0.00	63.27	639
TO_i	average daily turnover (in m DM)	t=2	3.43	19.43	0.00	141.76	531
$DMAJ_i$	=1, if firm majority-controlled	t=2	0.71	0.45	0	1	605
FFV_i	freefloat of voting equity (%)	t=2	0.32	0.27	0	1	570
BH_i	=1, if blockholder >25%	t=2	0.89	0.31	0	1	605
OC_i	=1, if firm owner-controlled	t=2	0.59	0.49	0	1	614
BS_i	=1, if bank in supervisory board	t=2	0.23	0.42	0	1	605

TABLE III

ORDERED PROBIT REGRESSIONS OF ACQUISITION ACTIVITY

The table presents the estimation results of an ordered probit regression for different versions of [5]. The *p-values* of the regression coefficients are reported below the coefficient estimates in parentheses. The Pseudo R^2 is defined as $1 - \ln L / \ln L_0$ where $\ln L_0$ equals the maximized value of the log-likelihood function in a regression with a constant term only. The estimated cut-off values, $\widehat{\theta}_1$ to $\widehat{\theta}_6$, are not reported.

	$y_{i,\Delta t1}$	$AC_{i,t=1}$	$NCR_{i,t=1}$	$CGR_{i,t=1}$	N	lnL	Prob>χ^2	Pseudo R^2
I	0.337 (0.000)	0.004 (0.000)			465	-277.57	0.000	12.82%
II	0.372 (0.000)	0.004 (0.002)	0.769 (0.006)		365	-136.94	0.000	14.47%
III	0.366 (0.000)	0.005 (0.002)		−0.618 (0.021)	369	-140.84	0.000	14.23%
IV	0.370 (0.000)	0.004 (0.003)	0.638 (0.029)	−0.452 (0.111)	365	-134.64	0.000	14.67%

TABLE IV

BIVARIATE (ORDERED) PROBIT MODEL OF ACCEPTANCE DECISION

The table presents the estimation results of the bivariate (ordered) probit regression for different versions of [7]. The *p-values* of the regression coefficients are reported below the coefficient estimates in parentheses.

		I	II	III
y^*_{2i}	Ordered probit model	Acquisition activity		
	$y_{i,\Delta t1}$	0.313 (0.000)	0.373 (0.000)	0.391 (0.000)
	$AC_{i,t=1}$	0.002 (0.026)	0.004 (0.006)	0.004 (0.013)
	$NCR_{i,t=1}$	0.544 (0.069)	0.577 (0.058)	0.562 (0.055)
	$CGR_{i,t=1}$	−0.439 (0.094)	−0.279 (0.186)	−0.311 (0.126)
	ρ	−0.234 (0.197)	−0.198 (0.269)	−0.221 (0.232)
y^*_{2i}	Probit model	Acceptance Decision		
	Constant	−0.927 (0.000)	−1.004 (0.000)	−0.820 (0.000)
	$OC_{i,t=2}$	−0.426 (0.000)		−0.412 (0.011)
	$OC_{i,t=2} \cdot \widehat{y}_{i,\Delta t2+1}$		−0.337 (0.000)	−0.223 (0.047)
	$MDAX_{i,t=2}$	0.547 (0.001)	0.798 (0.000)	0.773 (0.001)
	$PAI_{i,t=2}$	2.445 (0.000)	2.389 (0.000)	2.388 (0.000)
	$BS_{i,t=2}$	−0.051 (0.730)	−0.083 (0.612)	−0.187 (0.276)
	Obs	293	287	287
	$\ln L_{1,2}$	-245.20	-197.36	-178.22
	Prob>χ^2	0.000	0.000	0.000

TABLE V

ESTIMATES OF ABNORMAL STOCK RETURNS AROUND ACCEPTANCE DATE

The table presents estimates of [9], the cumulative abnormal returns from event window $t0 = -2$ to $t1 = 7$. The market model is estimated with return data from day -280 to day -30 prior to the acceptance of the Code. The event window covers seven post-event days to allow for publication of the acceptance declaration in the 'Börsenzeitung' and its dissemination by the stock exchange. The J-statistic is calculated according to [10].

Sample	Criteria	$\overline{CAR10}$	Obs	J-statistic
Full sample		0.53%	232	1.429
Companies under owner-control	$OC_i = 1$	3.21%	94	4.769
Prospective bidders	$\widehat{y}_{i,\Delta t2+1} \geqslant \widehat{\theta}_1$	1.80%	114	3.530
Owner-controlled prospective bidders	$OC_i = 1$ and $\widehat{y}_{i,\Delta t2+1} \geqslant \widehat{\theta}_1$	5.40%	54	6.594

TABLE VI

TRIVARIATE LDV MODEL FOR CROSS-SECTIONAL RETURN REGRESSION

The table presents estimation results of the trivariate limited dependent variable model as specified in [12]-[14]. The *p-values* of the regression coefficients are reported below the coefficient estimates in parentheses.

