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**ESSAYS ON VOTING POWER, CORPORATE GOVERNANCE AND  
CAPITAL STRUCTURE**

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# Essays on Voting Power, Corporate Governance and Capital Structure

## Abstract

This dissertation is divided into 4 essays. Each focuses on different aspect of firm risk and corporate governance issues. It mainly deals with corporate governance issues in the context of strong owner control and its implications to market efficiency. The interrelationship between corporate governance, takeovers, firm performance, capital structure and voting structure is explored.

The first paper integrates existing knowledge in owner control and corporate governance using Swedish data. First it provides different measurements of voting power, and then links the voting power with private benefits of control in an analysis of control rent. The implication of dual class of shares in a takeover contest is explored. As an application, the power structures of a group of Swedish listed firms are examined using the Shapely-Shubik power index and the Banzhaf power index.

The second paper employs agency theory and findings in corporate governance to study a group of listed firms with dual class of shares and pyramidal structure in Sweden. 44 listed firms with both A and B shares traded on SSE are studied using market data and accounting statements. Determinants of voting concentration are analyzed both by using a single equation Tobit model and by a simultaneous equations model where power of the controlling owner, and firm performance are treated as endogenous. The single equation Tobit model indicates that growth rate in terms of increase in total assets is negatively related to the voting concentration. Also, firms with better performance in terms of (accounting) return on assets tend to have a more concentrated voting structure. However, performance in terms of market-to-book ratio is negatively and significantly correlated to voting concentration when voting power of the controlling owner is evaluated at simple majority but not when evaluated at the super majority.

The third paper studies the effects of a voting scheme change on the stock market prices of both Electrolux and SKF AB using standard event study methodology and a clinical approach. The economic effect of the voting scheme change is assessed using the market model. We investigate the loss of control due to the change in the voting scheme. The degree of change in power is calculated using the Shapley-Shubik power index and the Banzhaf power index. There is a wealth transfer from the high vote shareholders to the low vote shareholders in the process.

The last paper analyzes factors influencing firm leverage. We use market capital ratio, book capital ratio and book debt ratio as measures of leverage and an unbalanced panel data of seven countries: Canada, Denmark, Germany, Italy, Sweden, the UK, and the US. We find that firm size, profitability, tangibility, and market-to-book ratio have significant impact on the capital structure choices of firms. Tangibility is positively related to leverage, while profitability shows a negative significant relation to leverage across all seven countries. The impact of the market-to-book ratio varies in the book debt ratio model but shows a negative and significant relation in the market leverage model for all countries except Denmark, which shows an insignificant parameter value. Evidence from the seven countries is consistent with the findings in capital structure theories, i.e. more profitable firms borrow less. Smaller firms borrow less, etc.

Key words: corporate governance; power indices; dual class of shares; pyramidal structure; owner control; firm performance; voting premium; Shapley-Shubik power index; Banzhaf power index; capital structure; firm leverage; profitability; tangibility; panel data

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# Voting power, control rents and corporate governance: An integrated analysis

Yinghong Chen<sup>1</sup>

## Abstract

This paper integrates existing knowledge in owner control and corporate governance using Swedish data. First it provides different measurements of voting power, and then links the voting power with private benefits of control in an analysis of control rent. The implication of dual class of shares in a takeover contest is explored. As an application, the power structures of a group of Swedish listed firms are examined using the Shapely-Shubik power indices and the Banzhaf power indices. This paper provides a tool in conducting corporate governance studies, such as linkages between degrees of control and corporate performance, takeover probability and private benefit of control, etc. Degree of control as an endogenous variable is partly determined by laws and cultural heritage of a country. This needs to be given special care when cross-country comparison is to be conducted. The consistency among corporate governance measures and the harmonization of corporate governance rules in both the country level and pan European level are most important for the corporate governance system to work efficiently. As a final note, corporate governance rules should be adapted to different types of firms.

Key words: power indices; dual class of shares; pyramidal structure; owner control

JEL Classifications: G32, G34, K22.

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# 1 Introduction

Laws and corporate governance rules are important institutional factors that influence investment levels and the economic development of a country. Better corporate governance reduces the total risk of a firm and thus increases firm value.<sup>2</sup> Ownership structures and types of control are essential aspects for studying corporate governance and the related economic values (see Harris and Raviv, 1988; Milgrom and Roberts, 1992). Modern corporations will not survive without a credible corporate governance mechanism.

Berle and Means foresaw in their seminal work of 1932 that:

*“Dispersion in the ownership of separate enterprises appears to be inherent in the corporate system.”*

Berle and Means (1932) have led to a huge research interest on separation of ownership and control, and agency theory, focusing on theorizing institutions of management control and market discipline (Jensen and Meckling, 1976; Fama, 1980; among others). This paper focuses on one type of continental European corporate governance and control model, namely the model of dual class of shares and/or pyramidal structure featuring a dispersed ownership with minority owner control. Legal devices such as differential voting stocks, pyramidal structure are used to facilitate minority owner control. The type of governance problems shifts from management shareholder conflict to agency problems between controlling owners and minority interests as compared to the Anglo-American corporate governance problems. Corporate governance as an institution deals precisely with problems of conflicts of interests, designs ways to prevent corporate misconduct, and aligns the interests of stakeholders using incentive mechanisms (Shleifer and Vishny, 1997).

Swedish corporate governance rules are relatively investor friendly compared to international practices according to a series of studies of investor protection and

corporate finance by La Porta et al. (La Porta, et al., 1998, 1999a, 1999b; the Swedish Shareholders Association, 2003). Given the knowledge of the existing studies, this paper distinguishes itself by using a gradual approach to build a study of corporate control system and make comparisons between different systems possible based on corporate performance.

The rest of the paper is organized as follows: Section 2 measures the voting power of the controlling owner. It provides a review on related literature on corporate governance and construction of power indices focusing on control type classifications. Section 3 deals with a theoretical model of voting premium. Section 4 provides a takeover model and discusses the implications to takeover under dual class of shares. Section 5 discusses law and cultural influences in determining ownership choices. Section 6 discusses types of corporate governance and some implications.

## **2 Measuring the power of controlling owner**

This paper employs two strands of literature to study the research subject of ownership concentration and firm performance: (1) the theory of the political voting game pioneered by Shapley and Shubik (1958), Banzhaf (1965), and (2) agency theory of the firm and the findings in corporate governance. Among the most known contributions in corporate governance are Jensen and Meckling (1976), Grossman and Hart (1988), Harris and Raviv (1988), Meyer, Milgrom and Roberts (1992), Vishny and Shleifer (1997).

Leech and Cubbin (1983), Leech and Leahy (1991), and Gambarelli (1989) have applied political voting indices to measure control and classify firms' types of control. There are three main ways to measure control: (1) fixed rule (or the voting ratio), (2) variable rule, i.e. measuring ownership concentration taking into account the dispersion of ownership structure using the Herfindahl index, and (3) the Shapley-Shubik power

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<sup>2</sup> The required risk premium is reduced.

indices and the Banzhaf power indices. Clearly, more statistical precision can be achieved by using the Shapley-Shubik indices and the Banzhaf indices in describing overall ownership structure since these indices take into account of the fact that the distribution of the other shareholders can influence the voting outcome.

## **2.1 Classifying control type: degrees of separation of ownership and control**

Control type can be identified by defining several thresholds according to the degree of separation of ownership and control.<sup>3</sup>

### **Majority control**

The controlling owner owns a majority of the stocks, the remainder is widely held. This means voting power and ownership are highly concentrated on one controlling owner. The degree of separation of ownership and control is small.

### **Minority control**

Frequently, ownership is sufficiently scattered, and working control can therefore be obtained by holding only a minority of shares. Control occurs through voting rights, pyramidal structure or other contractual arrangements. The separation of ownership and control is larger than in the majority control.

### **Management control**

Management owning negligible amount of shares controls the firm. Separation of ownership and control is almost complete.

Berle and Means (1932) classify firms according to different ownership threshold. Above 80% of shareholding in one firm is deemed as private ownership, 80-50% of shareholding is classified as majority control, 50-20% as minority control, 20-5% as

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<sup>3</sup> The three degrees of separation are deduced from Berle and Means (1932).

joint ownership-minority and management control, while fewer than 5% is classified as management control.

Voting trust, or dual class of shares system is classified as control by legal device. This type of control bears the same feature as minority control or working control. If the parent company is itself a management control, the firm is classified as management controlled.

In the US, in the beginning of the 1930s, 80% of the combined wealth and 65% of the 200 largest firms were controlled by legal devices and management teams, indicating a large separation of ownership and control. Management control accounted for 44% of the firms and 58% of the combined wealth (see Berle and Means, 1932, p94). The companies included were 42 railroads, 52 public utilities, and 106 industrial companies. The separation of ownership and control in US has led to a development of intermediate institutions and market mechanisms to govern the corporate activities such as market for corporate control and a liquid capital market.

La Porta, Lopez-de-Silanes and Andrei Shleifer (1999a) present data on ownership structures of large corporations in 27 wealthy economies identifying ultimate controlling shareholders in these firms. They find that with the exception of firms in economies with very good shareholder protection, relatively few firms are widely held, in contrast to the image provided by Berle and Means (1932) in their predictions of ownership in modern corporations. Rather, families and the state in many economies typically control the firms. Equity control by financial institutions or by other widely held corporations is less common. The controlling shareholders typically possess significantly higher voting rights than their cash flow rights in a firm, primarily through the use of pyramids and dual class of shares. These results suggest that the principal agent problem in large corporations in many economies is that of restricting expropriation of minority shareholders by the controlling shareholders, rather than that of restricting empire building desire of professional managers unaccountable to shareholders. I argue that management control in an owner controlled environment poses more problems since there are no market for corporate control that governs this



type of firms; and there is not enough legal rules that effectively govern management controlled firms in an owner controlled environment such as many economies in continental Europe. It provides considerable space for international corporations to engage in exploiting the differences of the two types of corporate governance system. There are therefore urgent needs to strengthen institutions of corporate governance and make sure regulations are adapted to different types of firms, and also by making investors aware of this type of fallacy.

## 2.2 Statistical methods of measuring degrees of control

The methods of classifying degrees of control have evolved over the years. There are mainly two ways to classify control type using two sets of variables. One is the simple fixed rule and the other is the variable rule. The simple fixed rule uses the largest shareholding exceeding a threshold, 5%, 10%, and 20%, etc., to represent degrees of control, denoted as OC<sub>1</sub>, OC<sub>2</sub>, OC<sub>3</sub>, etc. (Leech and Leahy, 1991).

The probabilistic voting model developed by Denis and Cubbin (1983) measures control type in terms of the likelihood of securing a simple majority in a voting game. This is the so-called variable rule. The degree of control of a block of large shareholdings is the probability of it attracting majority support in a voting contest. It depends not only on the size of the largest block of shares but also on the dispersion of the remainder, as measured by the Herfindahl index. This is summarized in definition 1.

### Definition 1: Degree of control

Assume that the shareholding structure can be represented by a series of shares in percentage terms  $w_1, w_2, \dots, w_n$ , such that  $w_i > w_{i+1}$  for all  $i$ , and  $\sum w_i = 100$ . The total number of holdings is  $N$ . The combined shareholding of the block consisting of the

leading  $k$  shareholders is  $C_k = \sum_{i=1}^k w_i$ . Then  $\alpha_k \cong \Phi \left[ \frac{C_k}{\sqrt{V_k}} \right]$ .  $\alpha_k$  denotes the degree of

control of the block comprised of k shareholdings,  $V_k = \sum_{i=k+1}^N w_i^2$  and  $\Phi(\cdot)$  denotes the cumulative standard normal distribution function. The degree of control depends on both the simple concentration ratio  $C_k$  and the Herfindahl concentration index  $H$ , since  $V_k = H - \sum_{i=1}^k w_i^2$ , and  $H = \sum_{i=1}^N w_i^2$ .

The degree of control of the controlling shareholder ( $k=1$ ) can be calculated as:

$$\alpha_1 \cong \Phi\left(\frac{C_1}{\sqrt{V_1}}\right) = \Phi\left(\frac{w_1}{\sqrt{(H - w_1^2)}}\right).$$

**Table 1** summarizes the two approaches and the variables used in these studies namely fixed rule and degrees of control analysis.

**Table 1: Variables measuring ownership structures**

Dichotomous control-type variables (0, 1)	
Name	Equals 1 if
OC <sub>1</sub>	Largest shareholding exceeds 5%
OC <sub>2</sub>	Largest shareholding exceeds 10%
OC <sub>3</sub>	Largest shareholding exceeds 20%
OC <sub>90</sub>	Degree of control of largest shareholding exceeds 90%
OC <sub>95</sub>	Degree of control of largest shareholding exceeds 95%
OC <sub>99</sub>	Degree of control of largest shareholding exceeds 99%

Note: The table is modified according to Leech and Leahy (1991).

Degree of control is calculated by the probabilistic voting model.

Empirical results in Leech and Leary (1991) show that in some cases the simple voting ratio tends to classify more firms as management-controlled firms than the probabilistic voting model when ignoring the possibility of potential coalition formation. The defects of these measures are that the control type depends on the specific criterion that is chosen. Some modification is made by Cubbin and Leech (1983) based on the belief that there is room to improve the statistic by assuming more realistic distributions such as log normal or truncated standard normal. Small shareholders normally forego their

rights to vote suggesting that the distribution of voting rights is truncated at a sufficiently low level of shareholdings.

## 2.3 Application of power indices to corporate control

The methods described above serve to classify different control types but the result is sometimes sensitive to the method employed. Indeed, classifying types of control are important for investigating firm characteristics and for implementing relevant corporate governance rules. A natural starting point would be to investigate the degrees of control and how it influences firm characteristics within one type of firms. Power indices give consideration to evaluating the overall distribution of voting power in a framework where the ability to form a winning coalition is compared among different owners. We need to introduce the concept of the Minimal Winning Coalition (MWC) in order to compare the ability of different owners. An MWC is a winning coalition that involves a minimal number of members; and there is no subset of this MWC that can be called an MWC. In the case of a weighted voting game of a share company, the MWC is a coalition comprised of a minimal number of voters who jointly own an amount of votes needed to pass a proposal or to reach an agreement (Holler and Widgren, 1999).

### Definition 2: Minimal Winning Coalition

A simple game (or a voting game) is a set  $N$  and a collection  $\omega$  of subsets of  $N$ , such that

$$\emptyset \notin \omega. \quad (i)$$

$$N \in \omega. \quad (ii)$$

$$S \in \omega \text{ and } S \subseteq T \Rightarrow T \in \omega. \quad (iii)$$

A coalition  $S$  is called a minimal winning coalition if  $S \in \omega$ , but no *proper* subset of  $S$  is in  $\omega$ . A simple game is *proper* if there are no two disjoint winning coalitions.

Equivalently,  $S \in \omega \Rightarrow N \setminus S \notin \omega$ .

A simple game is *strong* if no deadlock is possible, equivalently,  $S \notin \omega \Rightarrow N \setminus S \in \omega$ , so that deadlocks are not possible.

The (iii) property is the *monotonicity* property, which implies that the winning coalitions of any simple game can be described as the supersets of its minimal winning coalitions (Straffin, 1994).

### **Banzhaf Index and Shapley-Shubik Index**

#### **Definition 3: Power Indices**

A weighted voting game  $V = (d; w)$  with  $n$  voters, where  $d$  represents the needed votes to pass a bill or a proposal and  $w = (w_1, \dots, w_i, \dots, w_n)$  describes the voting weights held by each voter. The sum of the voting weights of all players is 1. A coalition  $S$  is a winning coalition if

$$\sum_{i \in S} w_i \geq d, \quad (2.1)$$

It is a losing coalition if (2.1) is not satisfied for  $S$ . If  $S$  is winning we assign a value 1 to  $S$ , such that  $V(S) = 1$  and assign  $V(S) = 0$  if  $S$  is losing. Thus,  $V$  defines a *simple* game. Player  $i$  has a *swing* for coalition  $S$  if  $i$  can turn  $S$  from a winning coalition into a losing coalition by leaving  $S$ .

Formally,  $i$  is a *swinger* with respect to  $S$  if

$$V(S) = 1 \text{ and } V(S \setminus \{i\}) = 0.$$

#### ***The Banzhaf Power Index***

The non-normalized Banzhaf index of player  $i$  is defined by the number of  $i$ 's swings divided by the number of coalitions that have  $i$  as a member. In other words, more power is assigned to  $i$  if  $i$  appears to be a swing voter in more coalitions.

$$\beta'_i(v) = \frac{\# \text{ swings}(i)}{\# \text{ coalition}(i)} = \frac{\# \text{ swings}(i)}{2^{n-1}}. \quad (2.2)$$

The standard Banzhaf index  $\beta$  is  $\beta'$  normalized to make the indices of all voters add up to a value of one.

$$\beta(v) = \frac{\#swings(i)}{\sum_{i \in N} \#swings(i)} \quad \text{with } \sum_{i \in N} \beta(v) = 1. \quad (2.3)$$

### ***The Shapley-Shubik Power Index***

The Shapley-Shubik power index is defined in terms of the orderings of members for each swing. Define  $i$  to be a swing voter for coalition  $S$  if  $S \in \omega \Rightarrow S \setminus \{i\} \notin \omega$ . To get a combinatorial formula for the Shapley-Shubik power index, letting  $\theta_i = \sum_{\substack{i \text{ swings} \\ \text{for } S}} (s-1)!(n-s)!$  where  $s$  is the number of members of the set  $S$ , the summation

is taken over swings where  $i$  is a swing voter for  $S$ . The index is defined as

$$\gamma_i = \frac{\theta_i}{n!} \rightarrow \Phi_i(v) = \sum_{\substack{i \text{ swings} \\ \text{for } S}} \frac{(s-1)!(n-s)!}{n!} [v(S) - v(S \setminus i)] \quad (2.4)$$

The voter  $i$  is considered *pivotal* for an ordering if and only if  $i$  is a swing voter for the coalition  $S$  of  $i$  and all voters who proceed  $i$ . There are  $(s-1)!$  ways in which the voters before  $i$  can be ordered, and  $(n-s)!$  ways in which the voters who follow  $i$  could be ordered. In other words, the Shapley-Shubik power index of voter  $i$  is the number of orderings in which  $i$  is pivotal, divided by the total number of possible orderings of the voters. In fact, the probability of a specific permutation is  $1/n!$ . Each permutation has one and only one player. The sum of the Shapley-Shubik power indices in a weighted voting game equals one.

$$\sum_{i \in N} \Phi(i) = 1. \quad (2.5)$$

The Shapley-Shubik power index and the Banzhaf power index give different values since they employ different coalitional and probabilistic models. The Banzhaf index is based on considering coalitions as combinations of members in the sense that a list is arranged in no particular order, or equivalently, the ordering is irrelevant to the coalition. The Shapley-Shubik power index counts coalitions on the basis of not only

swings, but also of the order in which members are listed. A reordering of the same members is counted as a different swing.

An interesting example is applied to the United Nations Security Council (Shapley and Shubik, 1954; Brams, 1975; Straffin, 1994). Shapley and Shubik (1954) analyze the Security Council with 11 members. A winning coalition needed 7 members including the 5 permanent members. Each of the 5 permanent members had veto power over every proposed action. The Shapley-Shubik index shows that the 6 non-permanent members added together held power with a Shapley value of 1.29%. The exact calculation is

$$\frac{(7-1)!(11-7)!C_1^5 \cdot 6}{11!}.$$

The rest of the power was held by the 5 permanent members, for a Shapley value of 98.7%. In 1965 the Security Council was expanded to 15 members, 10 of which were non-permanent members. The winning coalition needed 9 members including the 5 permanent members. Similarly, the power held by the 10 non-permanent members is

$$\frac{(9-1)!(15-9)!C_3^9 \cdot 10}{15!}.$$

The power held by the 10 non-permanent members became 1.86%, whereas the 5 permanent members together hold 98.1% of the power measured by the Shapley-Shubik index. The Banzhaf index gives a different calculation due to the reason previously stated. The values are 9.5% ( $\beta=30/310$ ) before and 16.5% after 1965 for the non-permanent members (see Brams, 1975).

Both methods show that the collective power of the non-permanent members improved after 1965. It is worth noting that the probability of passing a certain proposal has decreased since 1965. Under the pre-1965 Security Council rule the probability of reaching an agreement was 4.5%, or  $\frac{C_5^5 \cdot C_2^6}{C_7^{11}}$ . After 1965 the probability of reaching

an agreement became 4.19%, or  $\frac{C_5^5 \cdot C_4^{10}}{C_9^{15}}$ . This indicates that the Security Council is

very inefficient in terms of passing a proposal or reaching an agreement.

An application<sup>4</sup> to the power structure of Investor AB using the Shapley-Shubik indices and the Banzhaf indices is shown in **Table 2**. At the simple majority voting level, the Wallenberg sphere holds absolute power (equals to 1) as shown in both the Shapley-Shubik and the Banzhaf indices. At the super majority voting level, the Shapley-Shubik value (83.9%) is lower than the Banzhaf value (92%).

**Table 2: The power indices of Investor by different voting requirement.**

Investor	owner name	votes	Shapley	Shapley2	Banzhaf	Banzhaf2	ownership
1998 Feb.			MWC=1/2	MWC=2/3	MWC=1/2	MWC=2/3	
1	Wallenberg-sfären	0.417	1	0.838911	1	0.920291	0.196
2	Nordbankens Aktiefonder	0.058	0	0.026074	0	0.009879	0.032
3	S-E-B-sfären	0.051	0	0.026074	0	0.009879	0.041
4	SPP	0.029	0	0.026074	0	0.009879	0.037
5	Femte AP-Fonden	0.028	0	0.026074	0	0.009879	0.013
6	AMF Pensionsförsäkr AB	0.017	0	0.01317	0	0.008516	0.049
7	AMF sjukförsäkring AB	0.016	0	0.011172	0	0.007608	0.022
8	Skandia	0.012	0	0.008575	0	0.006018	0.028
9	S-E-Bankens Aktiefonder	0.008	0	0.004873	0	0.003633	0.005
10	SHB:s aktiefonder	0.008	0	0.004873	0	0.003633	0.01
11	Kammarkollegiets fondförv	0.005	0	0.003158	0	0.002384	0.008
12	Konsumentkooperationen	0.005	0	0.003158	0	0.002384	0.016
13	Länsförsäkrings-sfären	0.005	0	0.003158	0	0.002384	0.008
14	Arbetsmarknadens Förs AB	0.005	0	0.003158	0	0.002384	0.002
15	Ikea Finance S/A	0.002	0	0.001499	0	0.001249	0.003

Note:

1. Data source is Ägarna och Makten (1998).
2. MWC stands for minimal winning coalition.
3. The security interest of the controlling owner Wallenberg sphere is 19.6%.
4. Investor's controlling shareholder is identified as a dictator at 1/2 threshold, but not at 2/3 level.
5. Unknown foreign owners and trustees are excluded from the data.
6. 19% of A shares are held by shareholders other than the biggest 25.

<sup>4</sup> Since forming a winning coalition has cost and benefit considerations, and small shareholders seldom participate in voting, it is therefore realistic to trim off small shareholders below a certain threshold. The shareholdings that are larger than 0.25% are used in Leech and Leahy (1989). The Swedish ownership data report the biggest shareholdings of a firm from as small as 0.1% of shares.

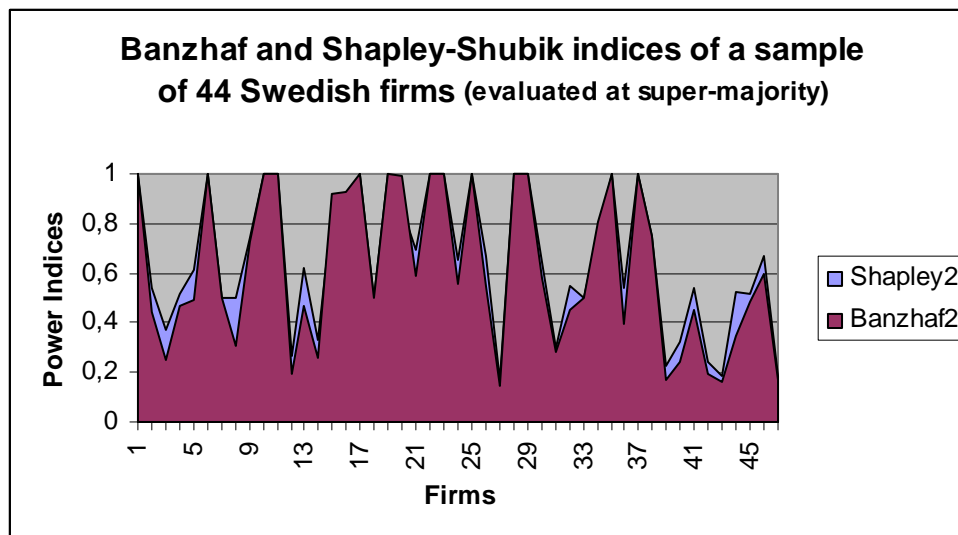
## 2.4 A comparison of the Shapley-Shubik and the Banzhaf indices in the context of shareholder voting

The two voting models give different results since the probabilistic distribution restrictions underlying the two voting models are different. In the context of corporate voting, each voting outcome with a pivotal voter has the same importance seems plausible. The total amount of permutation in a set  $N$  of size  $n$  is  $n!$  Every permutation has one pivotal voter who can swing. This seems to be applicable to corporate voting. The Shapley-Shubik power indices give each permutation the same weight  $1/n!$  However coalitions with different number of members have different weights (see Equation (2.4)). This seems to coincide with the corporate voting. Supposedly, bigger coalitions are more costly to construct. Consequently they should be assigned less weight. Also the preferences of each coalition do not matter. It is the power of a specific coalition to decide an outcome that matters. The power indices model cannot predict a voting outcome but can predict the probability of a coalition that wins whatever preference of that coalition has.

The Banzhaf indices do not place weight on each possible swing, i.e. the orders of the coalition members does not matter. The Banzhaf indices describe the ability to threat leaving by each member in all possible voting outcomes. The Banzhaf power index can be viewed as a special case of the Shapley-Shubik index in that each minimal winning coalition is given equal treatment and assigned a value of one no matter how big the coalition is. When applying the power index to corporate voting games, it is the context that matters. Given a preference voting (yes or no), the coalition that is stronger and less costly to build (have less member) will have a bigger chance to win. For the purpose of this study, it makes very little difference since the correlation coefficient of the two measures of voting power is quite high (0.9812) (see **Graph 1**).



**Graph 1: Comparison of the Banzhaf and Shapley-Shubik power indices for 44 Swedish listed firms**



## 2.5 Variation of control: Delegation of voting rights and *de facto* control

There are variations of control, which is not accounted for in the formal analysis of this study. The power indices calculation is based entirely on the shareholdings of each shareholder, it does not consider *de facto* control and control by implicit contracts. Banks can have controlling power over a firm via proxies or when a firm defaults on its bank loans. Certain members in the corporation can have disproportionately larger power than his/her shareholdings indicate.

Charkham (1994) gives a very detailed description of corporate governance dynamics in countries including Germany, the US, the UK, Japan, and France, emphasizing the ownership pattern in each country and its potential influence in determining the outcome of effective corporate governance. It is improper to compare two systems of corporate governance by only examining the legal framework and institutions but leaving the immeasurable factors unexamined. A good account of *de facto* control by German banks can be found in Charkham (1994, p.6-60). It is not exaggerated to say that banks played a key role in German industries not only by providing essential

working capital and other financial services, but also by supplying much needed equity capital associated with different circumstances.<sup>5</sup>

The deposited share holding rights system (DSVR) gives rise for German banks to act as a proxy in voting on behalf of the real owners. The DSVR is the basis for bank control. Banks exercise effective control over the 100 largest companies through proxy rights (36%), for the 10 largest companies the total voting power held by the banks exceeds 50 percent, according to a 1978 Monopolkommission report. The proportion of bank control has been changing in certain firms, but an overwhelming presence is kept on a whole. Some might worry about the fact that lacking oppositions in German corporations might create inefficiencies. In fact, German corporate governance practice particularly emphasizes building internal consistency into its bodies and members such that reaching unanimity in decision making<sup>6</sup> is given the highest concern. This is presumably done to avoid huge costs that might arise from internal disputes. This means that a built-in majority combined with common sense can be an effective way to reduce agency cost.

Stefan Peterson's (1998, essay 2) empirical work on large shareholders and corporate control in Sweden provides an interesting analysis. He argues that leverage ratio provides an alternative monitoring mechanism to owner controlled firms.<sup>7</sup>

These variations in control could potentially undermine the efficiency of ownership concentration analysis based purely on the voting percentage. This study limits the errors caused by this type of control variations by limiting the types of firms included in the study and also by conducting the research within one country.

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<sup>5</sup> In 1975, the banks had become substantial shareholders owning 14% of non-financial AGs. A published study of the acquisition by the top ten banks on Jan. 1, 1987 and on Sept. 1, 1989 shows that 14 shareholdings were made for rescue and financial support, 9 for placement purposes, 5 for investment and 1 to stop a takeover (see Charkham, 1994).

<sup>6</sup> For the legal procedure and design to ensure a fair result, *Keeping Good Company* (Charkham, 1994) provides numerous cases.

### 3 Voting premium in firms with dual class of shares: A theory of control rents

Does the institution of dual class of shares give rise to additional agency costs? It is widely accepted that controlling shareholders engage in activities that are not necessarily consistent with the objective of value maximization of total shareholder wealth (Jensen and Meckling, 1976). Under the dual class of shares system, the classic problem of agency cost acquires a new angle because the geared voting rights per se give additional incentive for the controlling owner to acquire private benefits of control. This is due to the fact that the controlling owner is no longer required to bear the costs of diversion in proportion to his/her voting rights but instead only to his/her cash flow rights.

The controlling owner maximizes his/her total wealth  $W$  and chooses an effort level  $e$ :

$$\text{Max}_{s, e} W = \{B(s, V)\} + \alpha V(e, s) - C(e) \quad (3.1)$$

$$\text{where } V'(e) > 0, \quad V''(e) < 0$$

$$C'(e) > 0, \quad C''(e) > 0$$

$$B'(s) > 0, \quad B''(s) < 0$$

$$B'(V) > 0, \quad B''(V) < 0$$

$$\text{clearly } \frac{\partial W}{\partial B} = 1, \quad \frac{dW}{dV} = \alpha + \frac{\partial B}{\partial V}$$

*f. o. c w.r.t s and e,*

$$\frac{\partial B}{\partial s} + \frac{\partial V}{\partial s} \frac{\partial B}{\partial V} + \alpha \frac{\partial V}{\partial s} = 0 \quad (3.2)$$

$$\frac{\partial V}{\partial e} \frac{\partial B}{\partial V} + \alpha \frac{\partial V}{\partial e} - \frac{\partial C}{\partial e} = 0. \quad (3.3)$$

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<sup>7</sup> See for example Jensen (1986), Stulz (1990), Hart and Moore (1998 and 1999) for the role of debt in mitigating agency cost. Also see Novaes and Zingales (1995).

The total wealth  $W$  of the controlling owner is consisted of 3 parts: the control benefit plus the return on his/her shareholdings minus the cost of control. The symbol  $e$  represents the effort level,  $C(e)$  is the cost function of the controlling owner,  $B$  denotes the benefit of control,  $s$  is the power of the controlling owner, and  $\alpha$  is the proportion of the controlling owner's cash flow right. There are 4 assumptions in the model. 1. The higher the effort exhibited by the controlling owner, the higher the firm value. This is represented by a concave function  $V(e)$ . 2. The higher the effort exhibited by the controlling owner the higher the cost of control. It is represented by a convex function  $C(e)$ . 3. The higher the power of the controlling owner, the higher the private benefit of control. This is represented by concave function of  $B(s)$ . 4. The higher the firm value, the higher the benefit of control. This is represented by concave function of  $B(V)$ .

It is readily seen that there is a leverage effect on his/her shareholdings ( $\alpha$ ) and the amount of control benefits. This depicts the classical agency problem of separation of ownership and control. Diversion of one dollar by the controlling shareholder will only cost him/her  $\alpha$  dollar in monetary terms. On the other hand, increasing firm value by one dollar will only benefit the controlling owner  $\alpha$  dollar. There are other properties at the extreme value of the power ( $s$ ), which could be of potential interest, which is omitted in this study. The omission does not change the nature of this modeling. Without other governance mechanism, controlling owners will explore the benefit of control until the point that increasing diversion will not result in an increase of his/her total wealth.

The control rent exists in Sweden like elsewhere in the world although the observed A-share premium differs on average from country to country.<sup>8</sup> For example, voting share premium is 82% in Italy according to Zingales (1994). In fact, the inferior shares in Zingales paper are non-voting shares with a specified dividend, which resembles debt instrument. In Sweden, the premium is low mainly due to the low probability of an

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<sup>8</sup> See for example Cronqvist and Nilsson (1999), who find that individual/family controlled firms on average incur significant agency costs, which in turn undermine firm market value. Peterson (1998, Essay 2) finds that there is no evidence showing that a high gearing of voting rights has a significant effect on firm performance after controlling for firm risk, industry, dividend yields, etc., using Swedish data. In fact, the regression for the individual controlled firms ( $n=68$ ) shows no significant parameters suggesting firms with high gearing of voting rights have alternative governance mechanism at work.

unfriendly takeover and the high liquidity risk premium priced in high voting shares.

It can be said that the cost of control of a minority controlling owner is a function of his/her voting gearing ratio. The higher the voting gearing, the lower the cost of control.

The gearing ratio of voting rights of the controlling owner can be denoted in two ways, either as a ratio or as a difference to its shareholding,

$$\delta_1 = \frac{\frac{ag + b}{N_a g + N_b}}{\frac{a + b}{N_a + N_b}}. \quad (3.4)$$

*The difference of votes to shareholding is, therefore,*

$$\delta_2 = \frac{ag + b}{N_a g + N_b} - \frac{a + b}{N_a + N_b} \quad (3.5)$$

The total number of A shares in the firm is  $N_a$  and that of B shares is  $N_b$ . The controlling owner owns A shares by the amount of  $a$ , and owns the B shares by the amount of  $b$ . The total number of votes is  $N_a g + N_b$ .  $g$  is the voting scheme, equivalently, the votes carried by the high voting shares normalizing the votes carried by low voting shares (B shares) to one. The total number of shares is  $N$ , where  $N = N_a + N_b$ .

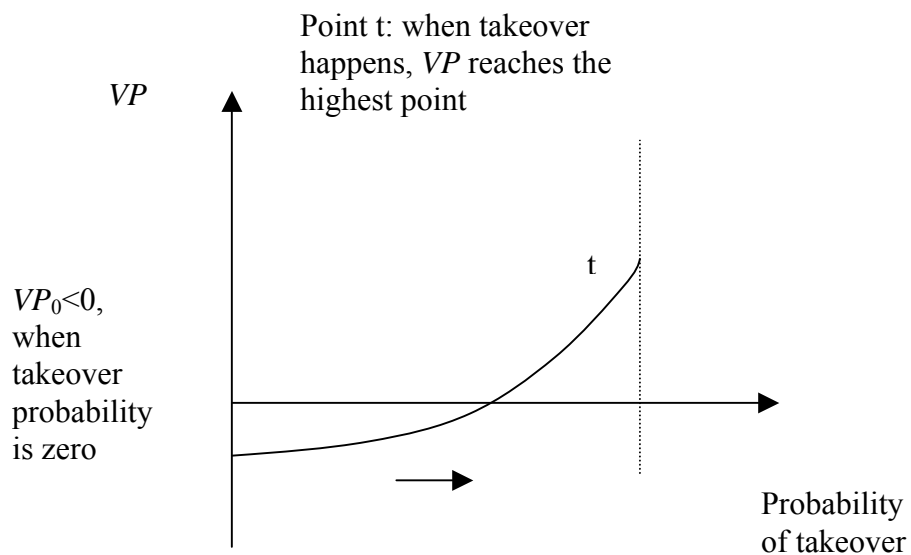
The voting premium can be modeled as a function of control benefit, takeover probability and liquidity risk premium priced in the high voting shares.<sup>9</sup> The control benefit is a function of the voting power. The higher the gearing ratio of voting rights, the larger the proportion of control benefit (equivalently, control rents) can be attributed

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<sup>9</sup> In Sweden, the dual class of shares bear differential votes that differ from 1: 1/1000 to 1: 1/5 as of 1999. See for example, Cronqvist and Nilsson (1999) for a general profile of different voting schemes in the Stockholm Stock Exchange.

to the gearing of the voting rights.<sup>10</sup> The observed voting premium thus reflects the marginal value of an additional vote to the potential bidder. This is because the larger the demand for the high voting shares, and also the larger the likelihood that a takeover is possible, the higher the observed voting premium. The voting premium curve becomes inelastic when the demand for the voting shares reaches a certain level, and the cost of acquiring more of the high voting shares (A shares) becomes more costly (see **Figure 1**). The voting premium is a function not only of benefits of control, but also of the likelihood that a takeover may occur.

**Figure 1: The voting premium versus takeover probability**



The observed voting premium ( $VP$ ) at time  $t$  is equal to the real premium (unobserved) times the probability of a takeover minus the liquidity risk premium associated with the lack of liquidity of the high voting shares. The real premium equals the private benefit of control per share (as suggested by Zingales, 1994).

<sup>10</sup> See Grossman and Hart (1988), for an extended discussion of agency problem stemming from separation of ownership and control.

Suppose that the total control rents is  $B$ , and the real premium is equal to the amount of control rents allocated among all high voting shares, i.e.  $B/N_a$ .

$N_a$  is the number of high voting shares.

$N$  is the total number of shares.

Defining  $VP = (P_a - P_b)/P_b$  where  $VP$  is the voting premium,  $P_a$  is the price of the high voting share,  $P_b$  is the price of the low voting share.

$B/V = \beta$  is the fraction of control rents over firm value ( $V$ ).

$V/N$  is the equilibrium share price.

$Lp$  denotes the liquidity risk premium on high voting shares.

$P^{to}$  is the takeover probability, which can be proxied as a function of the degree of large shareholder's voting power. The takeover probability can be represented by standard normal distribution of the inverse of the power of the largest owner in a firm. The Shapley-Shubik power index (the Banzhaf power index) of the controlling block<sup>11</sup> is denoted  $PI$ , the inverse of the power indices is then  $1/PI$ .

### **The probability of takeover**

A proxy of takeover probability can be stated as  $\Phi((1/PI)-3)$ . This is a cumulative standard normal distribution function, which gives a value between 1 and 0. When  $PI = 1$ , the value of the function is 0.022 or 2.2%; when  $PI = 0.2$ , the value is 0.977 or 97.7%. If the Shapley power index of the largest block equals a value of one, then the probability of a takeover is very small. The lower the power of the largest block, the higher the probability of a takeover.

The theoretical model for voting premium can be stated as:

$$d(\hat{VP}) = \left( \frac{B}{N_a} \frac{N}{V} P^{to} - Lp \right) dt + \sigma dW. \quad (3.6)$$

Equation (3.6) is a stochastic representation of the voting premium as an Itô process.

The characterization of the variable  $d(\hat{VP})$  is

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<sup>11</sup> The yearly published book by Sundin and Sundqvist: "Owners and power in Sweden's listed firms" reports block holdings held by closely related groups of members.

$$\left[ \left( \frac{B}{N_a} \frac{N}{V} P^{TO} - Lp \right) \Delta t, \sigma^2 \Delta t \right].$$

The private benefit of control allocated over one high voting share  $\frac{B}{N_a}$  divided by the equilibrium price of one share  $\frac{V}{N}$  is the theoretical voting premium. When the takeover probability is 0, the equilibrium price of the voting premium is equal to the liquidity risk premium (see **Figure 1**). Higher perceived probability of a takeover increases the voting premium. When the takeover probability is 1, the total theoretical voting premium is realized. This needs to be adjusted by the liquidity risk premium of the high voting shares.

The testable equation can then be stated as follows,

$$\hat{V}P_{it} = \alpha_0 + \alpha_1 \beta \left( \frac{P^{TO}}{\phi} \right)_{it} + \alpha_2 Lp_{it} + \alpha_3 \sigma_{it}^2 + \varepsilon_{it}. \quad (3.7)$$

where  $\phi = N_a / N$ , i.e. the proportion of high voting shares to the total number of shares,  $\beta = B/V$ , i.e. the proportion of control benefit to market value of the firm,  $\alpha_0$  is the intercept term;  $\alpha_1, \alpha_2, \alpha_3$  are model parameters.  $\alpha_1$  should be positive.  $\alpha_2$  should be negative.  $\alpha_3$  should be positive.

The liquidity risk premium ( $Lp$ ) can be proxied by (1) the percentage of high voting shares that are tradable assuming that the 20 largest shareholders don't trade their high voting shares, only small shareholders trade their high voting shares; (2) the bid-ask spread of the high voting shares compared to that of the low voting shares; (3) the differential trading volume: trading volume of B shares/ the trading volume of A shares. Note that in general, the liquidity risk premium of A shares over B shares is negative,



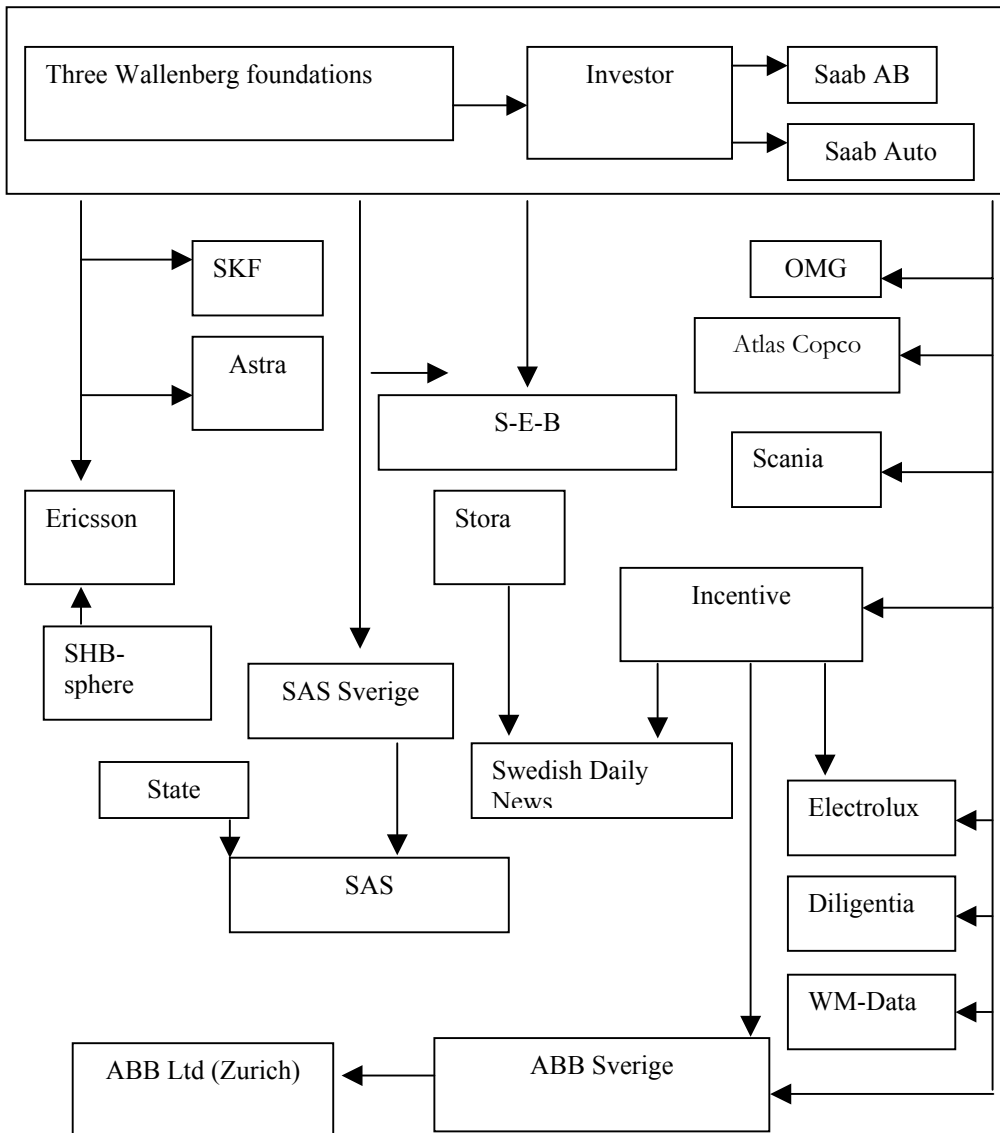
but if a takeover is expected, the liquidity risk premium can be erased as the trading frequency of A shares goes up. The variance  $\sigma^2$  should be represented by a moving average variance over a certain period.

### **3.1 De-layering the pyramidal structure**

The legal device of dual class of shares together with pyramidal structure have been commonly used to establish holding companies and family empires in the European countries, notably Sweden, Switzerland, France, the Netherlands, Belgium (pyramidal structure), Italy, and Germany (pyramidal structure) (Nicodano, 1998; Renneboog, 1999; Becht and Böhmer, 1997; Zingales, 1994; Schmidt, 2003). The combination of pyramids and dual class of shares produce an accelerating effect on the degree of control (**Appendices A3**).

In a pyramidal structure, the holding company plays a critical role. Strong family groups using holding company as the building block to establish control over layers of operating companies. The group usually manages the capital investments of the firms, shares information and competence within the group, and mobilizes resources within group members (see **Diagram 1**; also see Carlsson, 2001). This type of control model has arisen in many economies around the world mainly in owner controlled groups with vertical integration. The coordination among groups of firms is less likely in free market system with management control.

**Diagram 1: The Wallenberg Sphere (1998)**

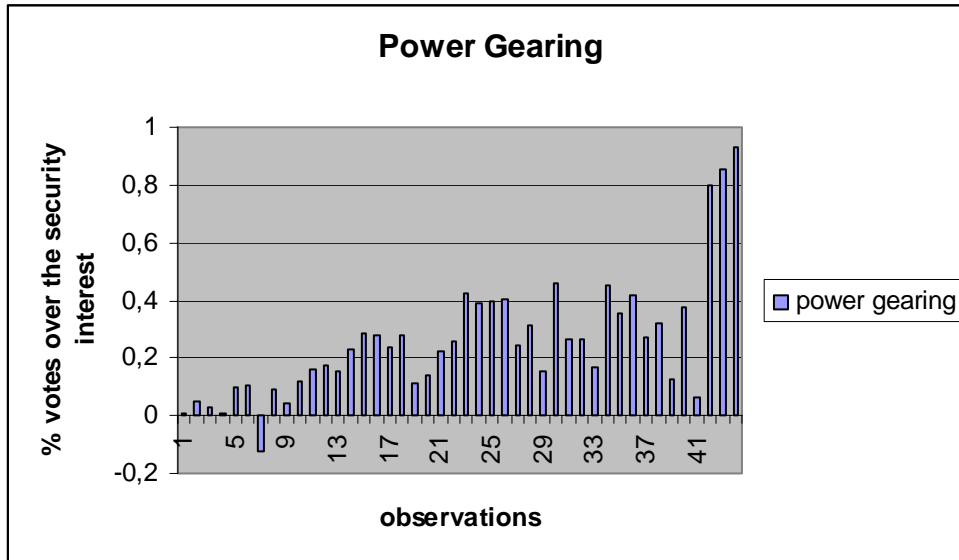


Note: The Information used here is from Sundin and Sundqvist (1998).

An example can best illustrate the effects of both *voting gearing* and pyramidal structure on the total amount of capital controlled (**Appendices A1**)

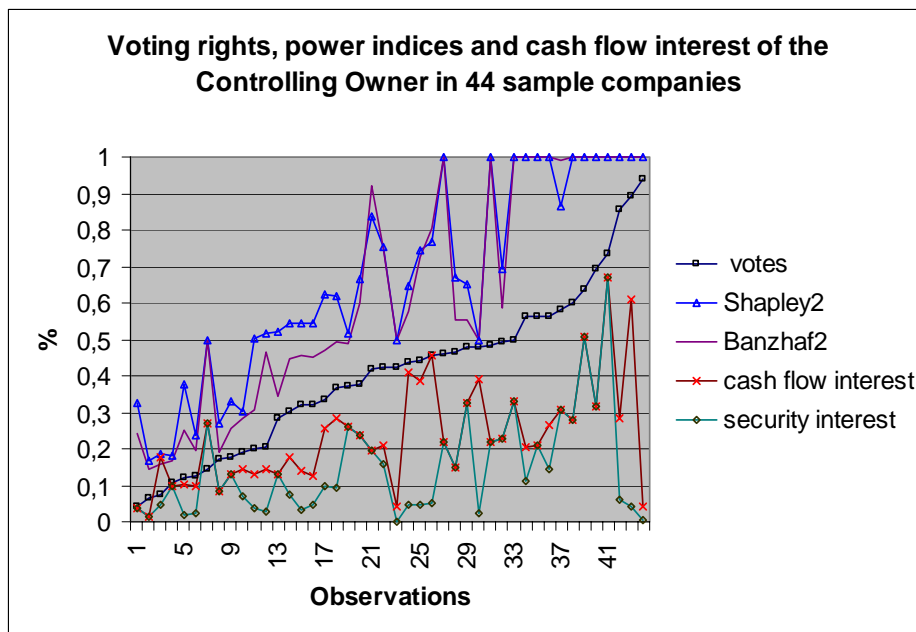
The difference of the voting rights to security interest ( $\delta_2$ ) is an indicator of the firm's controlling owner's power gearing. The power gearing of a group of 44 Swedish listed companies is presented in **Graph 2**.

**Graph 2: The power gearing of 44 Swedish listed firms with both A and B shares traded on SSE (sorted by votes)**



Note: The negative value is due to the voting constraint of no more than 20% of votes presented at the shareholder meeting at Lap Power AB.

**Graph 3: Voting rights, power indices, and cash flow interests of the largest owners in 44 Swedish listed firms**



## 4 Rivals, incumbents and takeover contests

In a takeover contest, dual class of shares can benefit the incumbents and consequently value increasing takeovers may not occur. The incumbent's willingness to pay in a control contest is determined by the number of the total voting shares, the ratio of voting shares to total shares outstanding, the private benefits of control of the incumbent, the incumbent's initial stake in the company, and by the security benefit of the incumbent over the rival.

### Case 1: The incumbent's willingness to pay in a control contest

In a control contest, the incumbent's maximum willingness to pay for control is equal to the incumbent's private benefit of control plus the difference between the security benefit of the incumbent and that of the rival. The value of the share under the incumbent is called the incumbent's security benefit. The incumbent will fight for

control since the incumbent's stake in the firm will lose value if the rival has inferior security benefits, and the incumbent will lose private benefit of control if control shifts to the rival (Nicodano, 1998).

Let  $V_I$  equal the incumbent  $I$ 's maximum willingness to pay in a control contest;  $B$  be the private benefit of the incumbent  $I$ ;  $N^V$  be the number of voting shares of the incumbent before the control contest;  $N^{NV}$  be the number of nonvoting shares of the incumbent before the control contest;  $p$  be the incumbent's security benefit per share; and  $q$  be the rival's perceived security benefit per share. Then the incumbent's maximum willingness to pay for the votes needed for control purposes is:

$$V_I = B_I + (p - q)(N_I^V + N_I^{NV}), \quad (3.8)$$

which is the difference between the incumbent's total value of keeping the control and of losing the control to the rival. If the incumbent stays put he/she will lose the private benefit of control and the difference between the incumbent's security benefit and the rival's security benefit assuming that the incumbent keeps his/her initial shareholdings.

**Situation 1: control contest for 50% votes**

Assuming that 50% of the voting shares is the threshold of obtaining control in a control contest, the incumbent's strategy is to buy enough voting shares to keep control. The incumbent leaves the non-voting shares unchanged since more non-voting shares will not give any votes. Then the incumbent's willingness to pay for votes is:

$$S_I = B_I + p(0.5N^V + N_I^{NV}) - q(N_I^V + N_I^{NV}) = V_I + p(0.5N^V - N_I^V). \quad (3.9)$$

$S_I$  is the difference between the incumbent keeping control by acquiring 50% of the voting shares and if the rival taking over while the incumbent keeps his/her initial shareholdings. This is the maximum amount that the incumbent will pay in the contest.

Assuming that 50% of the voting shares is what is required to defeat the rival, then, the per share price of the voting shares can be calculated by equalizing his surplus from keeping control and the extra voting shares needed to keep control.

That is,

$$P_V(0.5N^V - N_I^V) = S_I$$

$$P_V = p + \frac{V_I}{(0.5N^V - N_I^V)}. \quad (3.10)$$

$P_V$  is the maximum price that the incumbent is willing to pay for each voting share in order to have 50% of the voting shares.

### **Situation 2: control contest with Mandatory Bid Rule**

In case of a mandatory bid requirement (where the Mandatory Bid Rule is adopted), the offer is extended to the rest of the shares during a specified period of time, once the holding exceeds a certain threshold (1/3 or 33.3%).

Let  $\tilde{P}$  denote the price of the maximum offer if the incumbent has to buy all the shares  $N$ :

$$\tilde{P} = p + \frac{V_I}{(N - N_I^V - N_I^{NV})} \quad (3.11)$$

$\tilde{P}$  is the highest per share price that the incumbent can pay if the Mandatory Bid Rule is triggered. It does not specifically require different price offers for voting and non-voting shares. It follows from Equation (3.11) that the incumbent's maximum willingness to pay in order to maintain control is positively related to the initial amount of shares of the incumbent in the company,  $N^V + N^{NV}$ , the security benefit of the incumbent,  $p$ , the private benefit of the incumbent,  $B$ , and the security benefit of the incumbent over the rival. In other words, bigger initial position of the incumbent before a control contest increases the incumbent's chance of defeating the rival,  $p-q$ .

Other devices that could be effective in a control contest are the incumbent's personal reputation, the incumbent's influential power over other shareholders, and the

possibility of employing corporate resources to fight for control. All of these have high correlation with the incumbent's initial voting shares in the firm. Also, the Mandatory Bid Rule reduces the incumbent's ability to pay per share, since  $\tilde{P}$  is less than  $P_v$ . Introducing the Mandatory Bid Rule reduces the chance of a takeover compared to the 50% rule.

**Case 2: For the rival to initiate a control contest:**

Similarly, a rival's maximum willingness to pay for control is

$$V_R = B_R + (q - p)(N_R^V + N_R^{NV}), \quad (3.12)$$

where  $B_R$  is the benefit of control of the rival, and  $Q$  is the rival's security benefit. By the same reasoning, the maximum willingness for the rival to pay per voting share is:

$$Q_v = q + \frac{V_R}{(0.5N^V - N_R^V)}. \quad (3.13)$$

In a control contest the outsider's votes are pivotal to the competing parties, i.e. the incumbent  $I$  and the rival  $R$ . The voting premium can thus be related to the takeover contest where the rival and the incumbent fight over the outsider's votes (Zingales, 1994). The outsiders tender their shares to the highest offer.

When all the outsiders tender to the incumbent, the amount of votes that gets accepted by the incumbent is  $(0.5N^V - N_I^V)/N_o^V$  where  $N_o^V$  is the total voting shares of the outsiders.  $(0.5N^V - N_I^V)$  is the number of voting shares that the incumbent needs in the control contest. The expected value of an outsider's voting share is the probability of his voting share getting accepted times the price of the offer, and the probability of it not getting accepted times the security benefit under the incumbent control. That is,

$$\frac{(0.5N^V - N_I^V)}{N_o^V} P_v + \left(1 - \frac{(0.5N^V - N_I^V)}{N_o^V}\right) p = p + \frac{(0.5N^V - N_I^V)}{N_o^V} (P_v - p). \quad (3.14)$$

The outsider will tender to the rival if the expected value of the outsider's voting shares under the rival is larger than that of tendering to the incumbent.

$$\frac{(0.5N^V - N_R^V)}{N_O^V}Q_V + \left(1 - \frac{(0.5N^V - N_R^V)}{N_O^V}\right)q = q + \frac{(0.5N^V - N_R^V)}{N_O^V}(Q_V - q). \quad (3.15)$$

For the incumbent to keep control the expected price of the outsider's voting shares under the incumbent should be at least as large as the price conditional on tendering to the rival (compare Equation (3.14) to Equation (3.15)). The premium paid by the incumbent must be no smaller than the rival's. The larger the difference between the incumbent's management skill and that of the rival's, the easier it is for the outside shareholders to single a winner out (Grossman and Hart, 1988).

For the outsider to tender to the incumbent, it must satisfy the following: the expected value of the outsider's votes has to be greater under the incumbent than under the rival.

The outsider will tender to the incumbent if and only if,

$$\pi_R Q_V + (1 - \pi_R)q \leq \pi_I P_V + (1 - \pi_I)p = p + \pi_I(P_V - p),$$

where  $\pi_I = \frac{0.5N^V - N_I^V}{N_O^V}$ ,  $\pi_R = \frac{0.5N^V - N_R^V}{N_O^V}$ .

Rearranging and Using: (3.12)

$$\begin{aligned} \pi_I(P_V - p) &\geq \pi_R Q_V + (1 - \pi_R)q - p = \frac{V_R}{N_O^V} + q - p \\ &= \frac{B_R}{N_O^V} + (q - p) \left[1 + \frac{N_R^V + N_R^{MV}}{N_O^V}\right]. \end{aligned} \quad (3.16)$$



The expected premium of the voting shares of the outsiders given that the incumbent wins control must be no less than that which the rival can offer to the outsider,  $\frac{V_R}{N_o^V}$ , plus the security benefit of the rival over the incumbent,  $q - p$  (see Equation (3.16)).