		I	II	III
$y^*_{i,\Delta t2}$	Ordered probit model	Acquisition activity		
	$y_{i,\Delta t1}$	0.355 (0.000)	0.287 (0.000)	0.359 (0.000)
	$\mathrm{AC}_{i,t=1}$	0.002 (0.000)	0.003 (0.000)	0.002 (0.000)
	$\mathrm{NCR}_{i,t=1}$	0.492 (0.065)	0.543 (0.088)	0.471 (0.115)
	$\mathrm{CGR}_{i,t=1}$	−0.481 (0.117)	−0.407 (0.080)	−0.443 (0.179)
	ρ_{12}	−0.142 (0.442)	−0.092 (0.646)	−0.111 (0.531)
y^*_{2i}	Probit model	Acceptance decision - selection mechanism		
	Constant	−0.765 (0.000)	−0.899 (0.000)	−0.897 (0.000)
	$\mathrm{OC}_{i,t=2}$	−0.394 (0.010)	−0.453 (0.009)	−0.451 (0.010)
	$\mathrm{OC}_{i,t=2} \cdot \widehat{y}_{i,\Delta t2+1}$	−0.213 (0.036)	−0.193 (0.087)	−0.143 (0.107)
	$\mathrm{MDAX}_{i,t=2}$	0.541 (0.008)	0.499 (0.000)	0.486 (0.006)
	$\mathrm{PAI}_{i,t=2}$	1.938 (0.000)	1.708 (0.000)	1.965 (0.000)
	ρ_{23}	0.789 (0.000)	0.753 (0.000)	0.768 (0.000)
	σ_3	0.094 (0.000)	0.092 (0.000)	0.089 (0.000)
	$\rho_{23}\sigma_3$	0.074 (0.000)	0.069 (0.000)	0.068 (0.000)
CAR10	OLS	Cross-sectional return regression		
	Constant	−0.159 (0.000)	−0.123 (0.000)	−0.168 (0.000)
	$\mathrm{OC}_{i,t=2}$	0.035 (0.004)	0.029 (0.034)	0.024 (0.083)
	$\widehat{y}_{i,\Delta t2+1}$	0.028 (0.003)		0.019 (0.013)
	$\mathrm{OC}_{i,t=2} \cdot \widehat{y}_{i,\Delta t2+1}$		0.029 (0.019)	0.020 (0.093)
	$\mathrm{MDAX}_{i,t=2}$	0.005 (0.276)	0.022 (0.176)	0.008 (0.254)
	$\mathrm{PAI}_{i,t=2}$	0.149 (0.008)	0.147 (0.009)	0.133 (0.016)
	Obs	335	335	335
	$\mathrm{lnL}_{1,2}$	-198.17	-197.88	-186.84
	Prob>χ^2	0.000	0.000	0.000

A Appendix

A.1 Proofs to Lemmas and Propositions:

Proof to Proposition 1: The value of the t's blockholding to r is

$$\frac{k_R}{n_R} k_T Y_r + n_T B_r, \tag{15}$$

whereas t values the block at $k_T Y_t + n_T B_t$. The new blockholder of T, r, will pay the fraction k_R/n_R of the transaction price, $(n_R - k_R)/n_R$ will be carried by R's minority shareholders. If r just compensates t for the value of the share block, r will have to pay

$$\frac{k_R}{n_R} k_T Y_t + \frac{k_R}{n_R} n_T B_t. \tag{16}$$

In order for a transfer to occur the parties have to agree on a transaction price which will make both parties better off. Multiplying [15] and [16] by $n_R/k_T k_R$ we obtain the necessary and sufficient condition for a control transfer, namely $Y_r + (B_r n_T n_R)/k_T k_R > Y_t + (B_t n_T)/k_T$. ■

Proof to Proposition 2: (Bebchuck [1994]). Inequality [2] is both a necessary and sufficient condition for a transfer of control under the MBR. The transaction price under the MBR has to be greater than $Y_t + (n_T B_t)/k_T$ to make t better off, but cannot be larger than $Y_r + (n_R B_r)/k_R$, since r would incur a welfare loss. The condition is *sufficient* since the acquisition of the target company will have a value to r of at least $Y_r + (n_R B_r)/k_R$; more than $Y_r + (n_R B_r)/k_R$ if minority shareholders of T keep their shares and $Y_r + (n_R B_r)/k_R$ if they choose to tender their shares. Inequality [2] is also a *necessary* condition, since otherwise there exists no transaction price which will make both parties better off. Any price lower than $Y_t + (n_T B_t)/k_T$ will make t worse off and any price higher than $Y_r + (n_R B_r)/k_R$ will make r worse off. ■

Lemma 2: In order to derive the expected payoff to the small shareholders of R, we have to consider the two cases in which t and r make a take-it-or-leave-it offer to the respective other party. If r is the party making the take-it-or-leave-it offer, r will offer just t's reservation value per share, $Y_t + (n_T B_t)/k_T$. In the opposite case t will skim the total surplus and demand $Y_r + (n_R n_T B_r)/(k_T k_R)$ per share. The expected payoff for small R shareholders under the MR is a weighted average of the two bargaining scenarios and corresponds to

$$\begin{aligned} E(P_{MR}) \;=\; \theta\Big[& \underbrace{\tfrac{n_R - k_R}{n_R} n_T Y_r}_{\text{share of cash-flows to R}} - \underbrace{\tfrac{n_R - k_R}{n_R} k_T \left(Y_t + \tfrac{n_T}{k_T} B_t\right)}_{\text{share in acquisition costs}} - \underbrace{\tfrac{n_R - k_R}{n_R} (n_T - k_T) Y_r}_{\text{cash-flows to small T shareholders}} \\ & + (1-\theta)\left[\tfrac{n_R - k_R}{n_R} n_T Y_r - \tfrac{n_R - k_R}{n_R} k_T \left(Y_r + \tfrac{n_T}{k_T} \tfrac{n_R}{k_R} B_r\right) - \tfrac{n_R - k_R}{n_R} (n_T - k_T) Y_r \right]. \end{aligned} \tag{17}$$