A numerical experiment proves that the incumbent can fight back a takeover contest of rivals *inefficiently* by using his/her high initial holding of voting rights and his/her private benefit of control, but only to an extent. It is deemed *inefficient* due to the fact that even though the total value of the firm under the incumbent is less than under the rival, a shift of control does not occur. The higher the private benefit of the incumbent and the higher the proportion of voting shares the incumbent has before the takeover contest, the higher the probability that the incumbent will win the contest even though the total value of the firm under the rival is larger than the total value of the firm under the incumbent. The probability of the outsider's votes ( $\pi_I$ ) being accepted in a takeover contest by the incumbent is low if the incumbent's initial voting ratio is high. By simulating using experimental figures on the above model, I find out that the inefficient result occurs not as often as one might think (not reported). Unless there are other anti-takeover measures blocking the value increasing takeover. The fact that few hostile takeovers happen in countries like Sweden does not mean that it is a theoretical impossibility. It only means that firms prefer friendly takeover than hostile takeover under existing laws and regulations. A hostile takeover can be costly to both incumbent and the rival and can be destructive to the firm.

## **5 Law and cultural influences in determining ownership choices**

Ownership structure choices are highly related to company laws and regulations in a country (La Porta et al., 1998; La Porta et al., 1999a; Zingales, 1994 and 1997). Different laws and regulations on both the national and the corporate level often contribute to different ownership structures in firms (see **Appendices A2**). National

characteristics largely determine inter-country differences unaccounted for by laws and regulations (Hennart and Larimo, 1998).<sup>12</sup> The fact that the actual power of a controlling owner in one country can be quite different in the context of another country is largely due to national differences in the power distances and to different cultural beliefs. A society with a large power distance and strong masculinity as the cultural norm (notably, Italy, France, and the US) stresses power and success, and is therefore likely to value power more. In other words, special care is called for when cross border comparisons are conducted.

The differences in laws and cultures influence the choice of ownership structure and the degree of control in two ways. First, it influences the pricing of the power and the need to protect the power. It in turn influences the choice of corporate sub-law adopted by the corporate charter. Second, it can influence the probability of a takeover. A country or a firm might adopt some anti-takeover law to deter uninvited foreign acquisition if national identity of the ownership is important. For example, some Swedish firms have adopted the Mandatory Bid Rule<sup>13</sup> although the Swedish Company Law (1975: 1385) does not require this (Bergström and Högfeltdt, 1994). This makes takeover more expensive and less likely for the bidder since he/she has to buy up the rest of the shares if he/she reaches the stated limit (see Bergström and Högfeltdt, 1994; Bebchuk, 1994; Bebchuk and Hart, 2001). The lower the limit of the mandatory bid, the higher the protection to the incumbent's control rights. In countries where the control rights are valued higher, more control contests are expected. It remains an issue whether the value maximization standard should be considered before the adoption of each law. The tradeoff is between maximizing shareholder value with more market discipline and a stable long-term owner with no threat of takeover. In an environment of owner control as in Sweden, the Mandatory Bid Rule serves as a protection to the owner since takeover can be more costly to the bidder of the firm.

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<sup>12</sup> Hofstede Geert characterizes four dimensions of society in his work "Culture's Differences: International differences in work-related values," (1980), namely large vs. small power distance, masculine vs. feminine society, strong vs. weak uncertainty avoidance, and collectivist vs. individualist as the social norm. It contributes to the understanding of national character and its consequences: certain economic assumptions do not necessarily apply beyond national borders.

<sup>13</sup> A bidder who crosses a threshold of at most one third (33.33%) must make a mandatory offer for all the remaining voting rights and convertible securities of a firm at a price which equals the highest price he/she paid when establishing his/her position within a defined period of time.

## 6 Owner control, or management control?

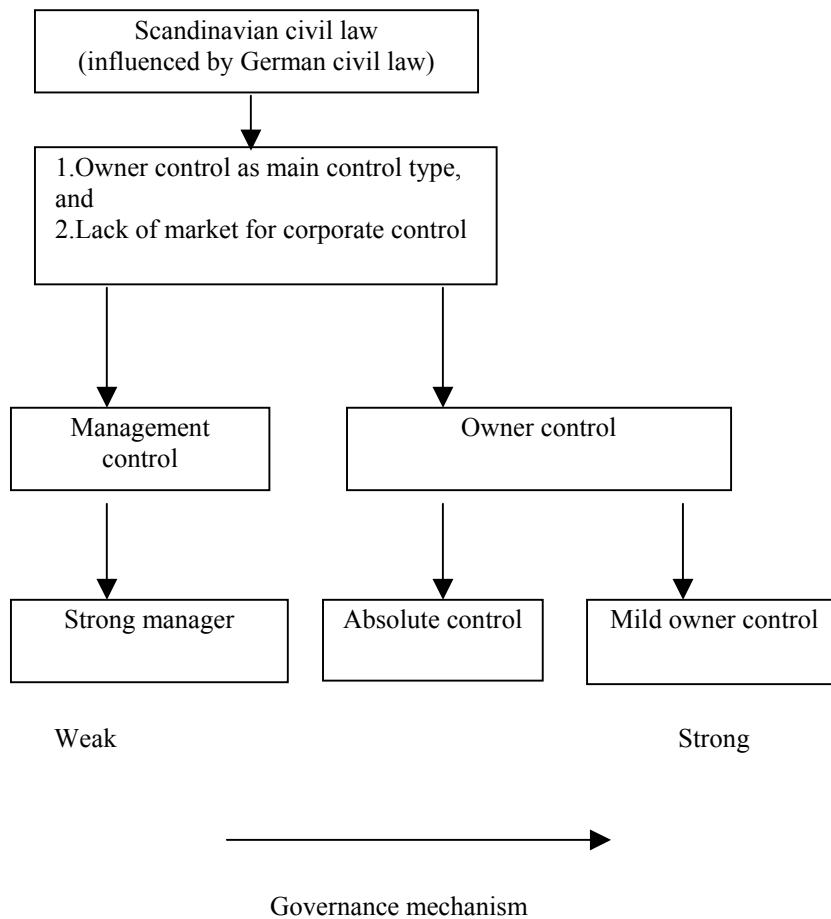
In a country where owner control has its cultural roots, management control may not be a better choice due to the lack of a market for corporate control. This suggests that management controlled firms have a weaker corporate governance mechanism in an owner controlled environment (Bebchuk and Fried, 2003). Management control without a strong owner makes the management powerful in pursuing their own goals for example setting their own incentive schemes that are unrelated to personal skills, big retirement packages, and disincentives to disclose information concerning company facts that are essential in deciding CEO payment. This exacerbates agency costs in management controlled firms in an owner controlled environment since it is unclear if there is alternative mechanism in place to govern management controlled firms if there is a lack of outside monitoring (see **Diagram 3**). Those firms have greater governance challenges since it will not be disciplined by the market for corporate control nor by strong shareholders. One possible outside monitor to this type of firms is institutional shareholders.

It is therefore important to design corporate governance rules in a consistent and systematic manner. For firms with management control there is a need to have stronger institutional owner monitoring. A stronger role should be assigned to annual shareholder meeting with better disclosure of information concerning management compensation and performance. There should also be strong emphasizing on independent boards in order to mitigate the power of the management. Strong management control can thus be seen as a weak point in the governance arena in an economy with owner control tradition and a less developed capital market.

Absolute owner control is less desirable to mild owner control. The latter allows better decision making and more efficient risk taking. Firms with absolute owner control are likely to incur more agency costs than firms with mild owner control. The order of the superiority of the governance types is presented in **Diagram 3**. There are efficiency

gains to be made by limiting absolute control either by strong managers or by big owners. Checks and balances are important in politics as well as in corporations.

**Diagram 3: A comparison of the strength of control types under an environment of owner control**



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## Appendices

### A1

#### Ex 1 A hypothetical pyramidal structure

Suppose that family A holds 50% of its holding company X, which has a total equity capital C. The holding company employs dual class of shares system with  $\sigma^V$  percent of voting shares. Also assume that dual class of shares can only apply to the first layer of the company. Company X, in turn, holds 50% of operating company B. Total capital in company B is 2C. The accelerating effect can be shown below.

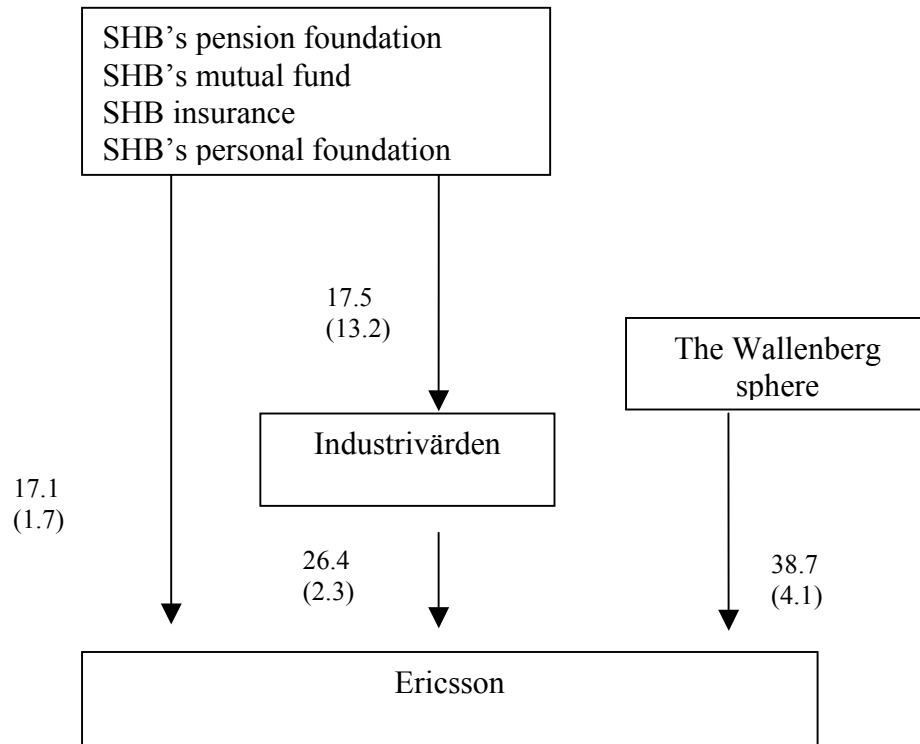
The capital needed to hold 50% of holding company X is  $0.5\sigma^V C$ . The total amount of capital that family A controls is  $C+2C=3C$ . Assuming that  $\sigma^V=0.1$ , the effect of acceleration is  $3C/(0.5\sigma^V C+C)=3/1.05=2.86$  times of the initial investment. Using dual class of shares in operating company B will have even larger accelerating effect. Suppose that the capital structure of these companies is 60% (debt to total assets), then the total amount of capital that family A control is 7.14 times its total investment.

The more the layers of companies, the more the capital that can be controlled by the controlling owner. This line of study is of interest to agency cost and corporate governance because private benefit of control is positively related to the ratio of the private investment of the controlling owners to the total amount of capital controlled (Zingales, 1994).

#### Ex 2 The ultimate ownership of SHB sphere to Ericsson

The SHB sphere controls its holding companies and operating companies via pyramidal structures and dual class of shares. The voting ratio of Ericsson A to B share was 1: 1/1000 in 1998. The SHB sphere owns 42.9% of the high voting shares having in total 43.5% of voting rights, while its cash flow right amounts to 4%. The ultimate shareholding of the SHB sphere in Ericsson is termed as security interest, which equals  $2.3\%*13.2\%+1.7\% = 2\%$  only.

**Diagram 2: Ownership structure of Ericsson**



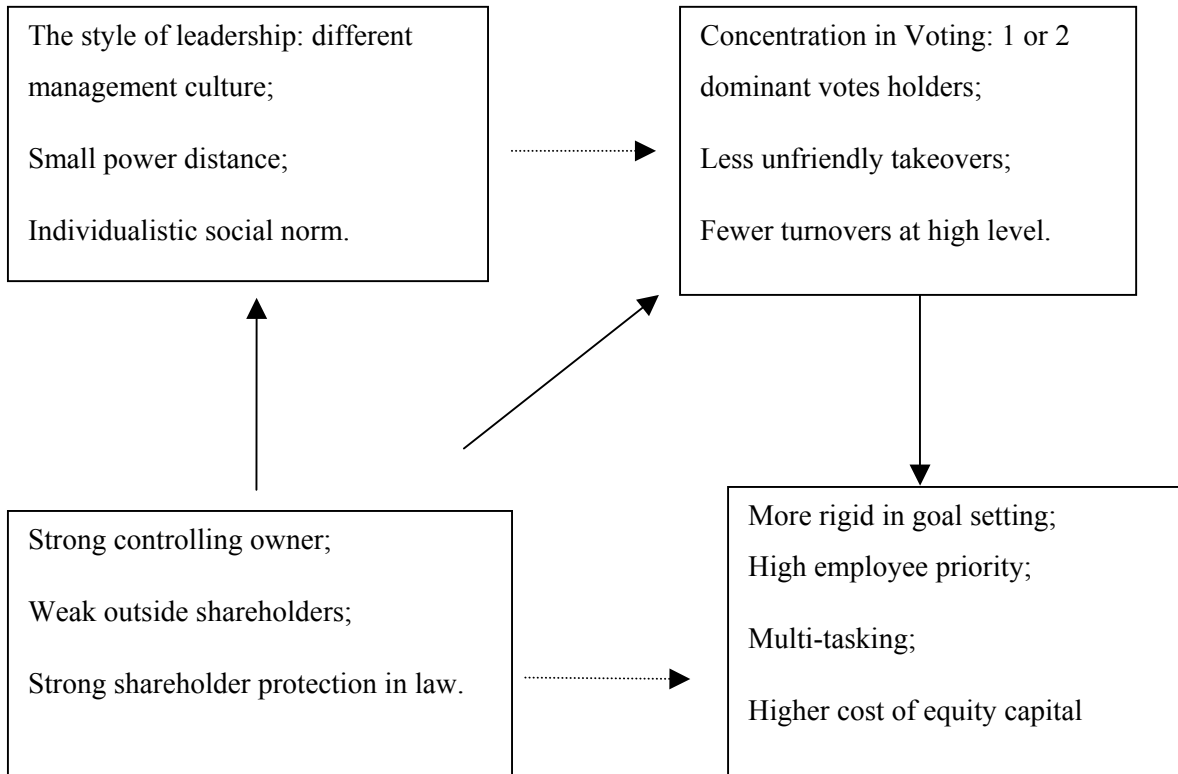
Note: The data and information used here is from Sundqvist (1998).

The leverage factor is

$(\text{Direct voting rights} / \text{Security interest}) = 43.5\% / 2\% = 21.75$ . The difference of the voting rights to security interest is 41.5%.

## A2

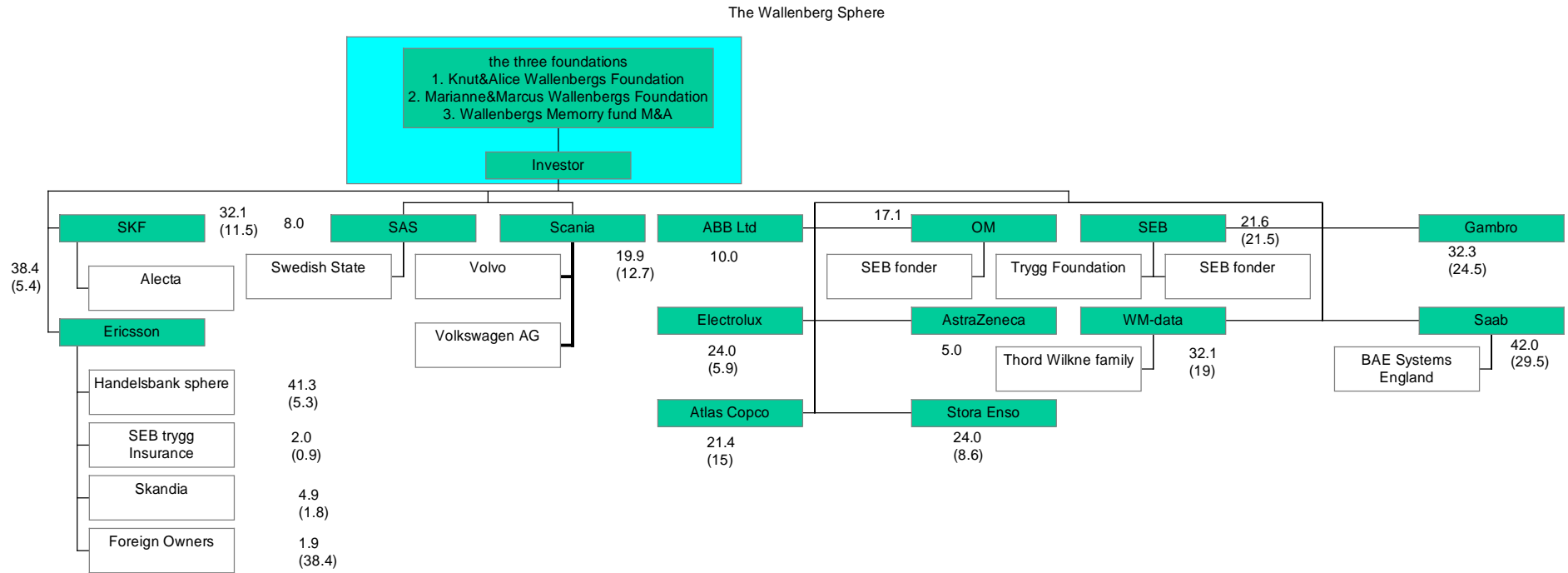
### Diagram 4: The cultural effects, ownership choices,<sup>14</sup> and efficiency: the case of Sweden



<sup>14</sup> This analysis is related to Hofstede Geert (1980) and Hennart and Larimo (1998).

# A3

## The Wallenberg Sphere in 2002

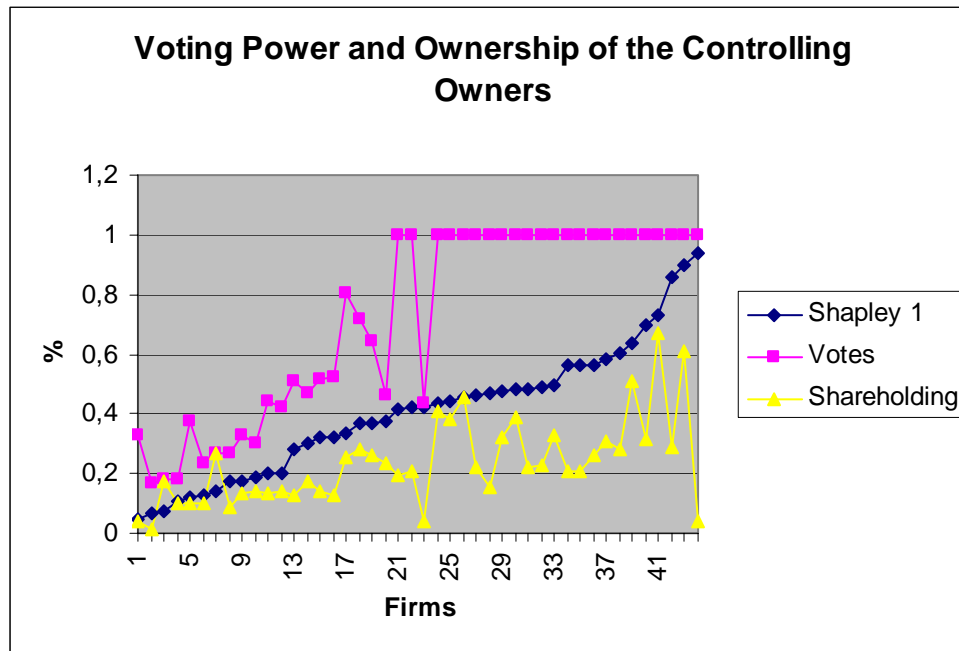


Source: Fristedt-Sundin-Sundqvist, “Ågarna och Makten i Sveriges Börsföretag 2003.”

The numbers are voting rights of the controlling owners; the numbers in parentheses show share ownership. The green entries are Wallenberg group members. The white entries are other significant owners.

# A4

## Voting power and ownership of the largest owners of 44 Swedish listed firms (sorted by votes)



## Essay 2:

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# Owner control and firm performance: a cross-sectional study of listed firms with dual class of shares in Sweden

Yinghong Chen<sup>1</sup>

## Abstract

This paper employs agency theory and findings in corporate governance to study a group of listed firms with dual class of shares and pyramidal structure in Sweden. 44 listed firms with both A and B shares traded on SSE are studied using market data and accounting statements. Determinants of voting concentration are studied both by using a single equation Tobit model and by a simultaneous equations model where power of the controlling owner, and firm performance are treated as endogenous. For comparison, two measures of voting concentration are used: (1) the Shapley-Shubik power indices, and (2) pure voting rights of the controlling owner. The single equation Tobit model indicates that growth rate is negatively related to the voting concentration. Also, firms with better performance in terms of return on assets tend to have a more concentrated voting structure. However, performance in terms of market-to-book ratio is negative and significant in relation to voting concentration when voting power of the controlling owner is evaluated at simple majority but not at the super majority. Higher debt ratio contributes to voting concentration, especially under super majority voting rule.

In the simultaneous equations system, the results show that firms with higher market-to-book ratio tend to have lower voting concentration as found in single equation Tobit model. Most significantly, firms with higher voting concentration tend to have lower market-to-book ratios but higher accounting profits. Higher debt ratio facilitates higher degree of owner control and vice versa. The discount on the market-to-book ratio for firms is associated with the power of the controlling owner. Firms with a higher power concentration have a higher discount.

**JEL Classifications:** G32, G34.

**Key words:** power indices; corporate governance; owner control; firm performance.

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# 1 Introduction

“Organizations are tools in the hands of their masters, thus, control over them is a prize that many people seek.”

By Charles Perrow in *Complex Organizations, a critical essay*, 1986.

This paper analyzes the power of the controlling shareholder and its impact on firm performance. Strong owner control can be found in many countries including many continental European countries such as Belgium, France, the Netherlands, Germany, Italy, and Sweden (Renneboog, 1997; Böhmer, 1999; Barca and Becht, 2001; Betts, 2003; Berglöf et al., 2003). Strong owner control represents a major type of corporate control in these countries. Control with legal devices such as pyramidal structure and dual class of shares deviates from the one share-one vote rule that can be seen as the major Anglo-America corporate voting model. This is also an issue much talked about at the EU legislative process, e.g., the harmonization of company laws and the formation of competitive takeover legislation within European Union member countries. Controlling owners on one side and institutional shareholders and perhaps legislators on the other side are in conflict about whether companies in European Union should adopt the rule of one share-one vote universally, which would pave the way towards more cross-border takeovers. The research issue here is to look at the relative market performance of firms with differing power structure without relating to EU integration process. What is the overall picture? Will a vanishing of the voting control result in a wave of takeover in Sweden?

Economic structure in a country is endogenously determined by its cultural tradition and political inheritance and economic policy (see Högfeltdt, 2003; Berglöf et al., 2003; Betts, 2003). Among the listed firms in Sweden, the level of ownership concentration is high; also high degree of owner control is often associated with control by voting rights and pyramidal structure (Agnblad et al., 2001). Control by dual class of shares and pyramidal structure arose as a major model of corporate control in the 1950s and 1960s in Sweden due to the need for outside capital to facilitate rapid expansion and growth (Bergström

and Rydqvist, 1992; Högfeltdt, 2003; Berglöf et al., 2003).<sup>2</sup> Excellent and voluminous studies have been done on Swedish family ownership and control from political economy point of view. This paper contributes to the study by concentrating on the economic implications of the strong owner control model that effectively shields a firm from market for corporate control.

Anglo-American corporate governance literature focuses on the theory of market for corporate control, management entrenchment and shareholder free riding problems, etc., based on a largely dispersed ownership structure (Berle and Means, 1932; Jensen and Meckling, 1976). The models of corporate control on both sides of the Atlantic are under scrutiny in the wake of numerous corporate scandals. The quality of corporate governance is one aspect for international institutional investors and shareholder to consider when deciding their investments (see Shleifer and Vishny, 1997; La Porta et al., 1998; La Porta et al., 1999; La Porta et al., 2000 (1); La Porta et al., 2000 (2)). It is thus important for firms to have strong corporate governance measures and provide the best information venue readily accessible by the market in order to compete for limited outside capital.

In contrast with Anglo-American model, controlling owners are often seen as long-term owners who care about the long-term development of the firms. In owner controlled firms, corporate governance should focus on issues like controlling owner entrenchment and harmonization of stakeholder interests, etc. (Jensen and Meckling, 1976; Berglöf et al., 2003). It is expected that agency cost increases with the gap between controlling owner's voting rights and his/her percentage shareholding, other things being equal (see **Appendices A1**).

The Swedish model of ownership and control has been successful in contributing to economic growth and since the mid-1960s this model has helped building up a strong industrial base (Högfeltdt, 2003; Carlsson, 2001). One negative argument is that owners with controlling interests and un-diversified portfolio may take less risk than what is

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<sup>2</sup> Firms that use dual class of shares increased from 18% in 1950 to 32 % in 1968, 42% in 1978, 54% in 1981, 87% in 1992, and 63% in 1998 among the 100 largest listed firms in Sweden.

optimal for the firm (Martin Holmén, 1998). If that is the case, then, since those firms often are in leading positions in a given industry, this type of owner control could do more harm to the industry by taking too little risk and thus hamper the growth and competitiveness of the economy. Optimally, the society should establish rules for resources to be managed by the most talented people in the most efficient way possible.

A growing body of literature suggests that corporate governance is endogenous to other institutional settings, e.g. culture and customs, economic histories, etc. (Roberts, 2003). Given that corporate governance models are endogenously determined, corporate governance model will also be divergent across countries that find themselves on different development stages. In this paper I focus on the extreme form of corporate control: the minority owner control<sup>3</sup> using dual class of shares, pyramiding structures and study the relationship between growth, performance and power structure. The study object is a group of firms with similar control type but different degrees of control.

The rest of the paper is organized as follows: part 2 reviews the literature on dual class of shares and firm performance; part 3 discusses a model of owner control; part 4 presents data and methodology; and the final section concludes the paper with a discussion of the findings and their implications.

## **2 Literature on dual class of shares and firm performance**

In Demsetz and Villalonga (2001) the literature on the effect of ownership structure on firm performance are reviewed for the period after 1985. The main findings are: Firms using employee stock option plans, CEO stock option plans, together with firms that emphasizing management stock ownerships have used ownership to provide extra incentive for the receivers to work in the interest of shareholders. This has produced controversial empirical results (Demsetz and Villalonga, 2001). Few studies find in favor

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<sup>3</sup>The term “minority owner control” stems from the fact that controlling owners holding a minority amount of equity that is often negligible compared to their voting powers. This can result in minority owner entrenchment in contrast to management entrenchment (see Betts, 2003).

of stock option plans. To limit the scope of the review, I focus on literature concerning dual class of shares and firm performance.

The advantage associated with dual class of shares is argued by Grossman and Hart (1988) for its surplus extraction role in an event of a takeover. Grossman and Hart point out that from the incumbent shareholders' point of view, it is efficient to have dual class of shares in order to extract surplus from the bidder in a takeover contest. However, one share-one vote outperforms, on average all the other voting structures, under simple majority voting rule.

Rydqvist (1998) studies the value of the voting premium from 1975 to 1985 in Swedish firms with dual class of shares listed at the Stockholm Stock Exchange. The main result is that higher voting premiums are associated with higher voting power of the outside shareholders and smaller firm size in a cross sectional setting. Small shareholders possess power through their ability to sell their shareholdings to raiders. Voting premium reflects the takeover possibility of the firm as it is verified by the Swedish data from 1975 to 1985.

Bergström and Rydqvist (1990) study Swedish firms with dual class of shares and test the expropriation hypothesis. They find no evidence that controlling shareholders expropriate other shareholders. They treat the voting fraction of the largest shareholder block as exogenous. The expropriation hypothesis is rejected on the ground that controlling owners<sup>4</sup> held more than minimum amount of shares required for the voting percentage they hold.

Demsetz and Villalonga (2001) find out that ownership choice is endogenous and that ownership does not contribute to firm performance by using a sample of 223 firms from all sectors of the US economy. They study the phenomenon in a two-equation system with ownership concentration and firm performance as endogenous variables using a 5-year (1976-1980) averaged data.

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<sup>4</sup> Controlling owners are shareholders or coalitions of shareholders, who have the largest votes in the firms, or who have enough voting power to replace managements at anytime (Bergström and Rydqvist, 1990).

I follow Demsetz and Villalonga (2001) and model the voting power and firm performance in a simultaneous equations framework. The Shapley-Shubik power indices are used to measure the voting power of the controlling owners (Chen, 2004). Firm performance is measured by (1). Market capitalization divided by shareholders' funds (QA). (2). Return on assets (ROA). An illustration of how the power indices can be used to measure power distribution within a board is presented in **Appendices A2** and **A3**.

### **3 A model of owner control**

#### **3.1 Owner's maximization function**

Assuming there is an entrepreneur with limited wealth and a positive NPV project. The entrepreneur needs outside capital in order to take on the positive NPV project but would like to stay in control, given that he /she has the specific knowledge to implement the production plan. One way of doing this is to utilize dual class of shares. As the founder he/she decides how many votes is to be assigned to A shares and to B shares in order to keep control. The founder cares not only about the cash flow benefits represented by his shareholding, but also cares about the total resources he/she controls since he/she can derive control benefit out of the firm.

Let  $V$  be the value of the firm,  $c$  be the percentage of shares held by the controlling owner, and  $d*V$  be the benefit of control. Then the total amounts of wealth of the controlling owner and of the non-controlling owners (other shareholders) are

$W_c = (c + d) V$  for the controlling owner, and

$W_n = (1-c) V$  for non-controlling owners.

$V$  is the market value of the firm.

The symbols of the variables used in the paper are presented below.

**Table 1 List of variables and descriptions**

<b>Variable names</b>	<b>Description of the Variables</b>
c	The shareholding of the controlling shareholder (%).
TA	Total assets.
Av(TA) <sub>5</sub>	The average total assets over a 5-year period.
GA	The growth rate of assets in the firm.
Av(GA) <sub>5</sub>	The average growth rate over a 5-year period.
IOP= {S <sub>1</sub> and S <sub>2</sub> }	S <sub>1</sub> is Shapley-Shubik power index measured using simple majority voting rule; S <sub>2</sub> is the Shapley-Shubik power index measured using super majority voting rule.
SECU	Security interest of the controlling owner, this is ownership adjusted for pyramidal structure.
SS	S1-SECU. It is the distance between the power of the controlling owner and his/her share of ownership adjusted for pyramidal structure.
CI	Represents cash interest of the biggest owner. CI = (a+b)/(A+B), where a is the number of A shares held by the controlling owner; b is the number of B shares held by the controlling owner; A= the total amount of A shares; B= the total amount of B shares.
SC	S1-CI the distance between power of the controlling owner and his share ownership.
d	The diversion ratio or the benefit of control.
V	Market value of the firm.
$g = \frac{aV_a + bV_b}{AV_a + BV_b} - \frac{a + b}{A + B}$	g is the difference between votes carried by the controlling owner and his/ shareholding in percentage; V <sub>a</sub> is the votes carried by one A share; V <sub>b</sub> is the votes carried by one B share.
Age	Years of incorporation.
Size	Ln (turnover).
DA	Debt ratio = 1 - shareholders' funds / total assets.
QA	Market capitalization / shareholders' funds
ROA	Return on Assets= EBIT/TA
Dm1	{Individual control, company control}= {0, 1}.

Assuming controlling owner is risk neutral. A utility maximizing agent maximizes his/her pecuniary benefit (c+d)\*V and the total resources he/she controls by maximizing the

objective function  $W$  as in (3.0), where  $W$  is a function of firm value  $V$ , Benefit of control  $d$ , and the shareholding  $c$ , growth rate  $g$  and total assets  $TA$ . A first order condition can be derived to represent the marginal relationship among the variables.

$$\underset{g}{Max} W = d(g)V(g) + cV(g) + (1 + GA(g))TA \quad (3.0)$$

*f.o.c w.r.t g*

$$\frac{\partial W}{\partial g} = \frac{\partial V}{\partial g} d(g) + V(g) \frac{\partial d}{\partial g} + c \frac{\partial V}{\partial g} + TA \frac{\partial GA}{\partial g} \geq 0$$

$$\frac{\partial V}{\partial g} (c + d) + \frac{\partial d}{\partial g} V + TA \frac{\partial GA}{\partial g} \geq 0. \quad (3.1)$$

*s.o.c. w.r.t. g*

$$\frac{\partial^2 W}{\partial g^2} = \frac{\partial^2 V}{\partial g^2} (c + d) + \frac{\partial V}{\partial g} \frac{\partial d}{\partial g} + \frac{\partial^2 d}{\partial g^2} V + \frac{\partial V}{\partial g} \frac{\partial d}{\partial g} + TA \frac{\partial^2 GA}{\partial g^2} < 0 \quad (3.2)$$

*the optimum g\* satisfies both (3.2) and,*

$$\frac{\partial V}{\partial g^*} (c + d) + \frac{\partial d}{\partial g^*} V + TA \frac{\partial GA}{\partial g^*} = 0 \quad (3.3)$$

The optimal point  $g^*$  can be found by solving (3.2) and (3.3).

By definition,  $\frac{\partial d}{\partial g}$  is strictly positive. This means increasing the voting ratio strictly

increases his/her benefit of control.

$\frac{\partial^2 d}{\partial g^2}$  is negative. This means private benefit of control is a concave function of the

power of the controlling owner.

$V$  is a concave function of  $g$ , where  $\frac{\partial V}{\partial g} > 0$  at interval  $[g, g''']$  and negative at interval

$[g'', g]$  and  $\frac{\partial^2 V}{\partial g^2} < 0$ . The point  $g''$  is determined by the shape of function  $V(g)$ .

$GA(g)$  is a concave function of  $g$ , where  $\frac{\partial GA}{\partial g} > 0$  at interval  $[g, g']$  and negative at interval  $[g', g]$  and  $\frac{\partial^2 GA}{\partial g^2} < 0$ . The point  $g'$  is determined by the shape of function  $GA(g)$ .  $\frac{\partial GA}{\partial g}$  is the marginal effect of the power of the controlling owner on the growth rate of the firm. When equation (3.1) is positive, there is room for the controlling owner to improve his/her gains by moving  $g$  up. This continues until it turns negative where the optimum  $g^*$  is achieved. The higher the rate of investment, the bigger the private benefit of control up to a point. However, the controlling owners have capital constraints and issuing more shares can dilute the ownership or decrease the voting power of the controlling owners. So even though it is desirable to have big empires, controlling owners might not be able to do so. In equilibrium, the controlling shareholder trades off the value of the firm against benefit of control and his/her empire building desire.

### **3.2 The variables: voting concentration as an endogenous variable**

Agrawal and Knoeber (1996), Loderer and Martin (1997), Cho (1998), Demsetz and Villalonga (2001) and others point out the importance of endogeneity and simultaneity when analyzing firm performance in relation to factors such as ownership structure and capital structure, etc.

More insights can be gained when studying voting concentration and performance in a simultaneous equation model other than a single equation framework. Since factors such as performance, firm size, market power of the firm, growth potential, and years of incorporation tend to influence voting concentration and vice versa. In a broad economic setting, voting concentration also changes with respect to the changing conditions of law and regulation, economic development both in and outside the firm.



### **The endogenous variables:**

***Voting power of the controlling owners*** This is measured by the Shapley-Shubik power indices. Two thresholds of voting rule are used: the simple majority voting (S1) and the super majority voting (S2). For the sake of comparison, regressions with pure votes are also conducted. This variable is analyzed both using a single equation model and a simultaneous equations model.

***Firm performance*** (1). Market capitalization to book value of equity (QA), and (2). Return on assets (ROA) are measures of firm performance. This is due to the simultaneity and endogeneity problem of the firm performance with respect to other firm characteristics, in this case, voting concentration. A simultaneous equations model is used to determine the relationship between firm performance and voting concentration.

### **The explanatory variables:**

***Firm size*** This is defined as natural logarithm of turnover of the firm. Firm size influences voting concentration. Normally the bigger the firm, the lower the ownership/voting concentration. However, for control purposes, it is possible for a shareholder or a group of shareholders with a minority shareholding to control the firm with a dispersed ownership structure as found in this study. Size effect should be negatively related to voting concentration. This does not exclude that a big firm can have a powerful owner/founder with limited amount of shareholding.

***Debt-equity ratio*** This is a measure of a firm's financial risk. Since debt facilitates ownership concentration, the higher the financial risk, the higher the voting concentration. Firms with dual class of shares often have higher debt-equity ratios. One conjecture is that controlling owners use bank monitoring as a credible device or an alternative governance mechanism to counterbalance the perceived increase of agency cost of control. Another conjecture is that controlling owners engage in less than efficient risky projects, which facilitates them to borrow more in order to keep control. Thus,

financial risk of a firm with owner control is generally higher than if the firm has a dispersed ownership with management control. In an owner controlled environment, high outside borrowing is often associated with a high degree of control. Also, high borrowing is associated with high voting control indicating that owner controlled firms have better access to capital markets than to equity market for funds.

**Age** The older the firm, the more dispersed the ownership structure will be due to the need to expand and diversification on the part of the big owners. The potential causes of the ownership changes are: marriage and inheritance; other personal factors; the need for outside capital; and seasoned public offerings which tend to result in more dispersed ownership. Law and regulation changes can result in changes on ownership concentration.

**Growth rate** A firm with a high growth potential is more likely to be related to a controlling owner with possibly high voting rights. Dual class of shares enable the owner to have control over the firm and, at the same time, reduce his/her risk exposure in the firm by holding fewer shares in the firm. This enables owner-controlled firms to grow faster than they otherwise they would.

## **4 Data and methodology**

### **4.1 The data**

The companies included in this study are firms with dual class of shares both traded at the Stockholm Stock Exchange.<sup>5</sup> Company ownership data is from Sundin and Sunqvist (1998). Market values of firms and accounting data, averaged across a 5-year period from 1994 to 1998 are from trading data and from company balance sheets and income

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<sup>5</sup> Except for banks and financial institutions, i.e. SEB, SHB, and Invik.

statements, respectively, provided by the Amadeus<sup>6</sup> database. There are 175 listed companies at the Stockholm Stock Exchange that have issued dual class of shares by Feb. 1998. I have selected firms with both class of shares traded on the SSE except for banks and other financial institutions. There are 44 firms that meet this criterion<sup>7</sup>.

## 4.2 Descriptive analysis

**Table 2** presents the descriptive statistics of the variables used in the empirical analysis. The average size of the largest block in the 44 firms with both A and B shares traded on Stockholm Stock Exchange is 40.61%. In most of the cases, the largest owner retains a working control of the firm (except for 4 firms<sup>8</sup> with S1 less than 25%). The minimum largest voting block of a firm in the sample is 4.4% corresponding to Shapley-Shubik values of 32.8% (S1) and 32.35% (S2). This is Sintercast AB, a hardware manufacturing company whose ownership structure has changed as of 2003. Note that the Shapley-Shubik value (S1) for Sintercast AB is not the smallest in the sample since the size of the votes does not have a monotonous increasing relationship with the voting power (see **Appendices 4A: Table 3a**). This is due to the distribution of the votes in the company.

Table 2 Descriptive statistics.

Variable	N	Mean	Std Dev	Minimum	Maximum
<b>VOTES</b>	44	0.4061	0.2221	0.044	0.94
<b>S1</b>	44	0.7139	0.3256	0.1674	1
<b>S2</b>	44	0.6569	0.2793	0.1669	1
<b>CI</b>	44	0.2338	0.1443	0.016	0.669
<b>SECU</b>	44	0.1472	0.1404	0.002	0.669
<b>Av(RoE)<sub>5</sub></b>	44	11.4105	30.433	-162.71	53.2
<b>Av(RoA)<sub>5</sub></b>	44	6.2566	7.8745	-28.56	24.94
<b>Av(GA)<sub>5</sub></b>	44	0.0848	0.1378	-0.2324	0.5069
<b>Av(DA)<sub>5</sub></b>	44	0.5592	0.1799	0.0248	0.8237
<b>Av(QA)<sub>5</sub></b>	44	2.8107	2.7129	0.3323	10.8382
<b>Av(Size)<sub>5</sub></b>	44	15.3247	2.3923	8.0439	18.9958
<b>Age</b>	44	57.5455	35.403	5	101
<b>DM1</b>	44	0.2727	0.4505	0	1

<sup>6</sup> The Amadeus database covers over 150,000 companies in 26 European countries (the 15 EU countries, Bulgaria, Czech Republic, Estonia, Hungary, Latvia, Poland, Romania, the Slovak Republic, Norway, Switzerland, and Latvia) which satisfy at least one of the two following criteria: a turnover greater than or equal to 10 million Euro (approximately 12 million US dollars), a number of employees greater than or equal to 150 people, or total assets greater than 10 million Euro (approximately 12 million US dollars).

<sup>7</sup> Including firms with only B shares traded would enlarge the sample and provide a comparison with this study.

<sup>8</sup> They are Ortivus AB, Volvo AB, Stora AB and SSAB AB.

**Table 3** shows the correlation coefficients matrix of the variables. It is noteworthy that votes and the Shapley-Shubik indices are highly correlated (the correlation coefficients are 0.8352 and 0.8788 for {Votes, S1} and {Votes, S2} respectively). Cash interest (CI) is correlated to S1 with a correlation coefficient 0.6182. CI is correlated to votes with a magnitude of 0.5855. This means although the value of power indices can be quite different from the votes for similar holdings of the controlling shareholders in different firms, the two series are nevertheless highly correlated. There are efficiency gains in that the power indices measures the voting power of the controlling owner more accurately as opposed to pure votes; the correlation results show that the efficiency gains are marginal. Comparing the two approaches should only improve our understanding to the nature of the problem. We turn to that in section 4.3 when discussing the regression results.

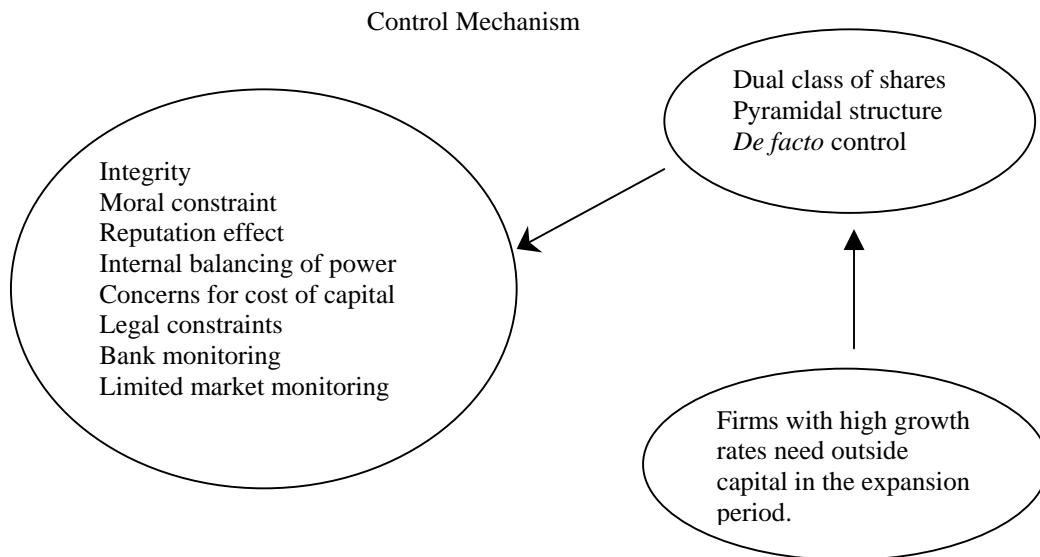
**Table 3 Correlation coefficients of the variables**

(Pearson Correlation Coefficients / Prob >  R  under Ho: Rho=0 / N = 44)												
	VOTES	S1	S2	CI	SECU	Age	Av(RoE) <sub>5</sub>	Av(RoA) <sub>5</sub>	Av(GA) <sub>5</sub>	Av(DA) <sub>5</sub>	Av(QA) <sub>5</sub>	Av(Size) <sub>5</sub>
VOTES	1.0000											
	0.0000											
S1	0.8352	1.0000										
	0.0001	0.0000										
S2	0.8788	0.8892	1.0000									
	0.0001	0.0001	0.0000									
CI	0.5855	0.6182	0.5652	1.0000								
	0.0001	0.0001	0.0001	0.0000								
SECU	0.3714	0.4151	0.5058	0.5649	1.0000							
	0.0131	0.0051	0.0005	0.0001	0.0000							
Age	-0.0112	-0.1644	-0.1434	-0.1248	-0.1619	1.0000						
	0.9426	0.2863	0.353	0.4192	0.2935	0.0000						
Av(RoE) <sub>5</sub>	-0.0247	-0.0823	-0.1307	0.0564	0.0223	0.2910	1.0000					
	0.8736	0.5954	0.3977	0.7161	0.8856	0.0554	0.0000					
Av(RoA) <sub>5</sub>	0.1379	0.0333	0.0466	0.2289	0.0876	0.3416	0.5697	1.0000				
	0.372	0.8301	0.7641	0.1351	0.5717	0.0232	0.0001	0.0000				
Av(GA) <sub>5</sub>	-0.3230	-0.2962	-0.3204	-0.2826	-0.1685	-0.3653	-0.052	-0.0336	1.0000			
	0.0325	0.0510	0.0340	0.0631	0.2744	0.0148	0.7376	0.8289	0.0000			
Av(DA) <sub>5</sub>	0.4001	0.4571	0.4232	0.1909	-0.0141	0.0982	-0.0630	0.0543	-0.1416	1.0000		
	0.0071	0.0018	0.0042	0.2146	0.9277	0.5260	0.6845	0.7261	0.3591	0.0000		
Av(QA) <sub>5</sub>	-0.1562	-0.1403	-0.1680	-0.2733	-0.2264	-0.4797	-0.3549	-0.2501	0.5592	-0.0509	1.0000	
	0.3113	0.3638	0.2756	0.0727	0.1395	0.0010	0.0181	0.1015	0.0001	0.7428	0.0000	
Av(Size) <sub>5</sub>	0.0866	-0.0432	-0.0206	-0.0425	-0.1158	0.6339	0.3108	0.6025	-0.2791	0.4241	-0.3521	1.0000
	0.5762	0.7809	0.8947	0.7843	0.4543	0.0001	0.0400	0.0001	0.0665	0.0041	0.0191	0.0000

### 4.3 Owner control and performance

The corporate control system prevailing in Sweden is characterized by individual/family control and control via legal devices such as dual class of shares and pyramidal structures (Rydqvist, 1998). The governance mechanism of this conventional type of firms can be depicted as follows.

**Figure 1 The mechanism of governance in firms with owner control**



A single equation model and a simultaneous equations model are used to study the relationship between power of the controlling owner and the firm performance. First, I use a single equation model to identify how firm performance and other economic variables influence the choice of voting power. This is done in a cross sectional setting.

**(1) The single equation Tobit model:**

$$(power)_i^* = \alpha_0 + \alpha_1 Performance_i + \alpha_2 Leverage + \alpha_3 Size_i + \alpha_4 Growth + \alpha_5 Age_i + \alpha_6 Dm_i + \varepsilon_i$$

$$(power)_i = \begin{cases} 1 & \text{if } (power)_i^* \geq 1 \\ (power)_i^* & \text{if } (power)_i^* < 1 \end{cases}$$

Since the voting power variable has a right censoring at 1, a Tobit model with latent variable voting power is used to estimate the regression coefficients.

Define the censored random variable voting power as  $\{S_1, S_2, \text{Votes}\}$ , where  $S_1, S_2$  stands for Shapley-Shubik value evaluated at simple and super majority, respectively. Votes are pure voting rights of the controlling owners, which are supposed to have less explanatory power. The reason is that votes of the controlling owner do not take into account of the voting distribution of the rest of the shareholders. This can in turn misrepresent the real power of the controlling owner.

The Tobit regression results are presented in **Table 4**. The dependent variable ownership concentration is measured both by the Shapley-Shubik power indices and by pure votes of the controlling owner of a firm or a closely related group. This is to compare the two different methods of measuring voting power and to identify the efficiency gains in using the Shapley-Shubik power indices.  $\{IOP\}=\{S_1, S_2\}$ , where  $S_1$  and  $S_2$  represent the Shapley-Shubik power indices using simple majority voting rule and super majority voting rule respectively. I focus on the result of the super majority voting rule since important decisions are made using super majority voting rule.

The explanatory variables are: Growth rate ( $Av(GA)_5$ ), the average growth ratio of assets over a 5 year period from 1994 to 1998; Firm characteristic variables are the size of the firm; the financial risk of the firm represented by debt ratio; Profitability represented by both return on assets and market-to-book ratio; Age represented by years of incorporation;  $Dm1$  denotes institutional owner (1) versus individual owner control (0). I

choose to use data averaged over 5 years in order to avoid the noises of the accounting data and the market data. This can also be understood as expected values of the variables on both side of the equation. This approach has been seen in many cross sectional studies.

**Table 4 Single equation results for the voting power determination**

Tobit results of debt ratio, size, performance or return on assets, identity of the biggest owner, time of incorporation, growth rate of the firm, on the power of the biggest owner evaluated by Shapley power Indices.						
<b>Dependent Variable</b>	<b>Model 1 S1 (n=44)</b>	<b>Model 2 S2 (n=44)</b>	<b>Model 3 S1 (n=44)</b>	<b>Model 4 S2 (n=44)</b>	<b>Model 5 Votes (n=44)</b>	<b>Model 6 Votes (n=44)</b>
<b>INTERCEP</b>	1.0724 (8.35)***	0.6228 (7.75)***	0.4674 (2.67)	0.4427 (5.74)***	0.656 (7.6)***	0.3899 (3.13)*
<b>Av(QA)<sub>5</sub></b>			-0.0210 (1.01)	-0.0135 (1.06)		-0.0063 (0.2)
<b>Av(RoA)<sub>5</sub></b>	1.2322 (5.78)**	0.6854 (2.8)*			1.0637 (5.36)**	
<b>Av(DA)<sub>5</sub></b>	0.5162 (4.49)**	0.556 (14.83)***	0.1950 (0.58)	0.5019 (12.01)***	0.6125 (10.9)***	0.4994 (6.99)***
<b>Av(Size)<sub>5</sub></b>	-0.0560 (2.27)	-0.0157 (0.61)	-0.3255 (0.66)	0.0043 (0.07)	-0.0376 (3.19)*	-0.0099 (0.3)
<b>Av(Ga)<sub>5</sub></b>	-0.6891 (9.99)***	-0.6288 (11.88)***	0.0090 (0.10)	-0.4031 (2.54)	-0.6084 (8.01)***	-0.4818 (3.52)*
<b>Age</b>	-0.0007 (0.11)	-0.002 (3.32)*	-0.0027 (1.58)	-0.0026 (5.33)**	-0.0004 (0.15)	-0.0008 (0.46)
<b>DM1</b>	-0.0007 (0.00)	-0.07 (1.94)	-0.0440 (0.37)	-0.0853 (2.49)	-0.0281 (0.2)	-0.0247 (0.13)
<b>Scale</b>	0.1287	0.1273	0.1423	0.1311	0.1778	0.1878
<b>Distribution</b>	Normal	Normal	Normal	Normal	Normal	Normal
<b>Log Likelihood</b>	12.9038	19.2405	10.9711	18.4259	13.5712	11.1418

Note:

\* indicates significance at the 10% level, \*\* indicates significance at the 5% level,

\*\*\* indicates significance at the 1% level. Chi-square value in the bracket.

S1 is the Shapley power indices evaluated at simple majority.

S2 is the Shapley power indices evaluated at super majority.

Av(DA)<sub>5</sub> is the debt ratio calculated by (total assets- shareholders' fund)/total assets.

Av(Size)<sub>5</sub> is the logarithm of the turnover of the firm.

Av(Qa)<sub>5</sub> is the ratio of marketcapitalization to book equity.

Av(RoA)<sub>5</sub> is the return on assets.

Av(GA)<sub>5</sub> is the growth rate of the firm's total assets, averaged over 5 years.

DM1 is the dummy for institutional control (1) and family or individual control (0).

The single equation results show that capital structure, namely, debt ratio influence the power indices of the controlling shareholders. The coefficients of debt ratio for the voting power model (S1) and (S2) are 0.5162 and 0.556 respectively as stated in model 1 and 2 in **Table 4**. For the voting model (votes), the coefficients of debt ratio are 0.6125 and 0.4994 respectively as can be found in model 5 and 6 in **Table 4**. Market-to-book ratios do not exhibit any significance to the voting power as shown by row 3 of **Table 4**. Return on assets influence the power positively on all three relevant models as shown by row 4 of **Table 4**. Growth rates of the firms mostly exhibit negative significant relations to voting power except when profitability is measured by market-to-book ratio. Ages of the firms are negative for all models but only show significance when the voting power is evaluated at super majority (-0.002 and -0.0026 for model 2 and model 4). Dummy variable for intuitional owners are negative but insignificant for all models of voting power.

This confirms earlier research results by many scholars that higher debt ratio facilitates higher degree of owner control. This has lead to a claim by some researchers: the alternative governance mechanism, which suggests that higher debt ratio indicates a higher level of outside monitoring: bank monitoring. This has been a strong argument for owner controlled firms and that they do have a sufficiently well functioning governance system (see Holmén, 1998).

Sizes of the firms are mostly insignificant. This is due to the fact that firms in the sample have dual class of shares and/or pyramidal structure that have effectively reduced the size effect. The shareholdings of controlling shareholders are negatively correlated with size but insignificant as shown in **Table 3** (The Pearson coefficient is -0.0425 but shows insignificant correlation: 0.78). The correlation coefficients of CI and SECU with the size, where CI denotes the cash interest, SECU denotes security interest adjusted for pyramidal structures. Size is natural logarithm of turnover.



The older the firm is, the less the concentration of power is only established when the voting power of the controlling owner is evaluated at super majority in the single equation model. This shows that firms reduce their owner control only marginally and stay in control in simple majority case. Growth rate of assets contributes negatively to the power of the controlling owner. The higher the growth rate, the faster the loss of voting power as shown by row 7 in **Table 4**.

Influences of performance on the voting power are two folds. The market-to-book ratio is negative and significant to voting power evaluated at super majority. The effect is not very strong at cross sectional setting. Also noted is that the growth rate is highly correlated to market-to-book ratio with a correlation coefficient of 0.5592 and significance level at 0.0001 (see **Table 3**). The insignificant effect of growth rate on voting power (model 3 and model 4) can be due to the collinearity problem between market-to-book and the growth variable.

The return on assets is positive and significant. It shows that firms with higher return on assets tend to have a stronger owner control (see row 4 in **Table 4**). Since positive accounting profit is a borrowing requirement by banks and credit institutions. Firms that financed by the banks and the credit institutions don't necessarily perform better in terms of market value as shown later in the simultaneous model.

## **(2) The simultaneous equations model**

The following simultaneous equations model is estimated:

**(1) Power = f(performance, age, debt ratio, growth rate, size, dummy 1)**

**(2) Performance = f(power, age, debt ratio, growth rate, size, dummy 1)**

The single equation model of ownership determination (model 1) is re-estimated in a simultaneous equation framework. With both performance and power as endogenous

variables in the two-equation system can help assess the effect of voting concentration on firm performance and achieves more efficient outcome (**Table 5**).

The simultaneous Tobit equations estimates differ from single equation results in that market-to-book ratio does influence the power indices choice when voting power is evaluated at the super majority. In model 4 in **Table 5** it shows that one percent increase of market-to-book ratio will result in 0.0796 percent decrease on voting power indices. One percent increase of voting power decreases market-to-book ratio by 12.55 percent. Clearly increasing voting power has a stronger effect on market-to-book ratio but not vice versa. Return on assets has strong effect on voting power and vice versa.

This has confirmed the need for the control issues and firm performance to be addressed in a simultaneous framework. It shows that firms with higher market-to-book ratios have lower power indices in a cross sectional setting. Also, higher power indices result in lower market-to-book ratios for S2 and votes (model 4 and 6).

The magnitude and significance level of the results indicate that power concentration has a stronger impact on firm performance. Firms with strong controlling owners perform worse in terms of market performance but they tend to do better on accounting profits (EBIT) as shown in model 1 and model 3. The debt ratios of the firms contribute negatively to accounting performance, but positive to voting concentration as shown by model 4 and model 5 in **Table 5**. Debt ratios contribute to firm performance (EBIT/TA) through the power concentration since better accounting profits contribute to power concentration and power concentration in turn contributes to accounting profit (model 1 and model 3). This has confirmed that firms with a stronger owner has better accounting performance and vice versa.

Growth rate of assets influence power concentration negatively for voting power (S2) model (model 3) and the votes model (model 5) but turned positive in the votes model with market performance as endogenous variable (model 6). Increasing growth rate, voting power tends to be decreasing. This is in line with the prediction: increasing growth rate decreases the power concentration but this effect is not detected when using the votes

as voting concentration in the market model (model 6) overall the votes model gives inconsistent stories and point to the usefulness of using the votes data.

Bank and other Intuitional owners as controlling owners do not have less power concentration (except in model 3 where institutional owner has a lower power index of S2) or higher firm performance due to the insignificance of dummy variable 1 in **Table 5**. Firms with longer years of incorporation perform worse in terms of market performance (see model 3 in **Table 5**).