Small R shareholders obtain their respective fraction of cash-flows from T, from which we have to subtract their share in the acquisition costs and the security benefits which accrue to the small shareholders of the target. The second term highlights that small R shareholders have to finance r's private benefits although they only participate in

the acquisition via security benefits. Under the MBR only the third payoff component changes: small T shareholders now have the option to tender their shares and receive the negotiated transaction price or to remain shareholders and participate in the security benefits of Y_r. The expected payoff under the MBR therefore equals

$$E(P_{MBR}) = \theta\left[\tfrac{n_R-k_R}{n_R}n_T Y_r - \tfrac{n_R-k_R}{n_R}k_T(Y_t+\tfrac{n_T}{k_T}B_t) - \tfrac{n_R-k_R}{n_R}(n_T-k_T)\max\{Y_r, Y_t+\tfrac{n_T}{k_T}B_t\}\right]$$
$$+(1-\theta)\left[\tfrac{n_R-k_R}{n_R}n_T Y_r - \tfrac{n_R-k_R}{n_R}k_T(Y_r+\tfrac{n_R}{k_R}B_r) - \tfrac{n_R-k_R}{n_R}(n_T-k_T)\max\{Y_r, Y_r+\tfrac{n_R}{k_R}B_r\}\right].$$

In the case where t has complete bargaining power small T shareholder will always tender their shares since $Y_r < Y_r + (n_R B_r)/k_R$. Simplifying the second half of $E(P_{MBR})$ and $E(P_{MR})$ we find that in both cases small R shareholders incur a wealth loss of $-n_T B_r(n_R - k_R)/k_R$ if t dominates the bargaining game. In both cases does t skim the surplus from r, so the wealth gain to r is zero. Small T shareholders, however, still have to finance r's private benefits in an order of magnitude of $-n_T B_r(n_R - k_R)/k_R$. The difference between the payoffs under the MBR and MR therefore only corresponds to the difference in the payoffs to small T shareholders if r has complete bargaining power, i.e.

$$\Delta W_{TT} = E(P_{MR}) - E(P_{MBR}) = -\theta\left[\tfrac{n_R-k_R}{n_R}(n_T-k_T)(Y_r - \max\{Y_r, Y_t+\tfrac{n_T}{k_T}B_t\})\right]. \blacksquare$$

Proof to Lemma 3: Since in case 2 no transfers occur under the MBR, the payoff to the minority shareholders of R is zero, i.e. $E(P_{MBR}) = 0$ so that $E(\Delta W_{TN} \mid .) = E(P_{MR})$. Simplifying [17] yields

$$\Delta W_{TN} = \tfrac{n_R-k_R}{n_R}\left[\theta[k_T(Y_r - Y_t) - n_T B_t] - (1-\theta)n_T\tfrac{n_R}{k_R}B_r\right]. \blacksquare$$

For transfers of control to occur under the MR, but not under the MR, the double inequality $Y_r + (n_R B_r)/k_R < Y_t + (n_T B_t)/k_T < Y_r + (n_R n_T B_r)/(k_T k_R)$ has to hold. Transforming the inequality yields $-(n_R k_T B_r)/k_R > k_T(Y_r - Y_t) - n_T B_t > -(n_R n_T B_r)/k_R$. The assumption $B_r > 0$ implies $k_T(Y_r - Y_t) - n_T B_t < 0$ which leaves small R shareholders with an expected welfare loss, $E(\Delta W_{TN} \mid .) < 0$ under the MR. $\blacksquare$

Proof to Proposition 3: We have to show that $|\Delta W_{TN}|$ under the conditions of case 2 exceeds ΔW_{TT} under the conditions of case 3, i.e. $E|(\Delta W_{TN} \mid .)| > E(\Delta W_{TT} \mid .)$. We proceed by examining the conditional expectations for given B_t and B_r and random $Y_r - Y_t$. The conditions of case 2 imply that ΔW_{TN} ranges between $-\pi_R(n_T n_R B_r/k_R)$ and $-\pi_R(n_R B_r/k_R)[\theta k_T + (1-\theta)n_T]$ where π_R denotes the fractional equity ownership of minority shareholders in R, $(n_R - k_R/n_R)$. In case 3 ΔW_{TT} can vary from 0 to $\pi_R\theta(n_R B_r/k_R)(n_T - k_T)$. In order for $|E(\Delta W_{TN} \mid .)|$ to outweigh $E(\Delta W_{TT} \mid .)$ for all possible realizations of $Y_r - Y_t$, the following inequality has to hold:

$$\left|-\theta\frac{n_R}{k_R}k_T B_r - (1-\theta)\frac{n_R}{k_R}n_T B_r\right| > \theta(n_T - k_T)\frac{n_R}{k_R}B_r.$$

The inequality is satisfied if $\theta < 1/2$. This is true for all possible combinations of B_t and B_r. $\blacksquare$