**Tabel 5 Simultaneous equations estimates**

Dependent Variable	Model 1		Model 2		Model 3		Model 4		Model 5		Model 6	
	S1	ROA	S1	QA	S2	ROA	S2	QA	Votes	ROA	Votes	QA
<b>INTERCEP</b>	0.8731 (2.7094)***	-0.4893 (-3.9867)***	0.5705 (1.0734)	6.5167 (0.9146)	0.9573 (2.9176)***	-0.5628 (-2.8856)***	0.6406 (0.8421)	8.0407 (0.7445)	0.6916 (1.8359)*	-0.4505 (-2.2368)**	0.1088 (0.1589)	1.1520 (0.1600)
<b>Av(QA)<sub>5</sub></b>			-0.0875 (-1.1611)				-0.0796 (-1.9976)**				-0.0935 (-2.4050)**	
<b>Av(RoA)<sub>5</sub></b>	1.7842 (2.3094)**				1.7011 (2.3577)**				1.5350 (2.5289)**			
<b>S1</b>		0.5605 (2.3094)**		-11.4224 (-1.1611)								
<b>S2</b>						0.5879 (2.3577)**		-12.5508 (-1.9977)**				
<b>Votes</b>										0.6514 (2.5289)**		-10.6642 (-2.4041)**
<b>Av(DA)<sub>5</sub></b>	1.2650 (2.8384)***	-0.7090 (-1.5736)	0.5883 (0.8572)	6.7205 (0.6185)	0.8824 (2.9800)***	-0.5187 (-2.653)***	0.5799 (1.4607)	7.2789 (1.1061)	0.8273 (3.3672)***	-0.5390 (-2.3935)**	0.1502 (0.1457)	1.5653 (0.1407)
<b>Av(Size)<sub>5</sub></b>	-0.0516 (-2.3346)**	0.0289 (2.2623)**	0.0291 (0.6104)	0.3332 (0.6690)	-0.0476 (-1.6683)*	0.0280 (2.4196)**	0.01953 (0.3439)	0.2452 (0.3554)	-0.0531 (-1.4887)	0.0346 (1.8066)*	0.0145 (0.2020)	0.1582 (0.2066)
<b>Av(GA)<sub>5</sub></b>	-0.7945 (-1.2776)	0.4453 (1.2965)	0.4445 (0.2103)	5.0781 (0.2486)	-0.7321 (-1.6847)*	0.4304 (1.4246)	0.3498 (0.5469)	4.3903 (0.6082)	-0.6660 (-1.9835)**	0.4339 (1.6044)	1.4412 (2.9055)***	15.3884 (2.3244)**
<b>AGE</b>	-0.0015 (-0.6296)	0.0009 (0.6595)	-0.0062 (-1.4498)	-0.0717 (-2.008)**	-0.0013 (-0.9148)	0.0008 (0.8934)	-0.0045 (-1.6171)	-0.0573 (-1.4212)	0.0002 (0.1429)	-0.0001 (-0.1452)	0.0019 (0.4902)	0.02116 (0.4418)
<b>DM1</b>	-0.1489 (-1.009)	0.0834 (1.0602)	-0.2527 (-0.4930)	-2.8862 (-0.7204)	-0.1133 (-1.1172)	0.0666 (1.0439)	-0.2279 (-1.7850)*	-2.8608 (-1.3938)	0.0116 (0.1047)	-0.0075 (-0.1037)	-0.3363 (-1.4801)	-3.6009 (-1.5479)
<b>s12/s22</b>	-0.5604		11.42		-0.5878		12.5507		-0.6514		10.6771	

Note:

\* indicates significance at 10% level, \*\* indicates significance at 5% level,

\*\*\* indicates 1% level significance.

t-value in bracket.

#### 4.4 One fatal flaw: the cost of equity capital

It is argued by most eminent researchers in the area of corporate governance that the cost of equity capital is higher for individual controlled firms than for non-individual controlled firms. This is based on the argument that individual controlling owners are likely to extract more control rents than institutional shareholders including banks and other firms. However the evidence from this study does not confirm that institutional owners have superior market performance (see **Table 5**,  $dm1=1$  for bank/institutional shareholders). The results in this study do provide support that there is a discount associated with stronger owner control. This is why the cost of equity capital increases with stronger owner control.

However, there are efficiency gains in minority owner control e.g. the efficiency gain in the amount of time a decision is reached in connection to concentrated ownership.

The concern about agency cost increases when the controlling owner is a minority owner since the divergence of the power and the cash flow interest creates an option-like investment.<sup>9</sup> Another powerful argument against concentration of voting power is that the controlling owner often has a strong interest in protecting his/her private benefit and thus might block profitable tender offers that could benefit other shareholders (Grossman and Hart, 1988).

The divergence of ownership and control creates room for diverting corporate funds on one hand, and provides incentives to take inefficient risks on the other. Mildly concentrated ownership/voting structure employing legal devices such as dual class of shares provides a better chance to achieve a more efficient outcome in terms of risk taking on investment projects. The controlling owners with mildly concentrated ownership/voting structure are more willing to take good risks which *ex anti* provide higher expected returns for shareholders, while having only mild power, it is harder for

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<sup>9</sup> Since the higher the risk, the higher the option value, the controlling owner may take on too much risk. The controlling owners are diversified to a certain degree due to the difference in voting of the two classes of shares. However, there is no evidence that the controlling owner is fully diversified.

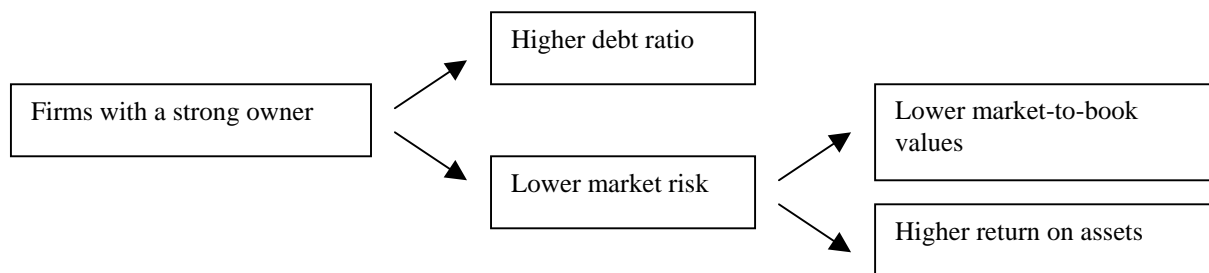
the controlling owner to sway on every decision, which also limits the potential negative effects of strong owner control.

## 5 Concluding remarks

The results show that higher degree of owner control is negatively related to market value of the firm in a cross sectional setting. This is consistent with the findings in Cronqvist and Nilsson (2003) that firms with voting concentration in Sweden have a lower Tobin's q (market-to-book ratio). However, the results in this paper show that firms with a stronger controlling owner in terms of voting control have higher accounting profits than firms with a less controlling owner. Stronger owner control is associated with a lower growth ratio of the firm. This means that controlling owners are constrained in expanding their company. These firms also tend to take on lower risk than other firms because of the high debt ratios they adopt in order to facilitate control. Also, traditional business provides better profit margins than new business branches. This could provide disincentive to invest in new and growing industries, which represent the future direction of investments. The market-to-book ratios are lower for firms with stronger controlling owners and a lower growth rates. This could be a warning signal for policy makers since bank capital is channeled primarily to matured industries which have better profit margins. An adjustment of the bank capital investment should be aiming at increasing investment shares in sectors that provide long term growth thus promote future growth of the economy.

A lower degree of voting concentration provides possibility of cooperation and result in better performance in terms of market-to-book ratio. The discount on firms with a powerful owner can be explained as a discount placed on agency costs or opaqueness of the firm. Firms with a less controlling owner have higher market value. This also means a lower cost of market capital for firms with less controlled owner. This, in turn, explains why firms with a controlling owner have a higher debt ratio since equity tends to be more expensive for them. The results can be shown in **Figure 2**.

**Figure 2 A result from the analysis of voting control and firm performance**



The result of this paper stands in contrast that of Demsetz and Villalonga (2001) who find no significant relations between ownership structure and firm performance in US. This can be due to the fact that in the US the dominating control system is not owner control but rather management control, and their changes of shareholdings are aimed at providing extra incentive for the management.

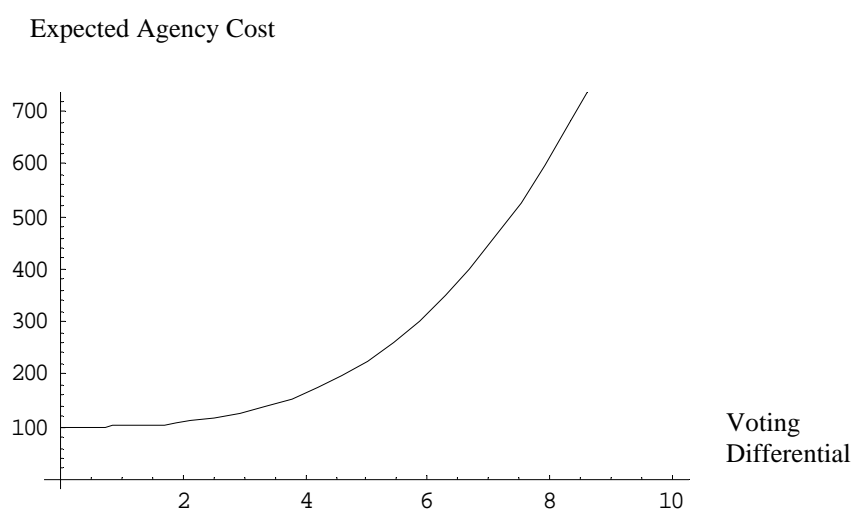
The discount on the market value of the firms with a stronger owner has meanings for takeover market. A successful takeover of these undervalued firms would result in value increase in terms of market value of the firm if the bidder subsequently changes the voting structure to one share-one vote. A universal adoption of a one share-one vote structure would make those firms vulnerable to takeovers and also the price of the firm would increase in the event of a voting scheme change which in turn makes the firm more vulnerable to takeover attempts.

It should also be pointed out that this analysis is done using cross sectional data; a deeper understanding could be achieved by using panel data with a long time dimension; it is a typical dilemma that ownership data can be quite static if time periods are too short.

## Appendices

### A1

#### Expected agency cost of a firm with dual class of shares



### A2

#### The power distribution within a board

Suppose that an actual decision making process involves two steps. First, the board meeting makes a proposal, for example a strategic plan, to be decided at the shareholders' meeting later on. Second, the shareholder meeting endorses the plan by the majority voting rule or dismisses the plan. The board influences the choices of the shareholders much like a politician in an electoral campaign. The politician tries to influence the largest crowd in order to win the election (Perrow, 1986). Also, suppose that the 'owner board member' (the insider) has more persuasion power<sup>10</sup> than other board members (the

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<sup>10</sup> This is because he/she is the one who may combine many roles as the founder of the firm, who has personal influence, and who has both credibility and financial interests tied in the company, which can be a powerful tool in persuasion.



outsider), i.e., for each business decision to be agreed upon, the ‘owner board member’ has to be included. This is equivalent to say that the ‘owner board member’ is a veto player. Further more, if a majority of board members agree on an issue, the rest of the members will follow suit (since the cost of disagreement is high in terms of his/her personal cost and of the cost of a split board which can be potentially high). It can then be argued that the majority voting rule is also valid in a board meeting. Therefore, the model below consists of one or multiple insider owners and each of them has veto power based on his/her shareholdings/voting rights and thus can sway a decision. The rationale behind this analysis is that the powerful inside owner carries a credible threat that if his/her proposal fails in a board meeting, then he/she can resort to the shareholders meeting to revert the situation. Since this threat is credible, insider owners are actually veto players in a compound game and quite naturally they carry more power than outsider board members. The compound game can thus be seen as two sub-games. The first sub-game involves one veto player or veto players; the second sub-game involves the rest of the players. The decision rule can be either simple majority or super majority in the compound game.

The voting game is composed of N players,  $I=(1, \dots, N)$ . The two sub games are: {Veto player 1, Veto player 2,.....}\*{Player 3, Player 4,....., Player N}. In a winning situation, the veto players must consent. This is a prerequisite for the proposal to pass.<sup>11</sup>

The decision rule can be described as:

The required percentage to pass a proposal =  
 (The number of veto players + the required number of non-veto players) / Total number of players.

Different decision rules correspond to different patterns of control in the board. The results can be useful for efficiency analysis.

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<sup>11</sup> It resembles the five permanent members in the United Nation’s Council, and is much like the President’s role in the 3-chamber system in the US.

### A3

#### An example of a board with one or two controlling owners

The patterns of ownership can be studied using the power indices assigned to the biggest owners. In a boardroom, the control patterns can be categorized into three types: firms with one controlling owner, firms with two controlling owners and firms with no controlling owners which corresponds to management control. There are rarely firms with more than three controlling owners. A firm with owner control usually reaches high levels of concentration very quickly in terms of voting. We demonstrate a board with one controlling owner and a board with two controlling owners and the voting power distribution of each board.

**Case 1:** A typical board has 7 members. Suppose there are 2 controlling owners sitting in the board, and that both have veto power. The simple majority rule requires 4 out of 7 members including the 2 veto players to consent. The winning set is therefore  $\{2, 2\} * \{2, 5\}$ . The power distribution in this type of board is presented in the **Table 1a** and **1b**. **Table 1a** is an application of the Shapley-Shubik power indices and **Table 1b** is an application of the Banzhaf power indices to the distribution of power within a board.<sup>12</sup>

**Table 1a Board type 1, two veto players**

subgame	player	weight	shapley
1	i	1	0.4286
subgame 1:			0.8571
2	i	1	0.0286
subgame 2:			0.1429
Total:			1.0000

Data file: board type 1; win set 1:  $[2, 2] * [2, 5]$

<sup>12</sup> For the calculation of power indices, see Shubik (1988) and Shapley and Shubik (1954). For an excellent review of power indices, see Straffin (1994).

**Table 1b Board Type 1, two veto players**

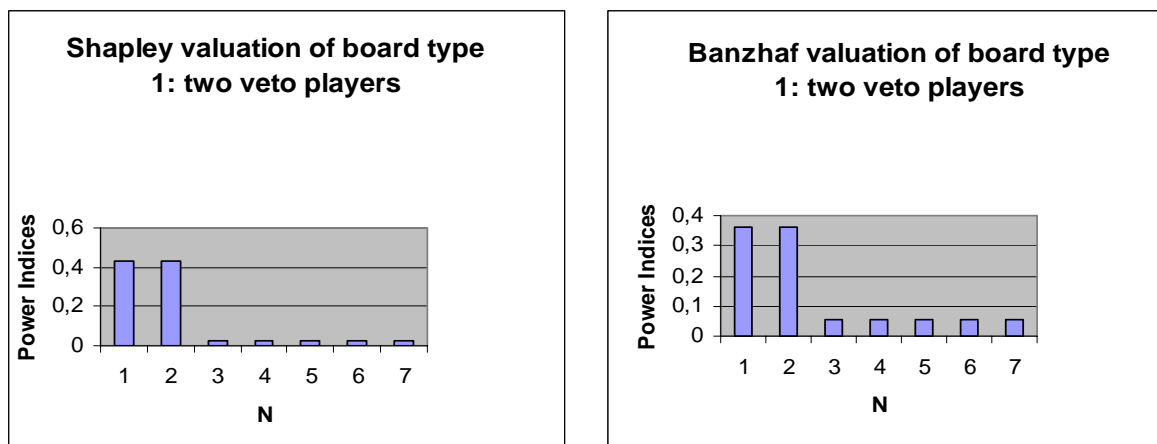
subgame	player	weight	non-n.bz.	norm.bz.
1	i	1	0.4063	0.3611
sum of subgame 1:			0.8125	0.7222
2	i	1	0.0625	0.0556
sum of subgame 2:			0.3125	0.2778
sum of all:			1.1250	1.0000
mean:			0.1607	0.1429

Data file: board type 1; win set 1: [2, 2] \* [2, 5]

Norm. bz. represents normalized Banzhaf indices.

The simple but powerful message is that the powers of individual board members are not equal, or else there would be no incentive to fight for control. The two veto players each enjoy 42.86% of the power; the rest of the board shares 14.29% together, or 2.86% each as stated in **Table 1a**. Or put it another way, 42.9% of the time one ‘owner board member’ wins and 2.8% of the time one outsider member wins. The Banzhaf power indices assign 36.11% of the power to each veto player and 27.78% to the rest of the members, or 5.56% each (see **Figure 1a**).

**Figure 1a Board type 1, two veto players**



**Case 2:** If there is only one controlling owner that sits on the board, the winning set is  $\{1, 1\} * \{3, 6\}$  and the distribution of power within the board can be calculated below (see **Table 2a** and **2b**).

**Table 2a Board type 2, 1 veto player**

subgame	player	weight	shapley
1	i	1	0.5714
subgame 1:			0.5714
2	i	1	0.0714
subgame 2:			0.4286
total:			1.0000

Data file: board type 2, win set 1: [1,1] \* [3,6]

**Table 2b Board type 2, 1 veto player**

subgame	player	weight	non-n.bz.	norm.bz.
1	i	1	0.6563	0.4117
sum of subgame 1:			0.6563	0.4117
2	i	1	0.1563	0.0980
sum of subgame 2:			0.9375	0.5882
sum of all:			1.5938	1.0000
mean:			0.2278	0.1429

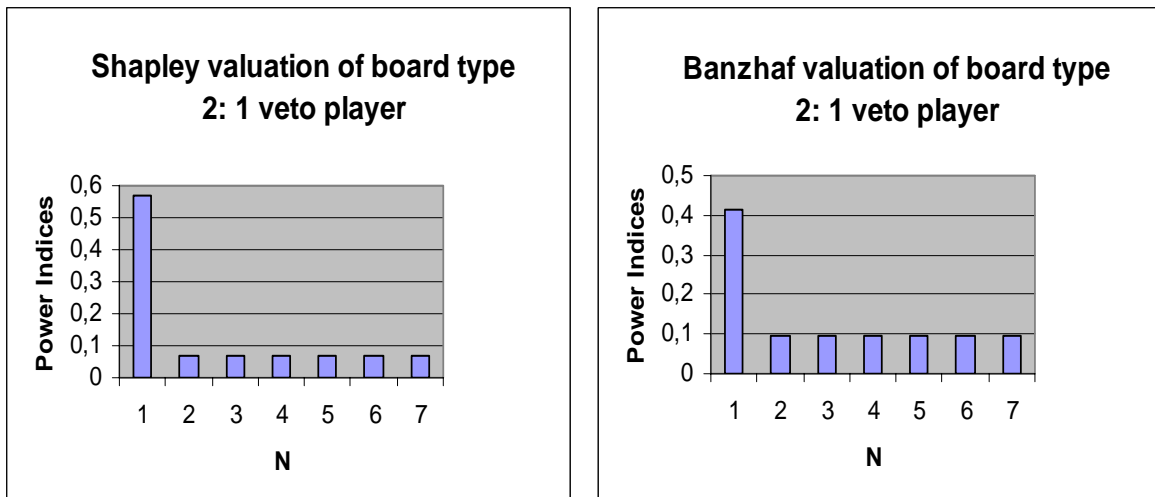
Data file: board type 2, win set 1: [1, 1] \* [3, 6]

The controlling owner has 57.14% of the power measured by Shapley-Shubik indices, the rest of the board shares 42.86% together, or 7.14% each as shown by **Table 2a**. The Banzhaf power indices assign 41.17% to the controlling owner and 58.82% to the rest of the members together, equivalent to 9.8% each (see **Figure 2a**).

It is obvious that one veto player in a board results in a more skewed power distribution than two veto players (see **Figure 1a** and **2a**). The implication of the results on the efficiency of the board is that a more balanced board with respect to power distribution can be expected to have better decision making ability and therefore contribute to the economic value of the firm. The downside is that this type of board can result in

stalemate.<sup>13</sup> A more skewed board with one veto player, on the contrary, is faster in decision making and therefore more efficient in terms of time-saving.

**Figure 2a Board type 2, 1 veto player**

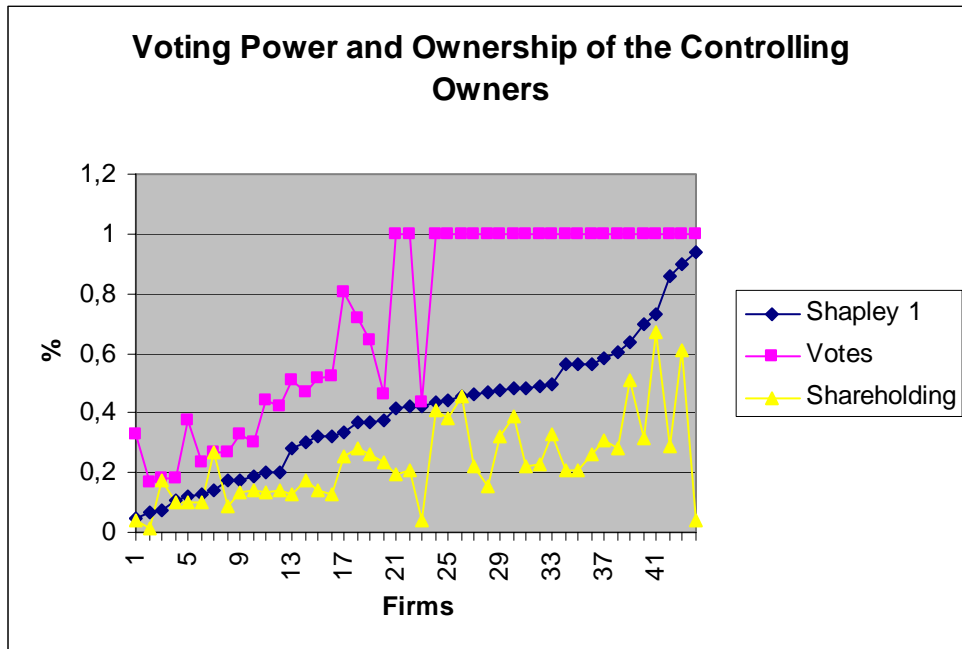


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<sup>13</sup> No win situation.

A4

Table 3a Voting Power and Ownership of the Controlling Minority Owners



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## Clinical study

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# Valuation of Voting Scheme Changes: The cases of Electrolux AB and SKF AB

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## Abstract

This paper studies the effects of a voting scheme change on the stock market prices of Electrolux and SKF AB using standard event study methodology and a clinical approach. The economic effect of the voting scheme change is assessed using the market model. We investigate the loss of control due to the change in the voting scheme. The degree of change in power is calculated using the Shapley-Shubik power index and the Banzhaf power index. There is a wealth transfer from the high vote shareholders to the low vote shareholders in the process since in both cases the high vote shareholders required no compensation. We expect share price to respond positively to an announcement of a forthcoming voting scheme change, due to the reduced *power discount* and corporate governance improvement. The magnitude of the response on the event day depends also on the information structure of the period leading up to the announcement. A bigger effect on the value of the firm is to be expected if the voting powers of the major owner(s) shift away from absolute control to moderate control, indicating a significant change in governance pattern.

Key words: voting; corporate governance; voting premium; Shapley-Shubik power index; Banzhaf power index.

JEL code: G32, G34

# 1 Corporate Governance: theories and hypotheses

## 1.1 *Agency theory and corporate governance*

Corporate governance is not a relevant research subject in an ideal world without agency cost. In the real world it is relevant since there are agency costs and incomplete contracts (Olive Hart, 1996). Who makes residual decisions and how to govern firms efficiently comprise the main tasks of corporate governance. The existence of agency costs makes residual decisions matter since they (the residual decisions) influence the value of the firm and determine who bears the agency costs. Investment decisions are therefore contingent on financial structure of the firm and various conflicts of interests among the claimants of the firm.

Agency theory<sup>1</sup> provides a framework to analyze the effects of separation of ownership and control, and provides effective tools to solve the principal-agent problem generated by conflicts of interests.<sup>2</sup> Under an effective governance system, the board and the executive management are expected to act according to their best judgments on corporate affairs, which does not guarantee a perfect match with the interests of outside shareholders.<sup>3</sup> Conflicts of interests between controlling owners as agents and other shareholders as principals generate agency costs that both parties, as rational self-interested people, have incentives to reduce in order to generate firm value. Agency theory provides a general structure in which there are a variety of classes of solutions to these problems. Empirical studies drawn from corporate practices have provided examples of linkage between

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<sup>1</sup> The origin of modern agency theory can be retrieved as far back as in Adam Smith's "The Wealth of Nations" from 1776: "The directors of such companies...cannot be well expected...Negligence and profusion, therefore, must always prevail..." More recently, see Berle and Means (1932) on separation of ownership and control.

<sup>2</sup> The ways to minimize agency costs are through better information disclosure, promotion of shareholder activism, better small shareholder protection, and other market disciplinary mechanisms.

<sup>3</sup> This refers to agency cost generated by both conflict of interests and lack of self-control, see, Jensen (1994).

corporate governance and value creation, which has enriched the theory and practices of corporate governance.<sup>4</sup>

## 1.2 The Jensen-Meckling Model: the REM model<sup>5</sup> of human behavior

Jensen and Meckling (1994) describe an economic agent/individual as *resourceful, evaluative and maximizing* (REM). They are capable of making trade-offs among different goods. They are interested not only in material goods but also in intangible goods such as respect, honesty, love, fame, morality, and immortality. This theory departs from the Economic Model (the Money Maximizing Model), the Sociological Model (the Social Victim Model) and the Political Model (the Perfect Agent Model) by adding new dimensions in evaluating human behavior. An individual falls short of a perfect agent (as in the Political Model) since a “perfect agent” is deemed as “a robot that has all the capability of a man except one flaw: his own self-interest” (Jensen and Meckling, 1994). On the contrary, a REM individual has his own self-interest and is resourceful, evaluative, and maximizing, but yet imperfect. A typical agent in the REM model has his own desires and wants and is perfectly willing to make trade-offs. Self-interested individuals in the REM model have the capacity for altruism, care about others and take other people’s interests into account while maximizing their own welfare. The REM model provides a sound and flexible predictive framework for evaluating human behavior. It is consistent with agency theory because it encompasses conflicts of interests between agent and principal in the model.

The REM model explains aspects of human behavior. It assumes that each individual is always willing to give up some sufficiently small amount of any particular good for some

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<sup>4</sup> Miron Stano, 1976, shows that, in the US, shareholders of owner-controlled firms have been provided with a significantly higher rate of return than shareholders of management controlled firms. See for example Dodd and Warner (1983) for a study of proxy contest; Demsetz and Lehn (1985) for an empirical test on Berle and Means theory. For more recent studies, see James S. Ang et al. (2000) and Hauser and Lauterbach (2000).

<sup>5</sup> In Jensen and Meckling’s “The Nature of Man” (1994), an individual is characterized as REM, i.e., resourceful, evaluative and maximizing.



sufficiently large amount of other goods. Agency Theory aims at solving the principal-agent problem (minimize the agency cost --not eliminate) by improving corporate governance based on the understanding of human behavior. For example, a typical agent might maximize his/her own self-interest taking into account that other people get a minimum of their shares. Or he/she might harm other people's interests by increasing the total risk of the firm and benefit from the volatility. This clearly calls for corporate governance to work.

Power is a common good that derives positive utility for the individuals possessing it. Voting rights provide power to run the firm. There is a market for corporate power and an equilibrium price for it in order for the "market for corporate power" to function well. Exchange of the corporate power should be priced in terms of the amount of power being transferred, the resulting power structure, and the total value of the firm after the transaction. In general, the higher the expected benefit of power, the higher the market price of power.<sup>6</sup> There are extreme cases where power is locked in and not subject to market contest, e.g. in cases where a firm has one absolute controlling owner. This provides room for corporate governance and market disciplinary mechanism to work, e.g. shareholder activism, internal monitoring, and market pricing mechanism.

Active owner control and entrepreneurship have contributed to a major industry boom and laid a foundation for long-term economic growth in Sweden in 1960<sup>th</sup> and 1970<sup>th</sup> (Carlsson, 2001). An absolute controlling owner in this case is not that controlling at all. He/She often takes interests of others into account rather than his/her own private benefits,<sup>7</sup> sometimes even forsakes his/her own private benefits for the benefit of the firm. Obviously, altruistic behavior does exist during the early stages of firm development, much like parents nurturing young children. The REM model is therefore relevant in explaining the Swedish case.

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<sup>6</sup> Hauser and Lauterbach (2000) study 67 dual class stock unifications in Israel and find out that the compensation to loss of power and price of vote depend strongly on the position and perspective of the majority shareholders.

<sup>7</sup> Economic benefits derived from control.

In this paper, active owners' strategic decisions of voting scheme changes are evaluated in a framework of shareholder wealth redistribution, the power redistribution of the owners, and the implicit trade-offs. The trade-off is made through exchanging *sufficiently small* amounts of power for *sufficiently large* amounts of other goods, i.e. management's inner propensity to thrive for excellence, the need to improve relationships with outside shareholders, the need to compete for outside capital, the necessity to comply with domestic and international stock market rules, and the need to re-balance the portfolio composition of the controlling shareholders.

This study also has policy implications on the issue of facilitating the market for corporate control. The EU proposal of one-share one-vote has met strong resistance from countries with dual class of shares, and notably from Sweden,<sup>8</sup> because of the concern that a uniform one-share one-vote would change the current Swedish corporate power structure and ownership of the large Swedish firms, which could potentially compromise Swedish national interests. In addition, this study provides a unique method in using the power indices to quantify the controlling shareholders' change of power and its economic value to the firm.