Proof to Proposition 4: Both B_r and B_t are distributed on $[0;\alpha_r]$ and $[0;\alpha_t]$ respectively, with density functions f_r and f_t. The difference $Y_r - Y_t$ is uniformly distributed on $[-\omega_0, \omega_1]$ where $\omega_0 \geqslant \alpha_r n_R n_T/(k_R k_T) - \alpha_t n_T/k_T$ and $\omega_1 \geqslant \alpha_t n_T/k_T$. Defining $Y_r - Y_t \equiv \Delta Y$, we can calculate the conditional expected values in [3]. The positive wealth effect of the MR in situations in which the transfers occur under both rules equals:

$$
\begin{aligned}
&P(\Delta Y > \tfrac{n_T}{k_T}B_t - \tfrac{n_R}{k_R}B_r) \cdot E(\Delta W_{TT} \mid \Delta Y > \tfrac{n_T}{k_T}B_t - \tfrac{n_R}{k_R}B_r) \\
&= \int_0^{\alpha_r}\int_0^{\alpha_t}\int_{\frac{n_T}{k_T}B_t - \frac{n_R}{k_R}B_r}^{\frac{n_T}{k_T}B_t} \left[\theta\tfrac{n_R - k_R}{n_R}(n_T - k_T)(\tfrac{n_T}{k_T}B_t - \Delta Y)\right]\tfrac{1}{\omega_0+\omega_1}d\Delta Y f_t dB_t f_r dB_r \\
&= \int_0^{\alpha_r}\int_0^{\alpha_t} \tfrac{n_R - k_R}{n_R}\tfrac{1}{2}\tfrac{1}{\omega_0+\omega_1}(n_T - k_T)\tfrac{n_R^2}{k_R^2}\theta B_r^2 \; f_t dB_t f_r dB_r. \qquad (18)
\end{aligned}
$$

The negative wealth effects of the MR in situations where transfers occur only under the MR equals:

$$
\begin{aligned}
&P(\tfrac{n_T}{k_T}B_t - \tfrac{n_R}{k_R}B_r > \Delta Y > \tfrac{n_T}{k_T}B_t - \tfrac{n_R}{k_R}\tfrac{n_T}{k_T}B_r) E(\Delta W_{TN} \mid \tfrac{n_T}{k_T}B_t - \tfrac{n_R}{k_R}B_r > \Delta Y > \tfrac{n_T}{k_T}B_t - \tfrac{n_R}{k_R}\tfrac{n_T}{k_T}B_r) \\
&= \int_0^{\alpha_r}\int_0^{\alpha_t}\int_{\frac{n_T}{k_T}B_t - \frac{n_R}{k_R}\frac{n_T}{k_T}B_r}^{\frac{n_T}{k_T}B_t - \frac{n_R}{k_R}B_r} \tfrac{n_R - k_R}{n_R}\left[\theta(k_T\Delta Y - n_T B_t) - (1-\theta)n_T\tfrac{n_R}{k_R}B_r\right]\tfrac{1}{\omega_0+\omega_1}d\Delta Y f_t dB_t f_r dB_r \\
&= \int_0^{\alpha_r}\int_0^{\alpha_t} -\tfrac{n_R - k_R}{n_R}\tfrac{1}{2}\tfrac{1}{\omega_0+\omega_1}(n_T - k_T)\tfrac{n_R^2}{k_R^2}\left[\theta\left(\tfrac{n_T+k_T}{k_T} + \tfrac{2n_T}{n_T - k_T}\right) + \tfrac{2n_T}{k_T}\right] B_r^2 \; f_t dB_t f_r dB_r. \qquad (19)
\end{aligned}
$$

Since the last term in square brackets is greater than one, the absolute value of (19) exceeds (18), i.e., the negative relative wealth effects of the MR outweigh the wealth gain in situations where transfers occur under both rules. The MBR therefore entails positive ex ante wealth effects for small shareholders of R. It can also easily be seen that the wealth increase is higher, the smaller the blockholding of the target company, k_T/n_T, and the smaller the size of the controlling blockholder of the raider, k_R/n_R. ■

A.2 Annotations to Data

TABLE A.I

TENDER OFFERS IN GERMANY DURING 1995-97 WITH INTENT TO ACQUIRE CONTROL

Date	Bidder	Target	Ownership (pre-bid)	Ownership (post-bid)
11/05/95	Caradon plc	Weru AG	Caradon (11%) BBV Holding (6%)	Caradon (51%)
03/09/96	Future Holding AG	Glunz AG	Fam Glunz (16%) IBM Pensionskasse (5%) PDFM (6%)	minuscule acceptance

TABLE A.II

DATA DESCRIPTION AND DATA SOURCES

Variable	Description	Data Source
y_{1i}^*	number of acquisitions	M&A Review Database University of St. Gallen Transaction type 0 (purchase of share stake) Transaction type 6 (increase of equity stake) Transaction type 8 (control agreement)
y_{2i}^*	=1, if firm signed Code	Übernahmekommission der Deutschen Börse
AC_i	authorized capital	Hoppenstedt Aktienführer 1991, 1996 Publication deadline: 30 September of previous year
NCR_i	net current assets/total assets	Datastream International Account Item No. 104/723 (October 1995) Annual reports 1990, 1995 Hoppenstedt Aktienführer 1991, 1996
CGR_i	liabilities/total assets	Datastream International Account Item No. 731 (October 1995) Annual reports 1990, 1995 Hoppenstedt Aktienführer 1991, 1996
$MDAX_i$	member of DAX or MDAX	Börsenzeitung October 1995
MV_i	market value ('000 m DM)	Datastream International Datatype MV (October 1995)
TO_i	average daily volume (m DM)	Datastream International Datatype VO (daily average in 1995)
BS_i	=1, if bank in supervisory board	Hoppenstedt Handbuch der Großunternehmen
$DMAJ_i$	=1, if firm majority-controlled	Hoppenstedt Aktienführer 1996
OC_i	=1, if firm owned by an ultimate controlling individual blockholder	Hoppenstedt Aktienführer 1996 Wer gehört zu wem? (Commerzbank 1994) Hoppenstedt Handbuch der Großunternehmen