### 1.3 A Model of Owner Control

Consider a simple model of owner control. Suppose owner A owns a majority of the votes of the firm and can decide on all the important issues concerning the firm. He/She has reputation capital (R) and social capital (S), which restricts him/her from harming the firm. His/Her utility function (U) is twice differentiable and concave:  $U = U(S) + U(R) + U(V) + U(H)$  where V denotes the votes of the owner A, H is the income stream owner A gets from his/her shareholdings.

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<sup>8</sup> The regime of dual class of shares is not contradictory to the co-existence of an effective takeover market, except for firms with an absolute controlling owner and firms that the high voting shares are not traded.

At the beginning of each period (e.g. when the company's quarterly result is announced), the controlling owner (A) convinces the stockholders to entrust their funds to him/her by promising to increase the value of the firm in the next period. When the firm performs well, all the outside shareholders are happy. But when the firm performs badly and the share loses its value, the outside shareholders investigate the firm by demanding the company accounts to be verified and may decide to sell their shares of the firm. In this situation, the controlling owner decides to give some of the control rights (votes) back in order to keep his social and reputation capital high and to boost the value of the firm by reducing the perceived agency costs associated to the controlling owner. If he/she gives the votes away to the outside shareholders for free, he/she will gain some social capital and reputation capital by an amount of  $d(S)+d(R)$  but lose his/her voting power by an amount of  $d(V)$ . The perceived change of agency costs of the controlling owner and the "would-be" compensation to the controlling owner will contribute to the value of the firm and therefore increase his/her share value by an amount of  $d(H)$ . The value of the voting change will be spread evenly among all the shareholders according to their shares. Most importantly, the controlling owner's percentage share of the company i.e. his/her cash flow rights is unchanged. Thus, there is a wealth transfer from the controlling owner to the outside shareholders. On the contrary, if the controlling owner demands fair compensation, he/she would be compensated for the value of the votes according to their market value, thus increases his/her percentage share of the company acquired by using the proceeds of the compensation to the loss of the votes. The change in his social capital and reputation capital is zero. The increase of the value per share will be less than in the former case by an amount of the compensation divided by the number of the shares.

## 1.4 Evaluating the voting change

Electrolux AB and SKF AB are two of the core holdings of the investment company Investor AB that belongs to the well-known Swedish group, the *Wallenberg Sphere*.<sup>9</sup> The Wallenberg family exercises active owner control through its holding company Investor AB.<sup>10</sup>

*Active owner control* typically adds value to the firm, but *absolute control* using voting difference decreases the value of the firm through the market discount on its share price. Thus, the economic value of reducing voting difference is expected to be positive because it is viewed as a corporate governance improvement. The loss of voting power of the controlling owner without direct compensation indicates transfer of wealth from the shareholders holding higher voting shares (A shares) to shareholders holding lower voting shares (B shares). The total economic value of the voting scheme change is composed of two parts: the value due to the reduced expected agency cost plus the would-be compensation to the owners of higher voting shares<sup>11</sup>. The reduced expected agency cost is the additional increase in the market capitalization of the firm. The transfer of wealth from A shareholders to B shareholders is, therefore, the percentage of the lower vote shares (B) over the total amount of shares (A+B) times the amount of the would-be compensation to the high voting (A) shareholders. The reduced expected agency cost indicates a wealth transfer from the controlling owner to the rest of the shareholders.

Formally, suppose the firm has two classes of shares: A and B. The total amount of A-share is A, the total amount of B-share is B, and the would-be compensation to the A-share

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<sup>9</sup> See Håkan Lindgren (1994). The Wallenberg sphere refers to a group of firms in which the Wallenberg family has exercised some form of active ownership either by providing members to serve on the Board of Directors or through direct management.

<sup>10</sup> See Sven-Olof Collin (1998) for a definition of business group. Business group is defined as a supra-organization consisting of legally independent firms joined together by some mechanisms, particularly by equity ownership, and by coordinating the use of one or more resources, for example, benefits of information sharing and sharing of an internal capital market, among other things.

<sup>11</sup> This is related to the decrease of the private benefit of control of the controlling owner.

owners is  $V(C)$  where  $V(C)$  translates to value of compensation. Then, the wealth transfer from the A-share owners to the B-share owners is

$$(B / (A+B)) * V(C),$$

where  $V(C)$  is determined by the price difference between the A and B shares,  $(P_a - P_b)$ .

Assuming A-share carries 1 vote per share and B-share carries 1/1000 vote per share. Also assuming the marginal vote price we observe on the market equals to the equilibrium vote price and there is no liquidity risk premium associated with high vote shares. Then, if B-share voting right changes from 1/1000 to 1/10, the marginal price of a 1% vote is<sup>12</sup>

$$MP(V) = - \frac{\Delta(\text{equity})\%}{\Delta(\text{votes})\%} = \frac{\left(\frac{P_a}{P_b} - 1\right) \frac{1}{A+B}}{\left(1 - \frac{P_a}{P_b 1000}\right) \frac{1}{A + \frac{B}{1000}}}. \quad (1)$$

In reality the voting premium can be negative as in the case of SKF, where we set the compensation to zero. The negative voting premium can be due to a lack of trading interest in A shares.

The resulting voting proportion of A and B shares is  $(V_a, V_b)$ , with  $V_a$  being the proportion of the total votes assigned to A shares, and  $V_b$  being the proportion of the total votes assigned to B shares.

$$[V_a, V_b] = \left[ \frac{A}{A + \frac{B}{10}}, \frac{B}{A + \frac{B}{10}} \right],$$

the total loss of voting rights of A shares (in percentage point) is

$$\left( \frac{A}{A + \frac{B}{1000}} - \frac{A}{A + \frac{B}{10}} \right) \times 100. \quad (2)$$

The total compensation to A-share owners for the loss of voting rights is (1) times (2).

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<sup>12</sup> See the calculation in detail in Hauser and Lauterbach (2000).

As an example, the loss of votes (%) of the controlling owner in the case of Electrolux AB is:  $93.6\% - 22.3\% = 71.3\%$ .

The loss of votes (%) of the controlling owner in the case of SKF is:  $32.1\% - 28.42\% = 3.68\%$ .

The premium of Electrolux A-share to B-share over the three-month period before the voting scheme change is 3.03% (see **Graph 6** in **Appendices B**). 1 percent of voting loss corresponds to 0.000857841 % of equity gain. The compensation would be 223,964 Electrolux B shares. The approximate value is 31.33 million SEK.

SKF had a negative premium during the three-month period indicating a zero compensation to the A-share owners based on the market price of the A-shares (see **Graph 7** in **Appendices B**). However, the actual compensations are zero to the A-share owners of both companies. An arbitrageur would make money by selling SKF B shares and buying SKF A shares for the same amount of capital, and end up making a risk free return if A shares can be freely converted to B shares which was vetoed by the major shareholder. Furthermore, the voting premium is expected to be larger after the voting scheme change due to the increased possibility of a takeover.

## 2 Methodology

We employ clinical study (Carlsson, 2000) methods to the two events of voting scheme changes. Clinical study method is best suited when few observations are available.<sup>13</sup> We use stock market value change as the measure of the economic value of the voting change.

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<sup>13</sup> The depth of discussion often offsets the defects of lack of statistical significance.

The market model is used to estimate the economic gains (see **Appendices A: Event Study Methodology**).

The power of the controlling owner is calculated by Shapley-Shubik power indices (Shapley, 1953; Shapley and Shubik, 1954) and Banzhaf power indices (Banzhaf, 1965).

The calculation is based on all possible voter permutations, from which all the decisive positions for a voter  $i$  are counted. The sum of all the decisive positions divided by all possible orderings (voter permutations) gives voter  $i$ 's share on all pivots (decisive positions).

Formally, voter  $i$ 's Shapley-Shubik index value is calculated as

$$\Phi_i = \sum_{\substack{i \in S \\ S \subset N}} \frac{(s-1)!(n-s)!}{n!} [v(S) - v(S/\{i\})]$$

where  $s$  is the number of actors in the minimal winning coalition  $S$  and  $n$  is the total number of voters in the voting body. Each swing is given a weight of  $\frac{(s-1)!(n-s)!}{n!}$ . The

power index value for  $i$  is then obtained by adding up all the weights. If  $S$  is a winning coalition and  $I$  can turn the winning coalition to a losing one by defecting from  $S$ , then,  $[v(S) - v(S/\{i\})] = 1$  for the specific  $S$ . The Shapley-Shubik power indices in one voting game add up to a value of 1.  $\sum_{i \in N} \Phi_i = 1$ .

The normalized/non-normalized Banzhaf index was introduced two decades after the Shapley-Shubik index by John F. Banzhaf in 1965. The non-normalized Banzhaf index of voter  $i$  is defined by the number of  $i$ 's swings divided by the number of coalitions which have  $i$  as a member. The latter number is  $2^{n-1}$  if the number of voters is  $n$ . The non-normalized Banzhaf is calculated as

$$\beta_i = \frac{\sum_{S \subset N} [v(S) - v(S/\{i\})]}{2^{n-1}}$$

The normalized Banzhaf index value of voter  $i$  is obtained by dividing the sum of  $i$ 's swings by the sum of all swings of all voters. This gives  $i$ 's proportion of all swings.

Formally, voter  $i$ 's normalized Banzhaf index is

$$\bar{\beta}_i = \frac{\sum_{S \subset N} [v(S) - v(S \setminus \{i\})]}{\sum_{j \in N} \sum_{S \subset N} [v(S) - v(S \setminus \{j\})]}.$$

The standard Banzhaf power indices assigned to voters in a voting game add up to a value of 1.  $\sum_{i \in N} \bar{\beta}_i = 1$ .

The difference between these two indices is that Banzhaf power indices calculate how many times the voter can swing and change the winning coalition to a losing one by defecting from  $S$ . The Shapley indices calculate how many times the voter is pivotal in all possible permutations of a winning coalition. Note that the voting game described here is non-cooperative.

### 3 The case of Electrolux AB

Electrolux AB and SKF AB implemented voting scheme changes in 1998 and 1999, respectively. The resulting voting difference after the changes complies with the Swedish Company Act which sets the highest voting difference to 1: 1/10 among common stocks.

#### 3.1 Background study

Electrolux AB was established in 1912 by Swedish salesman Axel Wenner-Gren, and became a Wallenberg company under the leadership of Marcus Wallenberg (MW) in 1959.



It was one of the many excellent acquisitions<sup>14</sup> accomplished by generations of Wallenberg family leaders. Due to some mysterious reasons, MW was offered a dominating stock post by the founder of Electrolux, which amounted to 70 percent of the voting rights.<sup>15</sup> MW took the opportunity believing that Electrolux and Asea together could create synergies and enhance value.<sup>16</sup>

From the late 19<sup>th</sup> century to the middle of 20<sup>th</sup> century, the acquisition of many industrial firms had transformed the Wallenberg sphere into an industrial group. Its holding company Investor AB introduced in 1916 and Förvaltnings AB Providentia in 1945 (due to regulatory reasons) have developed into industrial holding companies. Incentive AB founded in 1963, was intended to buy and develop small companies with interesting technology in cooperation with research. It acted also as a vehicle to restructure companies with possible gains through rationalization. Constant renewing and constant value enhancing as the group's deep-rooted tradition have been practiced constantly and the result of this has been extraordinary (Carlsson, 2001).<sup>17</sup> It has facilitated numerous ownership reshufflings. Active ownership has differentiated Investor AB from other institutional owners such as insurance companies and mutual funds. Investor AB, as the holding company of the Wallenberg sphere has a highly concentrated control profile itself: 41.7% of the voting rights and 19.6% of the shareholding (see also **Graph 3 in Appendices B** for the concentration of power of the biggest owners). This enables the control of the other companies within the Wallenberg sphere.

There were, however, practical reasons to change the voting schemes in the Wallenberg group companies besides the openly stated need to attract international investments and improve the company's governance structure. Incentive AB was seeking an exit from

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<sup>14</sup> Acquisitions of Stora in the 1870s, Scania and Astra in 1924, Ericsson in 1932, SKF in 1932, and WM data in 1994 to mention a few.

<sup>15</sup> The main part was placed under AB Separator, in 1962 transferred to Asea. The remainder was assumed by MW, Investor and Providentia. See Investor, 1916-1991.

<sup>16</sup> Asea's daughter company Helios was transferred to Electrolux in exchange for new share emission.

<sup>17</sup> There are, however, other opinions based on the rate of return to shareholders where Investor AB, among all the eight investment companies, ranks the last. See article: Investor sämst - och dyrast, by Simon Blecher, Affärsvärlden Nr. 17, 2003.

owning 48.3% of the voting rights (see **Table 2**) and merging into the medical technology company Gambro AB. The massive voting rights became an obstacle for Investor AB to acquire the holding. By relaxing the high voting ratio, Investor could acquire Electrolux shares from Incentive AB without having to consolidate Electrolux into its balance sheet. From the inside, Investor AB needed to minimize its *power discount* imposed on its net asset value. The discount was estimated at about 14% of Investor's net asset value as of February the 10<sup>th</sup>, 1998---a phenomenon usually associated with mutual funds. To reach its goal of shrinking and eventually eliminating the *power discount*, Investor has resorted to increasing its overall risk and concentrating on major holdings and its core competence area. This, however, has not worked to reduce the *power discount*. One way to change that image is to lower the power distance of the dual class of shares.<sup>18</sup> However the risk tied to Investor AB is more related to information asymmetry, the inadequate disclosure in high risky investments, risky out-of-balance-sheet activities, and agency costs associated with managing the portfolio of firms.

Public opinion, and particularly investors in the international market, perceived the almost non-existent voting rights of B shares as increasingly negative.<sup>19</sup> After the change, the company's voting scheme would be brought in line with the current Swedish Company Act, which allows a 1 to 1/10 voting difference. The liquidity of the A shares would also improve partly due to the expected additional demand of the higher voting shares, and partly due to the prospect of an outsider gaining a corner position in the company. All factors considered, it is favorable to change the voting scheme. We expect the change of the voting scheme to have a positive effect on the price movement of Electrolux shares.

### **Market reaction**

According to the press release dated March 10<sup>th</sup>, 1998, the Board of Directors had proposed an amendment of the Articles of Association that would give each B-share 1/10 of a vote

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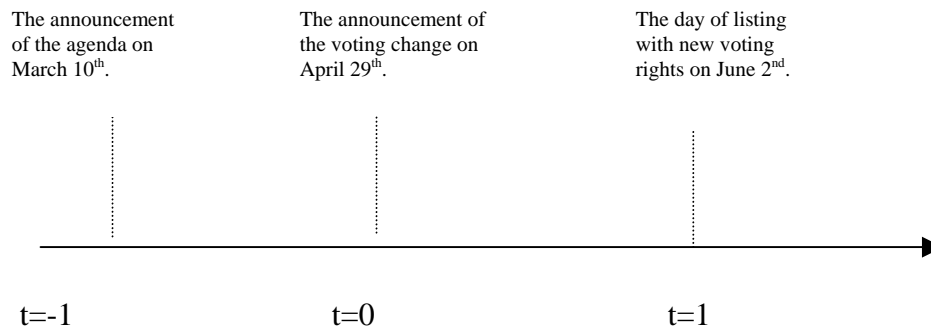
<sup>18</sup> If that is the goal, then the effort is bitterly failed since the power discount on the shares of Investor AB has increased to around 30% of its net asset value in 2001.

<sup>19</sup> Foreign ownership accounts for 59.9% share capital of Electrolux AB by Feb. 1998, mostly held by unknown foreign owners and trustees.

instead of 1/1000, and each A-share with 1 vote. Upon the news release, Electrolux shares posted a 3.57% gain (see **Graph 1**).

The proposal was subsequently approved at the 1998 ASM (04/29) of Electrolux AB.<sup>20</sup> The change of the voting scheme was not entirely unexpected due to the announcement of the agenda on the March 10<sup>th</sup>. As a result, the total voting rights in the company represented by B shares increased from 3.4% to 78.1%, and the voting rights of A shares decreased from 96.4% to 21.9%. An unchanged dividend of 2.5 SEK per share and an authorization of a stock split of 1:5 were approved in accordance with the board proposal. The first day of the new par value and of the new voting rights of the shares to be quoted on the SSE is June 2<sup>nd</sup>. This suggests three event dates. The first date is when the expectation of a voting change was formed. The second date has multiple events of a confirmation of the expected events in combination with the first quarter result. The third date is the date for the listing of the new voting rights and the new par value in the stock market.

### The event time line:



The effect had been built up since the release of the annual shareholder meeting agenda suggesting that the board's proposal had a good chance to be endorsed at the ASM. This had largely been priced in the stock by the time it was confirmed. Conditional event methodology<sup>21</sup> should be applied here. This would mean that the effect at the

<sup>20</sup> A qualified majority of both A and B shares were required at the AGM.

<sup>21</sup> Prabhala (1997).

announcement day ought to be not as strong as what it would have been had it been a totally unexpected event.

The data has been modified to calculate the model parameters<sup>22</sup> since the trading volume of A shares was extremely thin and non-continuous. This phenomenon was due to the fact that the 25 largest shareholders own 99.1% of the A shares outstanding. Thus, the liquidity of A shares is extremely low compared to B shares, and the voting premium of A-share is determined by the demand for A shares for control reasons (the expected probability of a takeover) and by the liquidity of the A shares. The low liquidity could partly explain the depressed price of the stocks (Huang and Stoll, 1997). The average daily trading volume of A and B shares on the SSE is shown in **Table 1**.

**Table 1: Average daily trading volume of Electrolux A and B shares (in thousands of SEK)**

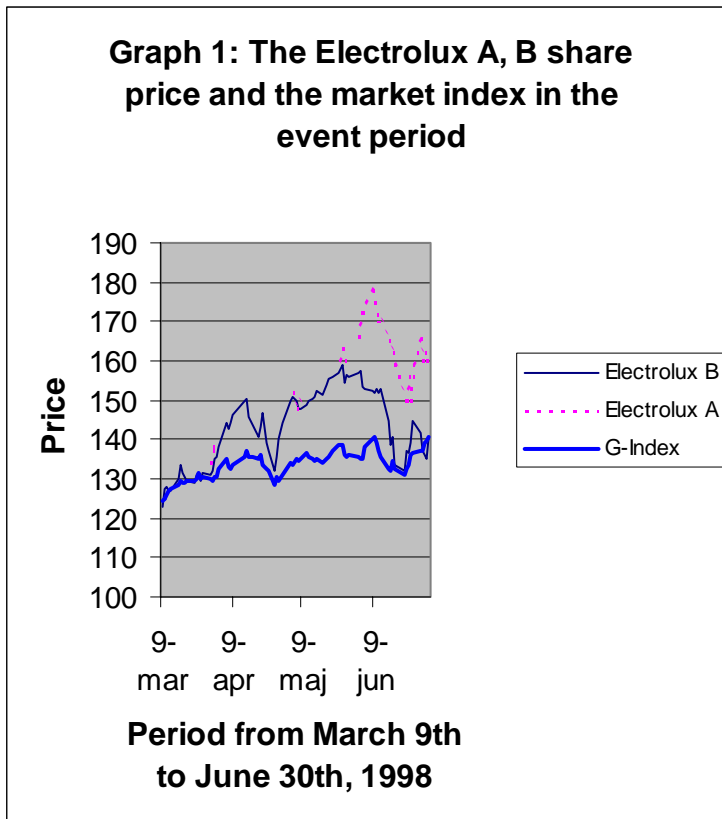
	1998	1997	1996	1995	1994
A Shares	89	17	27	9	58
B Shares	136353	130378	64441	77736	93720
Total	136442	130395	64468	77745	93788

Data source: Electrolux AB annual report of 1998.

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<sup>22</sup> The no trading day data has been filled by smoothing out the two nearest trading prices.

**Graph 1 The stock price movement of Electrolux in the event period**



### 3.2 The loss of control analysis using Shapley-Shubik and Banzhaf indices

A simple voting ratio and a power indices measure of voting rights of the shareholders are presented in **Table 2** and **Table 3**. It is obvious that the voting power of the controlling owner has reduced from absolute voting control (power index value equals to 1) to a block voter meaning any winning coalition would include the controlling owner (Burgin and Shapley, 2000).

**Table 2: The change of voting structure of Electrolux AB (ownership data from Feb. 16, 1998)**

	Votes before	Votes after	Share Capital
Incentive	48.3%	11%	1.4%
Investor	45.3%	11.3%	2.5%
<b>Wallenberg Sphere</b>	<b>93.6%</b>	<b>22.3%</b>	<b>3.9%</b>
Fjärde AP-fonden	0.3%	5.8%	7.3%
SPP	0.1%	2.1%	2.3%
Skandia	1.1%	2.1%	2.3%

Data source: Owners and power in Sweden's listed companies, 1999.  
Investor and Incentive are two holding companies of Wallenberg sphere.

By examining the relative voting powers of the biggest shareholders using power indices, we identify a moderate change in the voting pattern. The big owner lost *absolute control* in the super majority voting but retained absolute control in simple majority voting evaluated by the Shapley-Shubik and Banzhaf indices.<sup>23</sup>

Overall, Investor's decision to eliminate the extreme type of voting scheme was a big step towards a one share-one vote system, and received much credit from the public. It was

<sup>23</sup> Small owners with less than 0.1% of the votes are omitted.

nevertheless a move with limited risk since Investor AB will not lose control in the near term even though an absolute control at the super majority voting level was replaced with a veto control. Nevertheless, the possibility of an outside interest acquiring a corner position in the company has increased as shown by the increased voting premium (see **Graph 1** above and **Graph 6** in **Appendices B**). This is consistent with Rydqvist (1996) in that the voting premium increases as the power of the biggest owner decreases.

**Table 4** shows the abnormal return of the 11-day window and the significance of the abnormal return around the release of the news of the voting scheme change.

The sample period is 250 days before the event period. The market model is used to calculate the estimated normal return, by using the sample period standard deviation to calculate the event day standard deviation conditional on the market return. The abnormal return is calculated and a significance test is performed.

### **Interpretation of the result**

There were significant event period gains as shown in **Table 4**. Electrolux A shares were not traded on the event day in this event window. There was moderate movement in consistent with the price of B shares after the trading resumed. B shares posted a 4.42% abnormal return on the event day ( $t=0$ ). The cumulated abnormal return of the 11 day event window is 6.57%. There was a time lag between the release of the news and the actual day the new votes were listed on the SSE, which was June 2<sup>nd</sup>. A shares responded significantly on the first trading day of the shares with the new votes (See **Table 5**). The cumulated abnormal return of the 11 day event window is 7.05%. After the reintroduction of the A shares with the new votes, the premium of A shares increased significantly, indicating both an increased liquidity of A shares and the increase of voting premium due to the new voting scheme and a lowered grip on the control (Rydqvist, 1996).

**Table 3**

Before the change of the voting scheme			After the change of the voting scheme								
Electrolux	owner name	votes	Shapley 1	Shapley2	Banzhaf 1	Banzhaf2	votes	Shapley	Shapley2	Banzhaf 1	Banzhaf2
1998 Feb.			MWC=1/2	MWC=2/3	MWC=1/2	MWC=2/3		MWC=1/2	MWC=2/3	MWC=1/2	MWC=2/3
1	Wallenberg-sfären*	0.94	1	1	1	1	0.223	1	0.683	1	0.561
2	Skandia	0.011	0	0	0	0	0.021	0	0.036	0	0.056
3	SHB-sfären	0.006	0	0	0	0	0.003	0	0.005	0	0.007
4	Fjärde AP-Fonden	0.003	0	0	0	0	0.058	0	0.096	0	0.090
5	SPP	0.001	0	0	0	0	0.023	0	0.041	0	0.062
6	S-E-B-sfären	0.001	0	0	0	0	0.014	0	0.023	0	0.036
7	S-E-Bankens Aktiefonder	0.001	0	0	0	0	0.013	0	0.021	0	0.033
8	Templeton Growth Fund Ltd	0	0	0	0	0	0.01	0	0.016	0	0.025
9	Merrill Lynch Fonder (USA)	0	0	0	0	0	0.006	0	0.009	0	0.015
10	Schroder Investment	0	0	0	0	0	0.004	0	0.006	0	0.010
11	GMO International Funds	0	0	0	0	0	0.004	0	0.006	0	0.010
12	Fidelity Fonder	0	0	0	0	0	0.004	0	0.006	0	0.010
13	Lazard Fonder(USA)	0	0	0	0	0	0.004	0	0.006	0	0.010
14	AIM Fonder (USA)	0	0	0	0	0	0.002	0	0.003	0	0.005
15	Prudential Fonder (USA)	0	0	0	0	0	0.001	0	0.002	0	0.003
16	Konsumentkooperationen	0	0	0	0	0	0.009	0	0.014	0	0.023
17	SHB:s Aktiefonder	0	0	0	0	0	0.008	0	0.013	0	0.020
18	AMF Sjukförsäkring AB	0	0	0	0	0	0.009	0	0.014	0	0.023

\* Incentive and Investor own 48.3% and 45.7% respectively.

note:

1. Data source: Ägarna och Makten, 1998.
2. MWC stands for minimal winning coalition.
3. Unknown foreign owners and trustees are excluded from the data.



**Table 4**

The effect of the voting scheme change on April 29th, 1998,  
as evaluated by the sample period, 250 trading days before the event window.

	11 day window											CAR	CAR
	Event day												
	4-22	4-23	4-24	4-27	4-28	4-29	4-30	5-4	5-5	5-6	5-7		
	t-5	t-4	t-3	t-2	t-1	t	t+1	t+2	t+3	t+4	t+5		
Return on Electrolux A	-0.008	-0.008	0.01	0.01	0.01	0.01	0.017	-0.003	0	-0.026	0.014	0.026	0.012
Return on Electrolux B	0.024	-0.052	-0.014	-0.036	0.029	0.034	0.043	0.042	0.007	-0.007	-0.015	0.055	0.104
Return on General index	-0.021	-0.006	-0.006	-0.025	0.017	-0.008	0.013	0.021	-0.002	0.012	-0.004	-0.009	0.032
AR for Electrolux A	-0.006	-0.008	0.01	0.013	0.006	0.01	0.013	-0.008	-0.001	-0.03	0.013	0.012	-0.003
Significance level	(-0.747)	(-0.762)	(0.863)	(1.897)*	(0.385)	(0.912)	(0.928)	(-0.538)	(-0.092)	(-2.127)**	(1.123)	(0.555)	(0.085)
AR for Electrolux B	0.05	-0.045	-0.007	-0.005	0.008	0.044	0.027	0.016	0.009	-0.022	-0.009	0.066	0.065
Significance level	(3.721)***	(-2.363)**	(-0.379)	(-0.436)	(0.308)	(2.444)**	(1.135)	(0.603)	(0.470)	(-0.927)	(-0.486)	(1.233)	(1.322)

The critical values of the t distribution, two sided test, for n>100 are 1.645(10%)\*, 1.96(5%)\*\*, and 2.576(1%)\*\*\*.

**Table 5**

The effect of the period of actual listing with new par value and voting rights

	5-25	5-26	5-27	5-28	5-29	6-2	6-3	6-4	6-5	6-8	6-9	CAR	CAR
	t-5	t-4	t-3	t-2	t-1	t	t+1	t+2	t+3	t+4	t+5	(t-5,t+5)	(t,t+5)
	AR for Electrolux A	-0.003	0.017	-0.017	0.012	0.01	0.011	0.035	-0.001	0.012	0.014	-0.019	0.071
Significance level	(-0.244)	(1.4121)	(-2.001)**	(0.997)	(0.816)	(1.006)	(2.954)***	(-0.095)	(0.746)	(0.947)	(-1.485)	(1.524)	(1.663)*
AR for Electrolux B	-0.007	0.011	-0.005	0.017	-0.007	0.012	0.005	-0.023	-0.035	-0.02	-0.009	-0.061	-0.07
Significance level	(-0.306)	(0.517)	(-0.357)	(0.846)	(-0.319)	(0.601)	(0.254)	(-1.148)	(-1.311)	(-0.843)	(-0.396)	(-0.765)	(-1.363)

The critical values of the t distribution, two sided test, for n>100 are 1.645(10%)\*, 1.96(5%)\*\*, and 2.576(1%)\*\*\*.

## 4 The case of SKF AB

### 4.1 Background study

After the voting scheme change of Electrolux AB in 1998, SKF AB (Aktiebolaget Svenska Kullagerfabriken) and Ericsson AB were the only two firms listed on SSE that had an extreme voting scheme with 1 to 1/1000. SKF AB reversed the extreme voting scheme in 1999, one year after the proposal of a voting scheme change was rejected by the controlling owner Investor AB at the 1998 ASM. A somewhat less known fact is that the major owner vetoed the proposal of a free converting right from A-share to B-share at the 1999 ASM. Established in 1907, and based on one of its original founder Sven Winquist's (1876-1953) invention of the single-row ball bearing, SKF AB was to become the world's leading ball bearing manufacturer (82% of the bearings market in 1999). The Wallenberg family had mere 9% of the voting rights before the Kreuger crash in 1932 while Skandinaviska Banken held 17% of the voting rights (AB Investor, 1991). The merger of Stockholms Enskilda Bank and Skandinaviska Banken took place in 1971. On Dec. 31, 1999, SKF AB stock accounted for 2% of Investor's core holding (Carlsson, 2001).

The timing of the voting scheme change coincided with a time of industrial down turn. SKF had been losing market share and profit margin due to vigorous competition in its product market. The company was forced to reduce dividend payments by 60% compared to the years before 1999. The market had been expecting a turn-around this year because the stock price had already increased by some 35% since the turn of the year. The change of the voting scheme was proposed as one agenda to vote at the ASM, held on 22<sup>nd</sup>, April 1999.

#### **Market reaction**

The market reacted positively to the releases of the ASM and the voting scheme change.<sup>24</sup> As a result, the total voting rights in the company represented by B shares increased from

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<sup>24</sup> Although the threshold of passing the proposed change is unusually high: for the ASM to decide such a change of voting power, the proposal must be supported by two thirds of the votes given the shares represented at the ASM as well as by half of all A shares and nine tenth of the A shares represented at the ASM.

3.44% to 78.08%, and the voting rights of A shares decreased from 96.56% to 21.92%. The share prices of A and B advanced by 11.29% and 11.97% respectively on the day that the proposal was approved at the ASM. The abnormal returns of SKF A and B shares were 10.91 % and 11.59% respectively (see **Table 6**). The change has appeared to be sustainable in the longer time frame (see **Graph 2**). Typically there are other releases from the ASM, so this may not be the only contributing factor. The first quarter result was in line with expert forecasts but the market played on the belief that the worst was over although the company releases state otherwise.<sup>25</sup> The market reaction thus could be interpreted as both a reaction to a favorable quarterly result and the change of the governance structure. We expect that the voting premium would increase marginally after the voting scheme change since the biggest owner's voting share reduced marginally (Rydqvist, 1996).

The SKF B-share and A-share prices relative to the general index around the time of the event are shown in **Graph 2**. The market's perception of the governance structure of the firm was an important influencing factor. It related directly to the perceived value of the firm after the change of the governance structure. The bigger the voting change is, the larger the market reaction will be to the change. SKF AB experienced large loss over 1998, but returned to profit in the first quarter of 1999. In addition, a dividend of 2 SEK was approved by the 1999 ASM, corresponding to a 61.9% fall compared to the year before (dividend for the year 1997 was 5.25 per share).

**Graph 2** shows the stock price movement of the shares of SKF AB at the event window. Note that SKF A-share has a negative premium over B-share before the voting scheme change (see **Graph 7** in **Appendices B**).

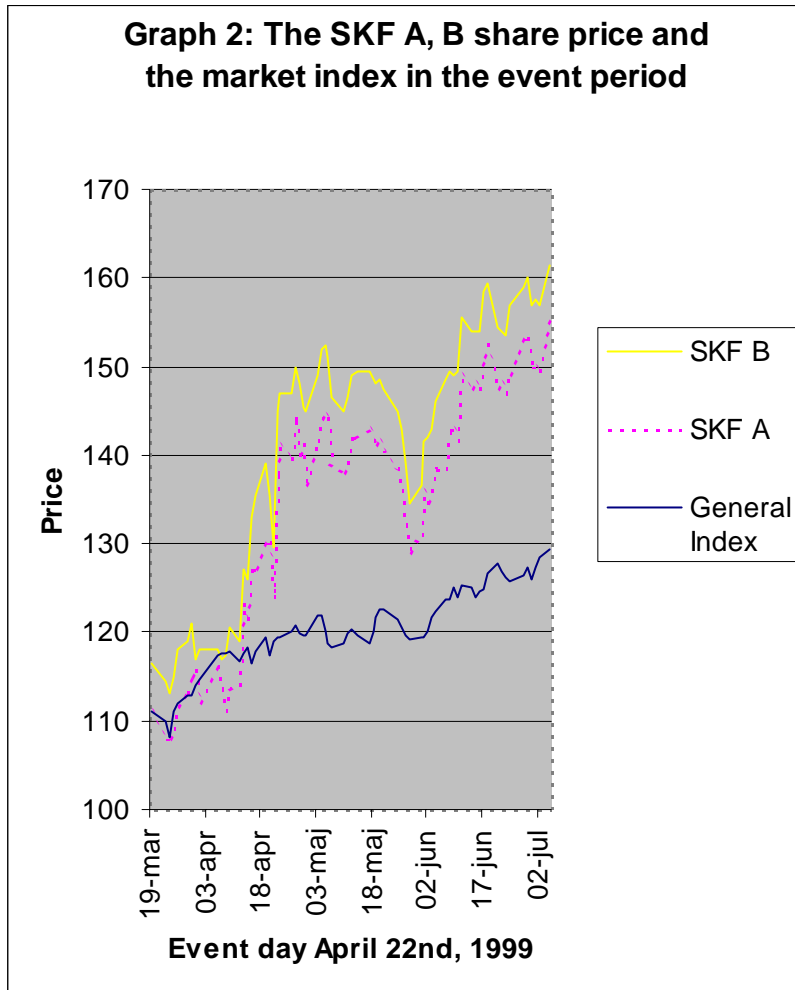
An 11 day event window is drawn: 5 days before, and 5 days after the event day. The event day is 22<sup>nd</sup> April 1999. The sample period is 250 trading days before the event window. The market reaction to the event in the event period conditional on the market return is tested using the market model. The general index of the SSE is chosen to be the benchmark

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<sup>25</sup> The original words of the press release commenting on the first quarter report were: "The sales are still declining at SKF's main markets, the bottom of the business cycle has not yet been reached. In Asia, however, SKF sales have started to grow again."

index. **Table 6** shows the abnormal return of the 11 day window and the significance of the abnormal return for both SKF A and B shares.

**Graph 2: The SKF A and B shares price and the market index in the event period**



**Table 6**

The effect of the voting scheme change on April 22nd, 1999,  
as evaluated by the sample period, 250 trading days before the event period.

	11 day window											CAR (t-5,t+5)	CAR (t,t+5)
	Event day												
	4-15 t-5	4-16 t-4	4-19 t-3	4-20 t-2	4-21 t-1	4-22 t	4-23 t+1	4-26 t+2	4-27 t+3	4-28 t+4	4-29 t+5		
Return on SKF A shares	0.045	0,0000	0.024	0,0000	-0.046	0.113	0.022	-0.011	0.032	0.014	0.007	0.2	0.177
Return on SKF B shares	0.056	0.019	0.026	-0.025	-0.044	0.12	0.014	0,0000	0.02	0,0000	-0.017	0.169	0.137
Return on SSE General index	-0.016	0.013	0.013	-0.017	0.013	0.005	-0.002	0.006	0.006	-0.007	-0.003	0.011	0.005
AR for SKF A shares	0.062	-0.012	0.012	0.018	-0.058	0.109	0.039	-0.016	0.028	-0.02	0.011	0.173	0.151
Significance level	(2.699)***	(-0.423)	(0.412)	(0.785)	(-2.049)**	(4.065)***	(1.519)	(-0.582)	(1.037)	(-0.792)	(0.437)	(2.02)**	(2.38)**
AR for SKF B shares	0.073	0.007	0.014	-0.007	-0.056	0.116	0.03	-0.005	0.016	-0.005	-0.013	0.17	0.139
Significance level	(3.361)***	(0.267)	(0.531)	(-0.338)	(-2.117)**	(4.626)***	(1.267)	(-0.198)	(0.643)	(-0.231)	(-0.538)	(2.11)**	(2.34)**

The critical values of the t distribution, two sided test, for n>100 are 1.645(10%), 1.96(5%) and 2.576(1%).

## Interpretation of the result

The market data indicates that SKF's market capitalization increased during the 11 day window by 17.44% for A shares and 17.02% for B shares corresponding to an increase in the value of 1090.97 MSEK for A shares and 1461.9 MSEK for B shares. The total market value of SKF increased by 2552.87 MSEK in the 11-day event period.

It is expected that a moderate gain shall be associated with voting scheme change. The resulting change in SKF voting structure was moderate. Since the A-share owners held almost the same amount of B shares. This also indicates that the extreme voting scheme can be detrimental to the firm since an outsider can acquire SKF A shares and accumulate a large position with a minimum amount of capital. We speculate that this might have played a role in the change of the voting scheme of SKF AB.

## 4.2 The loss of control analysis

However, the change of the voting structure is not significant by measures of Shapley-Shubik and Banzhaf power indices. The Wallenberg sphere weakly dominates other parties. A simple voting ratio and a power indices analysis of the voting power of the shareholders are presented in **Table 7** and **Table 8**, respectively.

**Table 7: The voting rights changes before and after the voting scheme change in SKF**

Data source: Owners and power in Sweden's listed companies.

	Votes before	Votes after	Share capital
<b>Wallenberg-sfären</b>	33.3%	29.5%	14.7%
Skanska	20%	17.71%	8.7%
SPP	4.7%	4.54%	3.9%
Nordbankens Aktiefonder	4.3%	4.49%	5.4%
Fjärde AP-fonden	4.1%	3.95%	3.3%
AMF Försäkring AB	2.3%	2.16%	1.6%
Skandia	1.9%	2.08%	2.7%

**Table 8**

SKF	owner name	Before the change of the voting scheme					After the change of the voting scheme				
		votes	Shapley 1 MWC=1/2	Shapley2 MWC=2/3	Banzhaf 1 MWC=1/2	Banzhaf2 MWC=2/3	votes	Shapley 1 MWC=1/2	Shapley2 MWC=2/3	Banzhaf 1 MWC=1/2	Banzhaf2 MWC=2/3
1999 Feb.											
	1 Wallenberg-sfären	0.333	0.6353	0.5458	0.7224	0.4555	0.295	0.577	0.5496	0.6708	0.4532
	2 Skanska	0.2	0.0728	0.285	0.046	0.3854	0.177	0.0894	0.2757	0.0594	0.375
	3 SPP	0.047	0.0728	0.0405	0.046	0.035	0.045	0.0761	0.0383	0.0591	0.0382
	4 Nordbankens aktiefonder	0.043	0.0728	0.0351	0.046	0.0345	0.045	0.0761	0.0383	0.0591	0.0382
	5 Fjärde AP-Fonden	0.041	0.0728	0.032	0.046	0.0337	0.04	0.0629	0.0322	0.0567	0.0355
	6 AMF försäkring AB	0.023	0.0238	0.013	0.028	0.0156	0.022	0.025	0.0144	0.0248	0.0151
	7 Skandia	0.019	0.0176	0.0114	0.02	0.0118	0.021	0.0241	0.0141	0.0231	0.0144
	8 Kunskap och kompetens stift	0.012	0.0119	0.0079	0.0165	0.007	0.011	0.0145	0.0097	0.0123	0.0068
	9 SHB:s aktiefonder	0.006	0.0044	0.006	0.006	0.0044	0.007	0.0123	0.0077	0.0084	0.0059
	10 praktiktj pens stiftelser	0.006	0.0044	0.006	0.006	0.0044	0.006	0.0106	0.0069	0.0071	0.0052
	11 Konsumentkooperationen	0.004	0.0028	0.0038	0.004	0.003	0.004	0.0081	0.0038	0.0051	0.0033
	12 Merrill Lynch fonder (USA)	0.003	0.002	0.0029	0.003	0.0022	0.003	0.0069	0.0026	0.0039	0.0025
	13 GMO international funds	0.003	0.002	0.0029	0.003	0.0022	0.003	0.0069	0.0026	0.0039	0.0025
	14 DFA fonder	0.001	0.0007	0.0011	0.001	0.0008	0.001	0.002	0.0008	0.0012	0.0008
	15 SKF:s allemonsfond	0.001	0.0007	0.0011	0.001	0.0008	0.001	0.002	0.0008	0.0012	0.0008
	16 Timber hill Europe AG	0.001	0.0007	0.0011	0.001	0.0008	0	0	0	0	0
	17 Norska staten	0.001	0.0007	0.0011	0.001	0.0008	0	0	0	0	0
	18 UBS Schweiz Stockholm	0.001	0.0007	0.0011	0.001	0.0008	0.001	0.002	0.0008	0.0012	0.0008
	19 FPG/AMFK	0.001	0.0007	0.0011	0.001	0.0008	0.001	0.002	0.0008	0.0012	0.0008
	20 Förenade Liv	0.001	0.0007	0.0011	0.001	0.0008	0.001	0.002	0.0008	0.0012	0.0008

note:

1. Data source is Ägarna och Makten, 1999.
2. MWC stands for minimal winning coalition.
3. Unknown foreign owners and trustees are excluded from the data.

The Shapley-Shubik indices for the simple majority voting changed from 63% to 57 %, for the super majority voting the power indices changed from 54.5% to 54.9%. Similarly, Banzhaf power indices changed only marginally (see **Graph 4** and **Graph 5** in **Appendices B**). This means there is no significant loss of voting power due to the change of voting scheme. What the voting scheme change did was to reduce the negative voting premium.

## 5 Concluding remarks

The voting scheme changes and the firm value are related because the market price of the firm reacts to governance issues via the expected agency cost of the firm. The magnitude of the change in market value depends on the market perception of the improvement towards better corporate governance and the actual loss of power. Electrolux AB experienced significant loss of control interest. This has led to an enlarged voting premium due to possible outside interest to a corner position in the firm. Also, the fact that no compensation was demanded from the A-share owners has a wealth transfer effect to the B-share owners especially in the Electrolux case.

However, reducing the voting dominance of the controlling owner does not necessarily mean reducing de facto dominance. But it does provide a possibility that the governance structure and control will change over time. This effect, however small, is decisive in determining corporate control modes in the long run.



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## Appendices

### A

#### The standard event study methodology and its development

This paper employs the market model of event study to assess the economic impact of a voting scheme change on the value of a firm. The estimation procedure is described below.

##### A standard market value framework

For a given firm,  $i$ , we consider a date  $t$ , occurring in an event period, as well as an estimation period distinct from the event period containing  $T$  observations. The abnormal return  $A_{it}$  for the date  $t$  is computed as

$$A_{it} = R_{it} - \hat{\alpha} - \hat{\beta} R_{mt}. \quad (1)$$

where the parameters of the equation are obtained using the estimation period data. Since  $R_{it} = \alpha + \beta R_{mt} + \varepsilon_{it}$  the abnormal return in (1) can be written as

$$A_{it} = (\alpha - \hat{\alpha}) + (\beta - \hat{\beta}) R_{mt} + \varepsilon_{it}. \quad (2)$$

The variance–covariance matrix of the market model coefficients is (conditional on the market returns):

$$\text{var} \begin{Bmatrix} \hat{\alpha} \\ \hat{\beta} \end{Bmatrix} = \frac{1}{T} \begin{bmatrix} 1 + \hat{\mu}_m^2 / \hat{\sigma}_m^2 & -\hat{\mu}_m / \hat{\sigma}_m^2 \\ -\hat{\mu}_m / \hat{\sigma}_m^2 & 1 / \hat{\sigma}_m^2 \end{bmatrix} \sigma_\varepsilon^2. \quad (3)$$

Combining (2) and (3) gives the variance of  $A_{it}$  (conditional on the market returns):

$$\text{var}\{A_{it}\} = \left[ 1 + \frac{1}{T} + \frac{(R_{mt} - \hat{\mu}_m)^2}{T \hat{\sigma}_m^2} \right] \sigma_\varepsilon^2. \quad (4)$$

Abnormal returns for a single firm or a cross section of firms are arranged in event time.  $T$  refers to the time in the event period. The significance of the abnormal return can be obtained by dividing the abnormal return by the standard deviation of the abnormal return at  $t$  using (4).

The average abnormal return in the event period is computed as

$$\bar{A}_i = \frac{1}{N} \sum_{t=0}^K A_{it},$$

where  $t$  refers to the date in firm  $i$ 's event period.

The statistical significance of  $\bar{A}_i$  is assessed by standardizing each abnormal return using (4).

$$SA_{it} = A_{it} / s_{it},$$

with  $s_{it}$  representing the standard deviation of  $A_{it}$ .

Then compute the test statistic:

$$Z_i = \frac{1}{\sqrt{N}} \sum_{i=1}^N SA_{it}.$$

Under the null hypothesis of zero abnormal return, the test statistic obeys the unit normal distribution for large  $N$ . Each  $SA_{it}$  is distributed Student-t with  $(T-2)$  degrees of freedom or unit normal for large  $T$ .

The cumulative abnormal return over  $K$  dates in the event period is often investigated. It is given by

$$CA_{i,\tau+\kappa} = \sum_{t=\tau}^{\tau+\kappa} A_{it},$$

which is normalized by computing

$$CSA_{i,\tau,\tau+\kappa} = \frac{1}{\sqrt{K}} \sum_{t=\tau}^{\tau+\kappa} SA_{it}$$

and

$$Z_{\tau,\tau+\kappa} = \frac{1}{\sqrt{N}} \sum_{i=1}^N CSA_{i,\tau,\tau+\kappa}.$$

The test statistic is distributed unit normal for large  $T$ .

This framework has become a standard when using market model. For an early exposition and example of its use, see Dodd and Warner (1983). However, if the information or announcements are not entirely unexpected, the standard event study method needs to be modified and adapted accordingly. The unexpected part of the information should decide the stock-price reaction of the event. This resulted in a new branch of literature, namely, the conditional methods in event studies (see Acharya, 1988; Prabhala, 1997).

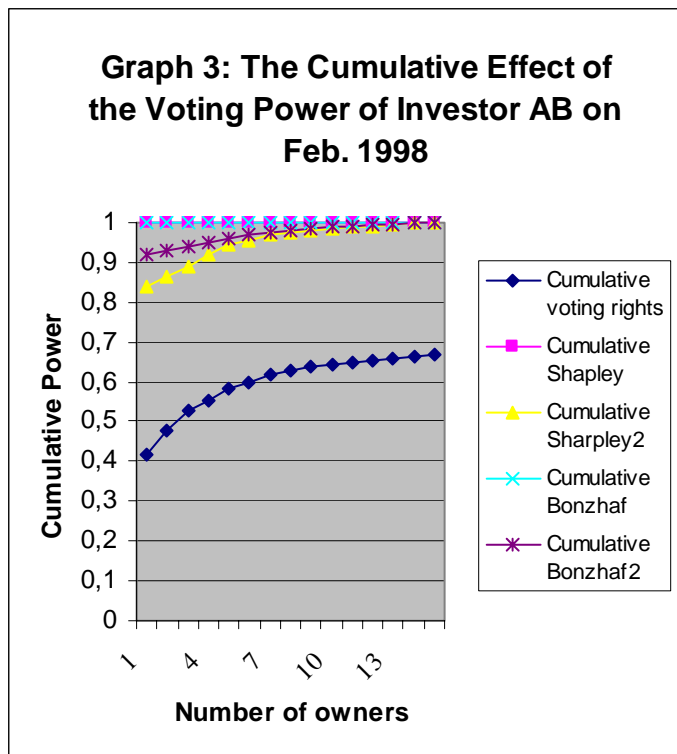
Information Structures (Prabhala, 1997):

1. Markets know, prior to the event, that the event-related information has arrived at firm  $i$  (but not its exact content).
2. Markets do not know, prior to the event, that the event-related information has arrived at firm  $i$ .
3. Markets know the probability that the event-related information has arrived at firm  $i$ .

The information effect is stronger if the markets do not know that the event-related information has arrived at the firm.

## B

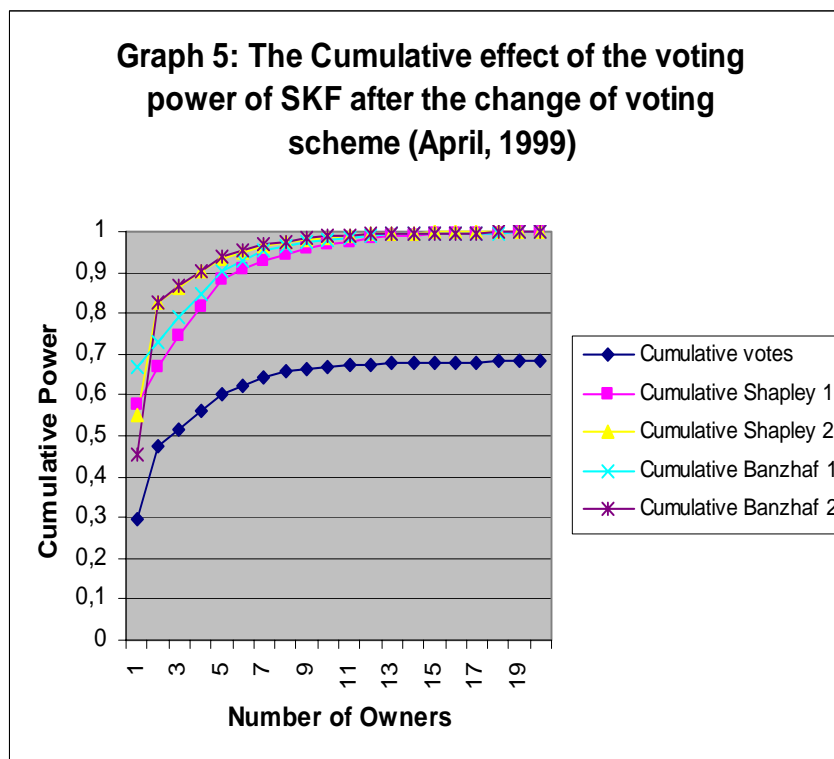
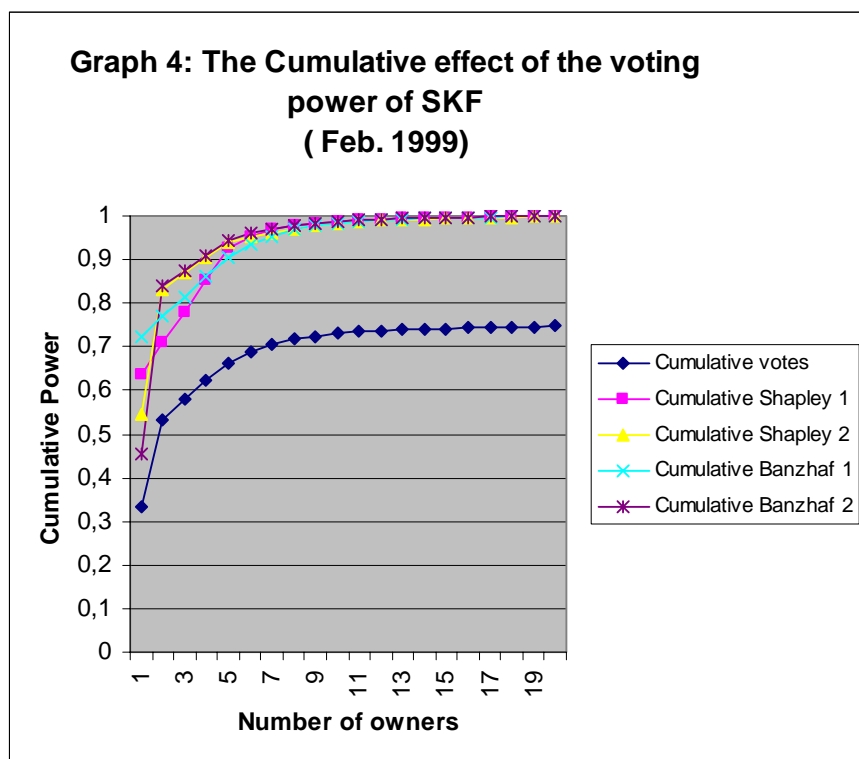
**Graph 3: The Cumulative Effect of the Voting Power of Investor AB on Feb. 1998**



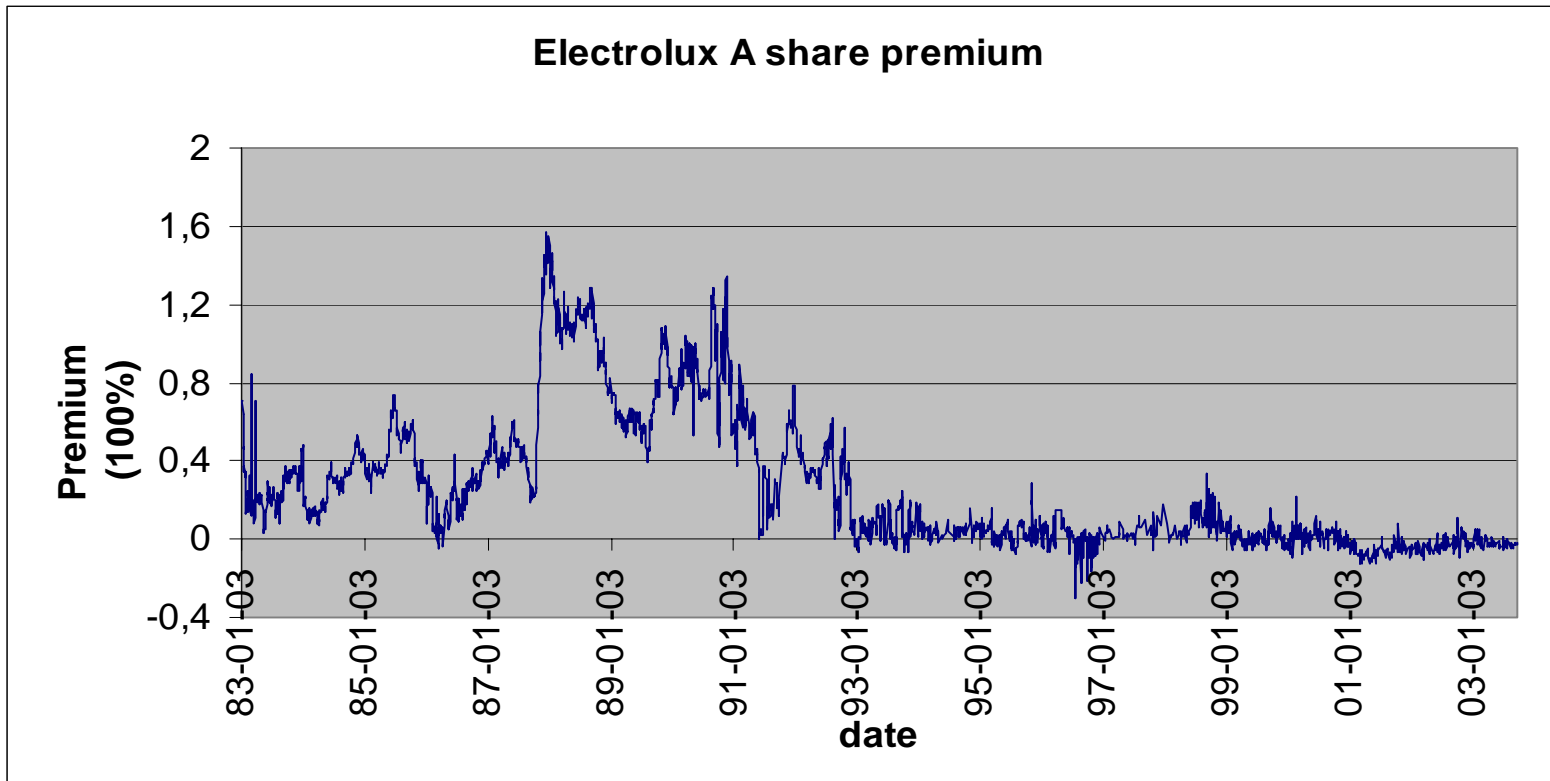


**Graph 4: The Cumulative Effect of Voting Power of SKF AB (Feb. 1999)**

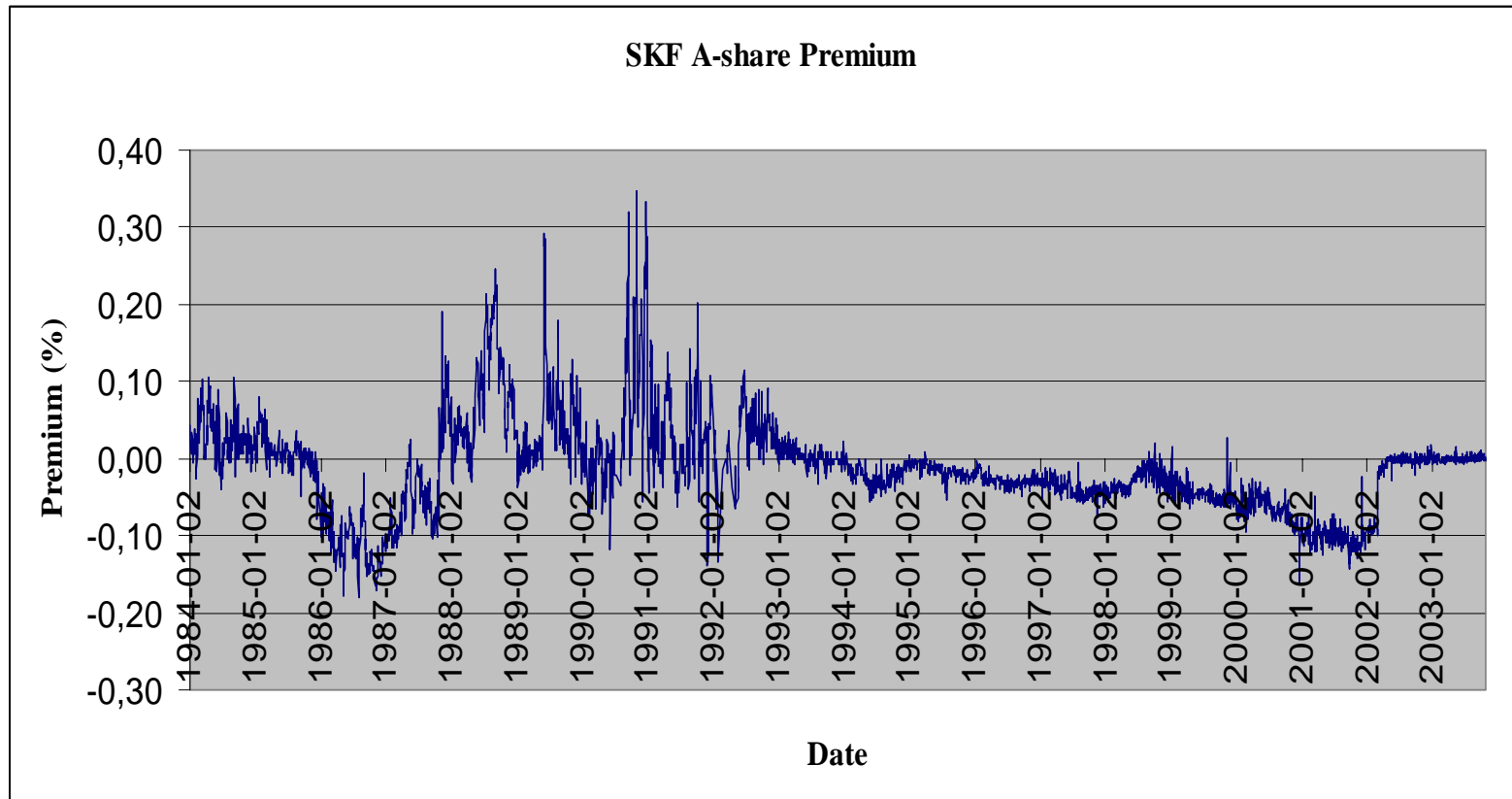
**Graph 5: The Cumulative Effect of Voting Power of SKF AB after the Voting Scheme Change**



**Graph 6: A-share premium (%) of Electrolux AB (1983 to 2003)**



**Graph 7: A-share premium (%) of SKF AB (1984 to 2003)**



## Essay 4:

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# Capital Structure: Theories and empirical results - a panel data analysis<sup>1</sup>

Yinghong Chen and Klaus Hammes<sup>2</sup>

## Abstract:

In this paper we analyze factors influencing firm leverage. We use market capital ratio, book capital ratio and book debt ratio as measures of leverage. We compare factors that influencing firm leverage using unbalanced panel data of seven countries: Canada, Denmark, Germany, Italy, Sweden, the UK, and the US. We find that firm size, profitability, tangibility, and market-to-book ratio have significant impact on the capital structure choices of firms. Tangibility is positively related to leverage, while profitability shows a negative significant relation to leverage across all seven countries. More profitable firms tend to borrow less. Size of the firm is positively and significantly related to firms' financial leverage. The impact of the market-to-book ratio varies in the book debt ratio model but shows a negative and significant relation in the market leverage model for all countries except Denmark, which shows an insignificant parameter value. Evidence we find from the seven countries show that there are considerable differences in the level of firms' leverages across countries, which can be attributed to institutional difference.