TABLE A.III

ACCEPTANCE DECLARATIONS BY INDUSTRY

The table lists the number of acceptance declarations of the Takeover Code in each two-digit NACE category in which more than 6 companies were listed during October 1995-December 1997. In order to test for the clustering of acceptance decisions in an industry a median-based sign-test is used. Under the null hypothesis of $H_0^i := P(X_i) = 0.5$, where X_i denotes the number of acceptance decisions in a specific industry $i = 1, ..., 30$, the random variable X_i is distributed binomially $B(n_i, 0.5)$. The null hypothesis is rejected if $X_i \leq k_{\alpha/2}$ or $X_i \geq k_{1-\alpha/2}$, where $k_{\alpha/2}$ and $k_{1-\alpha/2}$ are the greatest respectively the smallest integers which satisfy $\sum_{m=0}^{k_{\alpha/2}} \binom{n_i}{m} 0.5^{n_i} \leq \alpha/2$ and $\sum_{m=k_{1-\alpha/2}}^{n_i} \binom{n_i}{m} 0.5^{n_i} \leq \alpha/2$ respectively. Numbers marked with * indicate industries in which the null hypothesis can be rejected at the 5% significance level.

Industry	NACE	$\overline{S}$	S	%$\overline{S}$	%S	N
Manufacture of wood, straw and plaiting	20	6*	1	85.7%	14.3%	7
Office machinery and computers	30	4	3	57.1%	42.86%	7
Automotive supplies and transport equipment	35	6	2	75.0%	25.0%	8
Health and social work	85	5	4	44.4%	55.6%	9
Clothing and dyeing of fur	18	4	6	40.0%	60.0%	10
Pulp, paper and paper products	21	8*	2	80.0%	20.0%	10
Electrical machinery and apparatus	31	6	4	60.0%	40.0%	10
Radio, television and communication equipment	32	6	4	60.0%	40.0%	10
Medical, precision and optical instruments	33	5	5	50.0%	50.0%	10
Furniture, jewelry, musical instruments, etc.	36	8*	2	80.0%	20.0%	10
Land transport and pipelines	60	8*	2	80.0%	20.0%	10
Auxiliary activities to financial intermediation	67	6	5	54.5%	45.5%	11
Fabricated metal products	28	8	5	61.5%	38.5%	13
Automotive industry (motor vehicles and trailers)	34	7	6	53.8%	46.2%	13
Retail trade and repair of household goods	52	7	6	53.8%	46.2%	13
Rubber and plastic products	25	10	4	71.4%	28.6%	14
Non-metallic mineral products	26	8	6	57.1%	42.9%	14
Other mining and quarrying	14	11	6	64.7%	35.3%	17
Construction	45	16*	4	80.0%	20.0%	20
Wholesale and commission trade	51	18*	3	85.7%	14.3%	21
Basic metal	27	16*	6	72.7%	27.3%	22
Electricity, gas, steam and hot water supply	40	18*	5	78.3%	21.7%	23
Manufacture of textiles	17	14	10	58.3%	41.7%	24
Chemicals and chemical products	24	14	16	46.7%	53.3%	30
Insurance and pension funding	66	13	20	39.4%	60.6%	33
Financial intermediation	65	9	31*	22.5%	77.5%	40
Real estate activities	70	25	15	62.5%	37.5%	40
Machinery and equipment	29	26	16	61.9%	38.1%	42
Food products and beverages	15	45*	12	78.9%	21.1%	57
Other business activities	74	36	26	58.1%	41.9%	62
Mean	$\overline{X}$			62.8	37.2%	610
Standard deviation	SD			15.1%	15.1%	

A.3 Derivation of Maximum Likelihood Functions

The specification of the three-equation model estimated under [4.4.3] consists of an ordered probit regression (20), a probit regression (21) and a continuous OLS regression (22) which is selected if $y_2 = 1$, i.e. if a company has signed the Takeover Code. The set-up allows for potential correlation between the disturbance terms ε_1, ε_2, and ε_3.

$$
\begin{aligned}
y_1^* &= X_1^{90}\beta_1 + \varepsilon_1 && (20)\\
y_2^* &= X_2^{95}\beta_2 + \beta_3(X_1^{95}\beta_1) + \varepsilon_2 && (21)\\
CAR10 &= X_3^{95}\beta_4 + \beta_5(X_1^{95}\beta_1) + \varepsilon_3 \quad \text{observed only if } y_{2i} = 1 && (22)
\end{aligned}
$$

$$
\begin{aligned}
y_{1i} &= 0 \quad \text{if } \theta_{y_{1i}+1} < y_{1i}^* \leqslant \theta_{y_{1i}+2}\\
y_{1i} &= 1 \quad \text{if } \theta_{y_{1i}+1} < y_{1i}^* \leqslant \theta_{y_{1i}+2}\\
&\vdots\\
y_{1i} &= j \quad \text{if } \theta_{y_{1i}+1} < y_{1i}^* \leqslant \theta_{y_{1i}+2}
\end{aligned}
$$

$$
y_{2i} = 1 \quad \text{if } y_{2i}^* > 0, \qquad 0 \text{ otherwise}
$$

$$
\begin{bmatrix} \varepsilon_1 \\ \varepsilon_2 \\ \varepsilon_3 \end{bmatrix} \sim N\left(\begin{bmatrix} 0 \\ 0 \\ 0 \end{bmatrix}, \begin{bmatrix} 1 & \rho_{12}\sigma_2 & \rho_{13}\sigma_3 \\ \rho_{12}\sigma_2 & \sigma_2^2 & \rho_{23}\sigma_2\sigma_3 \\ \rho_{13}\sigma_3 & \rho_{23}\sigma_2\sigma_3 & \sigma_3^2 \end{bmatrix} \right)
$$

The matrix of observations on the explanatory variables X can be decomposed into $[x_{il}]_{1\leqslant i\leqslant n; 1\leqslant l\leqslant m}$ where i indexes the n sample observations and l the number of independent variables m. Similarly, $y_1 = [y_{1i}]_{1\leqslant i\leqslant n}$. The maximum likelihood function of the model consists of two parts: one part which is the result a bivariate probability distribution if the Code is not signed, and a second component resulting from a trivariate probability distribution if the Code is signed and excess stock returns are observed.

Case 1: $y_{2i} = 0$ (Code not signed) The joint probability of the normally distributed random variables ε_1 from (20) and ε_2 from (21) equals

$$
\begin{aligned}
\text{Prob}(\varepsilon_2 &\leqslant -X_2^{95}\beta_2 - \beta_3(X_1^{95}\beta_1)\ , \theta_{y+1} - X_1^{90}\beta_1 < \varepsilon_1 \leqslant \theta_{y+2} - X_1^{90}\beta_1)\\
&= \int_{-\infty}^{-X_2^{95}\beta_2 - \beta_3(X_1^{95}\beta_1)} \int_{\theta_{y+1} - X_1^{90}\beta_1}^{\theta_{y+2} - X_1^{90}\beta_1} \underbrace{f_{\varepsilon_1|\varepsilon_2}(\epsilon_1, \epsilon_2) f_{\varepsilon_2}(\epsilon_2)}_{=f_{\varepsilon_1,\varepsilon_2}(\epsilon_1,\epsilon_2)} d\epsilon_1 d\epsilon_2
\end{aligned}
$$

where $f_{\varepsilon_2}(\epsilon_2)$ stands for the density function of ε_2, and $f_{\varepsilon_1,\varepsilon_2}(\epsilon_1, \epsilon_2)$ and $f_{\varepsilon_1|\varepsilon_2}(\epsilon_1, \epsilon_2)$ denote the joint density and conditional density function of the random variables ε_1 and ε_2 respectively. The conditional distribution of ε_1 given ε_2 is normal as well: $\varepsilon_1 \mid \varepsilon_2 \sim$

$N(\mu_{1|2}, \sigma^2_{1|2})$ where $\mu_{1|2} = \rho_{12}\varepsilon_2/\sigma_2$ and $\sigma^2_{1|2} = 1 - \rho^2_{12}$. The density function $f_{\varepsilon_2}(\epsilon_2)$ and the conditional density function $f_{\varepsilon_1|\varepsilon_2}(\epsilon_1, \epsilon_2)$ are equal to

$$f_{\varepsilon_1|\varepsilon_2}(\epsilon_1, \epsilon_2) = \frac{1}{\sigma_{1|2}}\phi\left(\frac{\epsilon_1 - \mu_{1|2}}{\sigma_{1|2}}\right) \qquad \text{and} \qquad f_{\varepsilon_2}(\epsilon_2) = \frac{1}{\sigma_2}\phi\left(\frac{\epsilon_2}{\sigma_2}\right),$$

so that

$$\begin{aligned}\text{Prob}(\varepsilon_2 \leqslant -X_2^{95}\beta_2 - \beta_3(X_1^{95}\beta_1),\ \theta_{y+1} - X_1^{90}\beta_1 < \varepsilon_1 \leqslant \theta_{y+2} - X_1^{90}\beta_1) \\ = \int_{-\infty}^{-X_2^{95}\beta_2 - \beta_3(X_1^{95}\beta_1)} \left[\Phi\left(\frac{\theta_{y+2} - X_1^{90}\beta_1 - \mu_{1|2}}{\sigma_{1|2}}\right) - \Phi\left(\frac{\theta_{y+1} - X_1^{90}\beta_1 - \mu_{1|2}}{\sigma_{1|2}}\right)\right] \frac{1}{\sigma_2}\phi\left(\frac{\epsilon_2}{\sigma_2}\right) d\epsilon_2.\end{aligned}$$

Case 2: $y_{2i} = 1$ **(Code signed)**

The joint probability of the normally distributed random variables ε_1 from (20), ε_2 from (21) and ε_3 from (22) is

$$\begin{aligned} Prob(\varepsilon_2 &> -X_2^{95}\beta_2 - \beta_3(X_1^{95}\beta_1)\ , \theta_{y+1} - X_1^{90}\beta_1 < \varepsilon_1 \leqslant \theta_{y+2} - X_1^{90}\beta_1, \varepsilon_3) \\ &= \int_{-X_2^{95}\beta_2 - \beta_3(X_1^{95}\beta_1)}^{\infty} \int_{\theta_{y+1} - X_1^{90}\beta_1}^{\theta_{y+2} - X_1^{90}\beta_1} f_{\varepsilon_1,\varepsilon_2,\varepsilon_3}(\epsilon_1, \epsilon_2, \epsilon_3) d\epsilon_1 d\epsilon_2 \\ &= f_{\varepsilon_3}(\epsilon_3) \int_{-X_2^{95}\beta_2 - \beta_3(X_1^{95}\beta_1)}^{\infty} f_{\varepsilon_2|\varepsilon_3}(\epsilon_2, \epsilon_3) \int_{\theta_{y+1} - X_1^{90}\beta_1}^{\theta_{y+2} - X_1^{90}\beta_1} f_{\varepsilon_1|\varepsilon_2,\varepsilon_3}(\epsilon_1, \epsilon_2, \epsilon_3) d\epsilon_1 d\epsilon_2. \end{aligned}$$

where $f_{\varepsilon_3}(\epsilon_3)$ stands for the density function of ε_3, $f_{\varepsilon_2|\varepsilon_3}(\epsilon_2, \epsilon_3)$ denotes the conditional density function of ε_2 given ε_3, $f_{\varepsilon_1,\varepsilon_2,\varepsilon_3}(\epsilon_1, \epsilon_2, \epsilon_3)$ denotes the joint density of $\varepsilon_1, \varepsilon_2$, and ε_3, and $f_{\varepsilon_1|\varepsilon_2,\varepsilon_3}(\epsilon_1, \epsilon_2, \epsilon_3)$ the conditional density of ε_1 given ε_2 and ε_3. The conditional distribution of ε_2 given ε_3 is normal as well: $\varepsilon_2 \mid \varepsilon_3 \sim N(\mu_{2|3}, \sigma^2_{2|3})$ where $\mu_{2|3} = \rho_{23}\sigma_2\varepsilon_3/\sigma_3$ and $\sigma^2_{2|3} = \sigma^2_2(1 - \rho^2_{23})$. The conditional distribution of ε_1 given ε_2 and ε_3 likewise equals $\varepsilon_1 \mid \varepsilon_2, \varepsilon_3 \sim N(\mu_{1|2,3}, \sigma^2_{1|2,3})$ where

$$\begin{aligned}\mu_{1|2,3} &= \frac{(\rho_{12} - \rho_{13}\rho_{23})\sigma_3\varepsilon_2 + (\rho_{13} - \rho_{12}\rho_{23})\sigma_2\varepsilon_3}{\sigma_2\sigma_3(1 - \rho^2_{23})} \\ \sigma^2_{1|2,3} &= 1 - \frac{[\rho^2_{12} - 2\rho_{12}\rho_{13}\rho_{23} + \rho^2_{13}]}{1 - \rho^2_{23}}.\end{aligned}$$

The density functions necessary to compute the probabilities which enter the likelihood functions are

$$\begin{aligned} f_{\varepsilon_1|\varepsilon_2,\varepsilon_3}(\epsilon_1, \epsilon_2, \epsilon_3) &= \frac{1}{\sigma_{1|2,3}}\phi\left(\frac{\varepsilon_2 - \mu_{1|2,3}}{\sigma_{1|2,3}}\right), \\ f_{\varepsilon_2|\varepsilon_3}(\epsilon_2, \epsilon_3) &= \frac{1}{\sigma_{2|3}}\phi\left(\frac{\varepsilon_1 - \mu_{2|3}}{\sigma_{2|3}}\right), \\ \text{and} \quad f_{\varepsilon_3}(\epsilon_3) &= \frac{1}{\sigma_3}\phi\left(\frac{CAR10 - X_2^{95}\beta_4 - \beta_5(X_1^{95}\beta_1)}{\sigma_3}\right), \end{aligned}$$

so that

$$\begin{aligned} Prob(\varepsilon_2 > -X_2^{95}\beta_2 - \beta_3(X_1^{95}\beta_1)\ , \theta_{y+1} - X_1^{90}\beta_1 < \varepsilon_1 \leqslant \theta_{y+2} - X_1^{90}\beta_1, \varepsilon_3) = \\ f(\epsilon_3) \int_{-X_2^{95}\beta_2 - \beta_3(X_1^{95}\beta_1)}^{\infty} \left[\Phi\left(\frac{\theta_{y+2} - X_1^{90}\beta_1 - \mu_{1|2,3}}{\sigma_{1|2,3}}\right) - \Phi\left(\frac{\theta_{y+1} - X_1^{90}\beta_1 - \mu_{1|2,3}}{\sigma_{1|2,3}}\right)\right] \frac{1}{\sigma_{2|3}}\phi\left(\frac{\epsilon_2 - \mu_{2|3}}{\sigma_{2|3}}\right) d\epsilon_2. \end{aligned}$$

Combining the above probabilities for the two cases we obtain the log-likelihood function $L^*_{1,2,3} = \ln L =$

$$\sum_{i=1}^{n}(1-y_{2i})\ln\left[\int_{-\infty}^{-x_{2i}^{95}\beta_2-\beta_3(x_{1i}^{95}\beta_1)}\left[\Phi\left(\frac{\theta_{y_i+2}-x_{1i}^{90}\beta_1-\mu_{i,1|2}}{\sigma_{1|2}}\right)-\Phi\left(\frac{\theta_{y_i+1}-x_{1i}^{90}\beta_1-\mu_{i,1|2}}{\sigma_{1|2}}\right)\right]\frac{1}{\sigma_2}\phi\left(\frac{\epsilon_{2i}}{\sigma_2}\right)d\epsilon_{2i}\right]+$$

$$y_{2i}\ln\left[f(\epsilon_{3i})\int_{-x_{2i}^{95}\beta_2-\beta_3(x_{1i}^{95}\beta_1)}^{\infty}\left[\Phi\left(\frac{\theta_{y_i+2}-x_{1i}^{90}\beta_1-\mu_{i,1|2,3}}{\sigma_{1|2,3}}\right)-\Phi\left(\frac{\theta_{y_i+1}-x_{1i}^{90}\beta_1-\mu_{i,1|2,3}}{\sigma_{1|2,3}}\right)\right]\frac{1}{\sigma_{2|3}}\phi\left(\frac{\epsilon_{2i}-\mu_{i,2|3}}{\sigma_{2|3}}\right)d\epsilon_{2i}\right.$$

The integrals are calculated using Monte-Carlo integration:

$$\int_{-\infty}^{a}W(z)\phi(z)dz \approx \frac{1}{R}\sum_{r=1}^{R}W(z_r)\cdot\Phi(\tfrac{a-\mu}{\sigma})$$

where R denotes the number of drawings z_r from a normal distribution with density $\phi(z)$ which is truncated below a. As in Hajivassiliou and McFadden [1998] the truncated standard normal variate on the interval $[-\infty, a]$ is generated through a mapping q from a uniform (0,1) random variable u according to: $q(a,u) = \Phi^{-1}(\Phi(a)\cdot u)$. The maximization of the ln-likelihood function is carried out through numerical optimization procedures. Both the numerical optimization routines of Broyden, Fletcher, Goldfarb and Brown (requiring only first derivatives) and the Goldfeld-Quandt Quadratic Hill Climbing Algorithm (requiring first and second derivatives) are used.

FINANCIAL MARKETS GROUP
DISCUSSION PAPER SERIES

300 Cornelli, Francesca and Leonardo Felli, "Revenue Efficiency and Change of Control: The Case of Bankruptcy", August 1998

301 Board, John, Anne Vila and Stephen Wells, "Liquidity in Second Tier Equity Markets: Evidence From London's Alternative Investment Market (AIM)", August 1998

302 Lunde, Asger, Allan Timmermann and David Blake, "The Hazards of Mutual Fund Performance: A Cox Regression Analysis", September 1998

303 Sullivan, Ryan, Allan Timmermann and Halbert White, "Data-Snooping, Technical Trading and the Bootstrap", October 1998

304 Sullivan, Ryan, Allan Timmermann and Halbert White, "The Dangers of Data-Driven Inference: The Case of Calendar Effects in Stock Returns", October 1998

305 Bolton, Patrick and Xavier Freixas, "A Dilution Cost Approach to Financial Intermediation and Securities Markets", October 1998

306 Nobay, A. Robert and David A. Peel, "Optimal Monetary Policy in a Model of Asymmetric Central Bank Preferences", October 1998

307 Blake, David, and Allan Timmermann, "Mutual Fund Performance: Evidence from the UK", October 1998

308 Chadha, Jagjit and Philip Schellekens, "Utility Functions for Central Bankers: The Not So Drastic Quadratic", November 1998

309 Brunnermeier, Markus, "Buy on Rumours - Sell on News: A Manipulative Trading Strategy, November 1998

310 Ortalo-Magné, François, and Sven Rady, "Boom In, Bust Out: Young Households and the Housing Price Cycle", November 1998

311 Timmermann, Allan, "Structural Breaks, Incomplete Information and Stock Prices", November 1998

312 Sentana, Enrique, "Least Squares Predictions and Mean-Variance Analysis", January 1999

313 Goodhart, Charles A. E. and Haizhou Huang, "A Model of the Lender of the Last Resort", January 1999

314 Schellekens, Philip, "Conservatism at No Real Cost: Monetary Policy Delegation Reconsidered", January 1999

315 Hoffman-Burchardi, Ulrike, "Corporate Governance Rules and the Value of Control - A Study of German Dual-class Share", February 1999

316 Hoffmann-Burchardi, Ulrike, "Clustering of Initial Public Offerings, Information Revelation and Underpricing", February 1999

317 Vitale, Paolo, "Foreign Exchange Intervention and Macroeconomic Stability", March 1999

318 Alger, Ingela and Ching-to Albert Ma, "Moral Hazard, Insurance, and Some Collusion", March 1999

319 Zigrand, Jean-Pierre, "Arbitrage and Endogenous Market Integration", March 1999

320 Danielsson, Jon and Richard Payne, "Real Trading Patterns and Prices in Spot Foreign Exchange Markets", March 1999

321 Ellul, Andrew, "Inter-market Price and Volatility Impacts Generated by Large Trades: The Case of European Cross-quoted Securities", May 1999

322 Pesaran, Hashem and Allan Timmermann, "A Recursive Modelling Approach to Predicting UK Stock Returns", May 1999

323 Timmermann, Allan, "Moments of Markov Switching Models", May 1999

324 Koopman, Siem Jan and Hung Neng Lai, "Modelling Bid Ask Spreads in Competitive Dealership Markets, May 1999

325 Dahlström, Tom and Pierre Mella-Barral, "Corporate Walkout Decisions and the Value of Default", May 1999

326 Carletti, Elena, "Bank Moral Hazard and Market Discipline", May 1999

327 Freixas, Xavier, "Optimal Bail Out Policy, Conditionality and Creative Ambiguity", May 1999

328 Dessí, Roberta, "Financing Entrepreneurs: Optimal Contracts and the Role of Intermediaries", June 1999

329 Brunnermeier, Markus K. and Clemens Grafe, "Contrasting Different Forms of Price Stickiness: An Analysis of Exchange Rate Overshooting and the Beggar Thy Neighbour Policy", June 1999

Subject to availability, copies of these Discussion Papers can be obtained from the Financial Markets Group (Room G307, 0171 955 7002). Alternatively visit the FMG website ***http://cep.lse.ac.uk/fmg/*** where papers are available for downloading.