JEL Classification: G32

Keywords: capital structure; firm leverage; profitability; tangibility; panel data

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## 1 Introduction

How do firms choose their capital structures? What is the relationship between capital structure and the firm value? A first answer to the question was provided by Modigliani and Miller (1958). In their ideal world with exogenous operating decisions, no bankruptcy cost, no taxes and transaction costs, capital structure decisions are irrelevant to firm value. The investors can mimic debt-equity decisions made by the firm. Since their work, many theories of capital structure have been developed incorporating asymmetric information and market imperfections. Theoretical models incorporating asymmetric information can be found in Leland and Pyle (1977). Empirical models and results can be found in Rajan and Zingales (1995). Myers (1984) and Harris and Raviv (1991) provide excellent surveys on capital structure theories. Literature emphasizing the importance of the institutional differences and their influences on capital structure decisions can be found in La Porta, et al., (1996; 1997; 1999).

The purpose of this paper is to analyze the determinants of capital structures relating to theories of capital structure using a sample of listed firms in seven OECD countries: Canada, Denmark, Germany, Italy, Sweden, the UK, and the US. We then provide possible explanations of the different capital structure decisions found in those countries. We follow Rajan and Zingales (1995) model of capital structure. In addition, we compare our results using panel data with those obtained by Rajan and Zingales (1995) using cross-sectional data.

This paper is organized as follows: Section 2 is a partial survey of capital structure theories, Section 3 introduces the model and the variables, Section 4 deals with data and estimation method, Section 5 is a comparison of leverages in the selected seven countries, Sections 6 and 7 present empirical results and explain the different levels of capital ratios across countries with an analysis of institutional differences, and Section 8 concludes the paper.

## **2 Theories of Capital Structure**

The “irrelevance capital structure” theory by Modigliani and Miller (1958) is a milestone from which several relevant theories developed. These are done by relaxing the assumptions made by the original study and introducing market imperfections such as asymmetric information and agency costs, etc. (Leland and Pyle, 1977; Myers, 1984; and La Porta, et al., 1996; 1997). The literature of capital structure based on asymmetric information, different legal environments, and agency costs are summarized in this section. Note that the categorizations of the different theories are not mutually exclusive.

### **2.1 The “irrelevance” theory of capital structure**

Modigliani and Miller (1958) demonstrated in their seminal paper “The cost of capital, corporation finance, and the theory of investment” that in the absence of transaction cost, no tax subsidies on the payment of interest, and the same rate of interest of borrowing by individuals and corporations, firm value is independent of its financial structure. The model is based on a framework that starts with assumptions of perfect competition in factor and product markets and no transaction costs. Modigliani and Miller (1958) conclude that a firm cannot increase its value by using debt as part of its permanent capital structure. This argument is based on perfect arbitrage such that investors can assume personal debt to help financing the purchase of unlevered shares, if the value of the levered shares is greater than the unlevered ones. With perfect arbitrage any discrepancies in the value of the stocks of two hypothetical firms, one with levered shares and the other with unlevered shares, will be eliminated. Capital structure is thus irrelevant to firm value.

Including tax deductibility of interest payments into their model, Modigliani and Miller (1963) show that borrowing will only cause the value of the firm to rise by the amount of the capitalized value of the tax subsidy. Relaxing assumptions in their

original work and introducing imperfect competition, bankruptcy costs, asymmetric information, and monopoly power, financial structure appears to be an influencing factor on firm value.

## **2.2 Static trade-off theory: bankruptcy costs**

The optimal debt ratio of a firm is determined by a trade-off between cost and benefits of borrowing holding the firm's assets and investment plans constant. Firms balance debt and equity positions by making trade-offs between the value of interest tax shields and the cost of bankruptcy or financial distress. Provided there are no adjustment costs attached to capital structure changes, the observed capital structure should be optimal in the sense that it maximizes the firm value (Myers, 1984). Risky firms borrow less because of the higher expected probability of bankruptcy. Firms with specialized assets, large amounts of intangible assets, and firms with higher growth opportunities borrow less than firms otherwise would. This is because those firms have a higher chance of losing asset value in an adverse situation.

## **2.3 Capital structure models based on agency cost and asymmetric information**

### **2.3.1 Signaling models**

Asymmetric information between lenders and borrowers can generate under-investment results (Leland and Pyle, 1977; Myers and Majluf, 1984). The amount of under-investment can be reduced if information transfer can occur. Capital structure serves as a signal of inside information given a fixed level of firm investment.

Ross (1977) develops an incentive signaling model, which provides a theory for the determination of the financial structure of the firm. In the model it is assumed that the manager possesses inside information about the activities of the firm and is thus precluded from trading in his/her own instruments. In a competitive equilibrium, given that the investors know the manager's incentive scheme, financial choices made by the manager will signal the firm's worth.



In Leland and Pyle (1977) entrepreneurs signal their projects' worth by investing more in their projects than they would if they could communicate the true project value at zero cost. A welfare reduction effect is identified with the higher level of entrepreneur holdings compared to the case with costless information transfer. In equilibrium, the value of the firm is strictly increasing with the amount of entrepreneur holding of the firm. Also, for any level of firm value, greater project risk implies lower optimal debt.

Heinkel (1982) introduces asymmetric information into the otherwise perfect, Modigliani-Miller world and develops a signaling equilibrium in which investors' expectations about individual firms depend on the capital structures of the firms. A critical assumption for this costless equilibrium is that the credit risk of the firm is positively related to the value of the firm, such that the benefit gained from issuing safer debt through misrepresentation offsets the loss from issuing equity. This constructs a costless separating equilibrium in which no firms have incentive to misrepresent themselves.

Dewatripont and Tirole (1994) develop a model that rationalizes multiple outside investors: debt holders and equity holders with managerial moral hazard in a world of incomplete contracts. Capital structure thus serves as a control mechanism to discipline managers via managerial incentive schemes.

Lewis and Sappington (1995) consider a risk averse principal with under-diversified investments and his/her choice of capital structure in the context of an agency relationship. They find that outside financing can be valuable even when internal funds are available. Outside financing limits the agent's rents from his/her private information and limits the risk from stochastic production that the principal bears.

### **2.3.2 Agency cost models**

Agency costs due to separation of ownership and control arise when managers hold less than 100% of the residual claim. Managers make investment decisions based on

imperfect markets and incur agency costs of different types, thus influencing firm value (Jensen and Meckling, 1976). Optimal capital structure can be obtained by trading off the agency cost of debt financing for the benefit of debt financing.

Jensen (1986) argues that debt has to be paid back in cash, therefore, the amount of free cash flow that could be diverted by the manager is reduced by assuming more debt. Thus, debt serves as a mechanism to discipline the manager from engaging in self-serving activities, e.g. perquisite consumption, empire-building, etc. Grossman and Hart (1982) argue that short term debt can serve as a mechanism to align managerial incentive with that of shareholders since bankruptcy is costly for management.<sup>3</sup> The agency cost of debt financing arises when equity holders invest sub-optimally, for example by engaging in riskier project than the contract dictates. This is a classic hold-up problem. The loss of efficiency can be borne by the equity holders if the debt holders correctly anticipate the risky behavior of the borrower. These costs can be reduced but not eliminated.

Based on the agency cost theory of Jensen and Meckling (1976) and free-cash-flow stories of Oliver Williamson (1988) and Harris and Raviv (1990), Zwiebel (1996) develops a model in which managers voluntarily choose a debt level to credibly constrain their empire-building desire. A dynamically consistent capital structure is derived through trading-off managers' empire-building desires with the need to insure sufficient efficiency to avert takeover threats and challenges made to remove the managers from control. Debt as a committing device serves to constrain the ability of managers to undertake inefficient investments due to the increased threat of bankruptcy.

#### **2.4 The pecking order theory**

If investors are less informed than the firm insiders about the value of the firm, then equity may be mispriced by the market. When firms need to finance new investments, under-pricing may be so severe that new investors capture more than the Net Present

Value (NPV) of the project resulting in a dilution of value to the existing investors. This can lead to under-investment result. To avoid this, firms establish a preference over a financial pecking order. Under normal market conditions, firms prefer internal finance over external finance, safe debt over risky debt and convertibles, and finally common stocks (Donaldson, 1961; Myers and Majluf, 1984; Myers, 1984). There is no well-defined target debt-equity ratio according to this theory. The observed debt-equity ratio represents a firm's cumulative requirements for external finance. Therefore capital structure is path dependent.

## **2.5 The legal environment theory of capital structure**

Different legal environments should influence firms' financing decisions. The influence of the legal environment has been analyzed by La Porta, Lopez-de-Silanes, Shleifer and Vishny (1996) and many of their papers that follow (La Porta, et al., 1997; La Porta, et al., 1999). In La Porta, et al., (1997) legal determinants of external finance are analyzed. They find that countries with poorer investor protection have smaller and narrower capital markets, both for debt and equity. This finding affects capital structure: if the capital markets are smaller and narrower, this affects the costs of external finance and firms may rely more on internal finance or inter-firm credit.

La Porta, et al., (1999) find evidence of higher valuations of firms in countries with better protection of minority shareholders, which should affect the choice between debt and equity. In countries with less protection of minority shareholders, the costs of equity finance are higher than in countries with better minority shareholder protection.

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<sup>3</sup> See also Stulz, 1990 ; Harris and Raviv, 1990; Hart, 1993; and Hart and Moore, 1995.

### 3 Model and Variables

#### 3.1 The model

The model we use is adopted from Rajan and Zingales (1995) but differs in estimation technique. We run the following model using panel data method for listed firms in seven countries separately and compare the differences establish.<sup>4</sup>

$$\text{Leverage}_{it} = \alpha + \beta_1 \text{time} + \beta_2 \text{Tangibility}_{it} + \beta_3 \text{MBR}_{it} + \beta_4 \text{size}_{it} + \beta_5 \text{Profit}_{it} + u_{it}$$

Leverage = Book leverage or market leverage. Book leverage is defined as book value of debt divided by total assets. Market leverage is defined as book value of debt divided by book value of debt plus market capitalization of the equity.

Tangibility = ratio of fixed assets to total assets

MBR = Market-to-book ratio. We define it as market value of equity plus debt divided by total assets.

Size is the logarithm of firm turnover, i.e. log (sales).

Profit = Profitability, earnings before interest, depreciation and taxes divided by total assets.

$u_{it}$  = Random error term.

#### 3.2 Variables

##### Leverage

“Neither a borrower nor a lender be.” This can be true for unlimited liability. If the same principle applies to modern corporations is at least over-cautious. It has been established that firms can trade off bankruptcy risk with firm value up to a point to achieve optimal results (Myers, 1984).

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<sup>4</sup>Baltagi, Griffin, and Xiong, 1998; Mátyás and Sevestre, 1992.

The leverage can be measured by using different financial ratios.<sup>5</sup> Ross, Westerfield and Jaffe (2002) define leverage as either the debt ratio, i.e. the ratio of total debt to total assets, or as the debt-equity ratio (also called capital ratio), i.e. total debt divided by total capital. Another measure of leverage, namely, interest coverage is given by earnings before interest and tax (EBIT) divided by interest expense, which measures a firm's ability to meet its obligation of interest payment and provides information about the firm's short-term debt serving power. It is an important measure although not addressed in this study. Measures aimed at accommodating different accounting practices in different countries in an attempt to achieve comparable results can be found in Rajan and Zingales (1995), including the treatment of pension liabilities and near cash instruments.

We use capital ratios (both book capital ratio and market capital ratio) as primary measures of leverage, wherein market capital ratio uses market capitalization instead of book equity. We use book debt ratio (TD/TA) as a secondary measure. We notice that different measures of leverage could result in slightly different parameter estimates, which can be used to crosscheck the quality of the estimated results and the sensitivity of the different measures to the model specification. We expect that similar countries with similar legal environments and social values have similar parameter values. Differences in capital structure choices could be due to reasons other than those already mentioned. We have not yet found a way to test social institutions and their connection to firm behavior.

We are aware of the fact that adjusted debt to capital ratio measures are suggested and used by Rajan and Zingales (1995). In their model, adjusted debt is given by subtracting cash and marketable securities from total debt. Adjusted book equity is book equity plus provisions plus deferred taxes minus intangibles. We agree that these measures make sense in an international comparison, but they need not be the optimal way to study leverage. One argument is that the accounting difference might be an optimal response to the existing legal environments. We therefore use raw measures and draw inferences from the basic information provided by the accounting data

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<sup>5</sup> See Rajan and Zingales, 1995; Titman and Wessels, 1988 .

without homogenizing the data *a priori*. This gives us the option of interpreting the results based on different accounting practices across countries.

### **Tangibility**

Tangibility is defined as the ratio of tangible assets to total assets. Harris and Raviv (1990) predict that firms with higher liquidation values will have more debt. On the contrary, intangible assets such as good will can lose market value rapidly in the event of financial distress or bankruptcy. Firms with more tangible assets usually have a higher liquidation value although asset specificity may play a role since assets with high specificity have a lower second hand market value, for example the airline industry falls into this category. This dictates the firm to have a lower capital structure. In general, firms with higher proportion of tangible assets are also more likely to be in a mature industry and therefore less risky, which can afford higher financial leverages.

*Formally, the higher the tangibility is, the higher the debt ratio of a firm, other things being equal.*

### **Market-to-book ratio**

The growth potential of a firm can be measured by many different variables: market value per share divided by book value per share, P/E ratio or R&D divided by total sales (Ross, Westerfield and Jaffe, 2002).

The market-to-book ratio is commonly calculated by the book value of debt plus market capitalization divided by total assets (Rajan and Zingales, 1995). We define the market-to-book ratio as the ratio of the book value of assets minus the book value of equity plus the market capitalization, divided by the book value of assets. This notion of market-to-book is built on the q-value, which is the market value of a firm divided by the replacement value of its assets.

Since higher growth potential corresponds to higher expected future cash flow and higher market capitalization, it enables the firm to have a lower cost of equity finance.

Leverage is expected to be negatively related to the measure of growth potential (Jensen and Meckling, 1976; Myers, 1977).

*Formally, the higher the market-to-book ratio is, the lower the debt equity ratio, other things being equal.*

### **Profitability**

Banks lend to those who do not need money. This is an oxymoron. Firms who find themselves in financial distress are forced to borrow or issue equity under adversarial condition, while firms that have enjoyed financial success may have less debt to serve and have more capacity to borrow. These are the two competing forces that influence the capital structure. The profitability of a firm is the basic concern of the shareholders. It can also predict the firm's future earnings' ability, to some extent. Myers (1977) in his pecking order theory predicts that firms prefer raising capital from retained earnings, than from debt, than from issuing equity. The cost of capital dictates the rank of the pecking order under asymmetric information and market imperfections. If pecking order applies, then, higher profitability will correspond to a lower debt ratio holding other things equal. We therefore proclaim that higher profitability is negatively related to firm's financial leverage.

As a measure of profitability we use the ratio of earnings before tax, interest payments, and depreciation (Ebitda) to the book value of total assets (as in Rajan and Zingales, 1995). This measure is not influenced by different taxation of profits and different depreciation rules (especially those rules regarding goodwill amortization, which vary a lot across countries.<sup>6</sup>

Other measures of profitability that are often used are:

1. The ratio of operating cash flow to total assets, which measures firm's internal cash generating ability.
2. The ratio of retained earnings to total assets, which measures firm's investment power after financial items.

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<sup>6</sup> See Rajan and Zingales, 1995. Goodwill can be depreciated over 40 years in the USA compared to five years in Germany.

*Formally, the higher the profitability, the lower the debt equity ratios, other things being equal.*

### **Size**

Total assets and turnover are commonly used as proxies for firm size. We use the logarithm of total turnover as proxy for the size of a firm (as in Rajan and Zingales, 1995).

Size is also an indicator of riskiness of a firm because,

1. Smaller firms have higher product market risks,
2. Small firms have a higher probability to be takeover targets,
3. Small firms have limited access to capital market and stock market, which can mean higher costs of capital. According to Whited (1992), small firms cannot access long-term debt markets since their growth opportunities exceed their collateralizable assets. Titman and Wessels (1988) argue that larger firms have easier access to capital markets.

The first point predicts smaller firms borrow less since they are riskier. Higher product risk corresponds to higher market risk and lower debt ratio. This is consistent with the static trade-off theory, firms trade off the benefit of debt financing with the increased bankruptcy risk. Being a potential takeover target corresponds to more inflated share prices, thus, makes equity offering more attractive. The third point states that larger firms have lower cost of borrowing and better access to capital markets. Too big to fail doctrine can also explain why bigger firms have bigger borrowing capacity. In the event of defaults, governments are more prone to save larger firms than smaller firms. This also makes banks lend more to bigger firms.

*Formally, the larger the size of the firm the higher the leverage, other things being equal.*



## 4 Data and Estimation Method

### 4.1 The data

The data in this study are derived from the Financial Times database EXTEL. EXTEL Financial contains two databases: Company Research and Equity Research. Company Research contains comprehensive information for over 11,000 publicly listed companies worldwide. It provides balance sheets, profit and loss accounts, cash flow and forecast, and capital history, etc. from 1990 to 1996. It has a direct link to Equity Research containing prime line share prices and graphics, etc. for companies in Company Research. We choose seven OECD countries: Canada, Denmark, Germany, Italy, Sweden, the UK, and the US. The selected countries include the five countries chosen by Rajan and Zingales (1995). We add Sweden and Denmark to make the case for countries in the Nordic region, partly because they are less intensively researched. All seven countries in the samples have relatively developed financial systems but differ in financial system orientations and law origins, etc.

All firms fall into the EXTEL category “C” where C stands for commercial, industrial and mining companies. Banks and insurance companies, investment companies, building societies as well as unit trust are excluded due to their different accounting categories and rules.<sup>7</sup> We have compiled up to five consecutive observations for each firm for the time period from 1990 to 1996. Since only listed firms (but not all listed firms) are included in the EXTEL database, sample selection bias does exist. Within the available firms we have selected firms randomly. It can be said that the samples are representative of a country’s listed companies in industrial and commercial sector.

The samples include: 77 firms for Canada and a total of 409 observations; 92 firms for Denmark and a total of 427 observations; 147 firms for Italy and 666 observations; 421 firms for the US and a total of 1968 observations; 200 firms for the UK out of

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<sup>7</sup> For example, banks have different balance sheet items and deal with completely different products thus has very different capital structure. Banks are also subject to capital adequacy rules, etc.

2000 available firms and altogether 689 observations; 345 firms for Germany and 836 observations; 115 firms for Sweden and 371 observations.

## 4.2 Estimation method

We use panel data method to estimate the parameters of interest.<sup>8</sup> The panel data approach has several advantages compared to the cross-sectional approach often used in financial research.

1. Due to an increase in the number of data points, degrees of freedom are increased and multicollinearity problem is reduced thus the efficiency of econometric estimates is improved.<sup>9</sup>
2. Panel data can control for individual heterogeneity due to hidden factors, which, if neglected in time-series or cross-section estimations leads to biased results.<sup>10</sup> Heterogeneity is captured by firm specific fixed effects or random effects components based on the characteristics of the data set.

We write the model in matrix notation (Baltagi, 1995):

$$(1) y_{it} = \mathbf{b}_0 + \mathbf{b}_1 x'_{it} + u_{it},$$

$$u_{it} = \mu_i + v_{it},$$

$u_{it}$  is a random term which comprised of two parts,  $\mu_i$  is firm specific effect and  $v_{it}$  is a random term.  $E(x_{it}|\mu_i) \neq 0$  and  $v_{it} \sim \text{iid}(0, \sigma_v^2)$ .  $x_{it}$  and  $\mu_i$  are uncorrelated.

Depending on the underlying assumptions, the model(s) can be estimated assuming fixed firm specific effects or random effects. In fixed effects model,  $\mu_i$ , the firm-specific effects, are fixed. In the random effect model (which is chosen here)  $\mu_i$  are random with known distribution. An advantage of the random effects model is the inclusion of time invariant variables such as industry dummies. We are interested in the parameters associated with the distribution, i.e.  $\mu_i \sim \text{iid}(0, \sigma_\mu^2)$ ,  $\lambda_t \sim \text{iid}(0, \sigma_\lambda^2)$ ,

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<sup>8</sup> Baltagi and Chang, 1994, show that it is more efficient to use the whole unbalanced data set instead of making the data set balanced by cutting off excessive data.

<sup>9</sup> See Hsiao, 1986.

$v_{it} \sim \text{iid}(0, \sigma_v^2)$ . The variance components,  $\sigma_v^2$ ,  $\sigma_u^2$  are used to transform the data. The variance component  $\sigma_u^2$  is obtained from the pooled regression.

$$\text{Var}(u_i) = \sigma_u^2 = T\sigma_\mu^2 + \sigma_v^2, \quad \sigma_\mu^2 = (\sigma_u^2 - \sigma_v^2)/T.$$

$$(2) y_{it}^* = y_{it} - \theta \bar{y}_i$$

and

$$(3) x_{it}^* = x_{it} - \theta \bar{x}_i$$

$$(4) \bar{y}_i = \frac{\sum_t y_{it}}{T}$$

$$(5) \bar{x}_i = \frac{\sum_t x_{it}}{T}$$

$$(6) \theta = \left[ 1 - \sqrt{\frac{\sigma_v^2}{T\sigma_\mu^2 + \sigma_v^2}} \right]$$

We then estimate the following model on the transformed variables using OLS.

$$(7) y_{it}^* = \beta_0^* + \beta_1^* x_{it}^* + u_{it}^*.$$

Ordinary least-square regression on transformed data is called feasible GLS, which consistent and efficient estimation of the parameters.<sup>11</sup> Note that in Random effects model,  $0 < \theta < 1$ . If  $\theta = 0$  the model reduces to OLS, if  $\theta = 1$  the model equates within fixed effects model.<sup>12</sup>

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<sup>10</sup> See Baltagi, 1995.

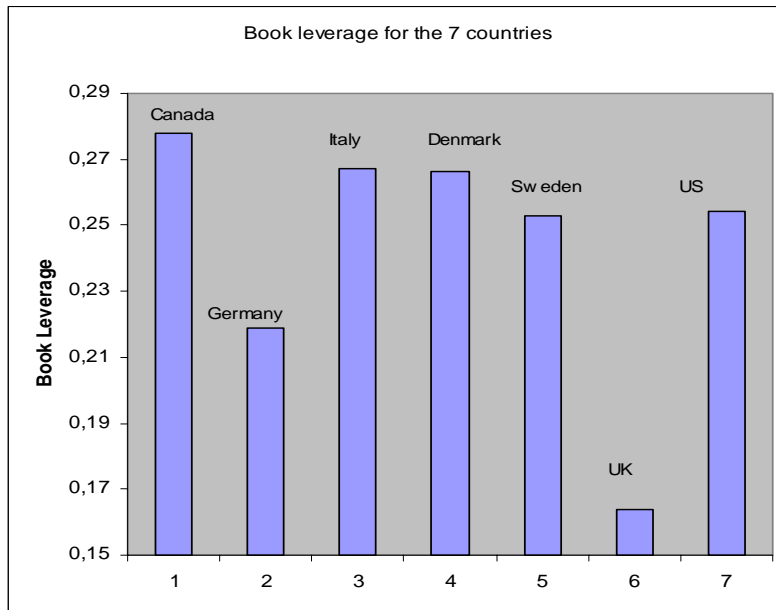
<sup>11</sup> See Greene, 2000.

<sup>12</sup> See Baltagi, 1995.

## 5 A Comparison of Leverages of the Seven Countries

Average debt ratios and capital ratios of the seven countries are presented in **Figure 1** and **Table 2**. We rank the leverages of the seven countries and make a comparison.

**Figure 1: Book leverages (TD/TA) for the seven countries**



**Insert Table 2**

We find that Germany and the UK have the lowest values in debt ratios. Canada scores the highest followed by Italy and Denmark, Sweden and US. It is consistent with what Rajan and Zingales (1995) have discovered. The results do not provide a clear separation w. r. t continental Europe and the Anglo-American countries. This means one-dimensional explanation is limited in the explanatory power. Different tax codes *per se* do not explain the different levels of capital structure either. We provide a multi-dimensional analysis in section 7. The significant lower leverage for the UK can be due to the risk attitudes of firms and that of the financial system. Also we suspect the firms included in the sample are mostly large firms which have management control. This could have contributed to the lower debt ratios on average.

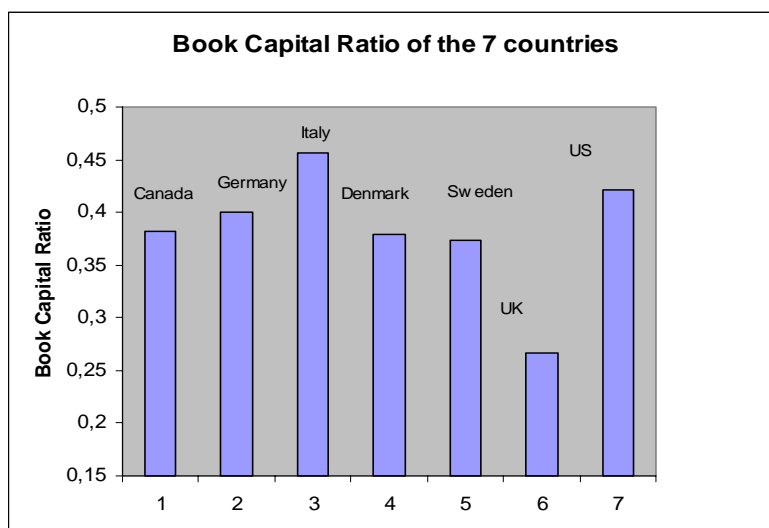
The fact that the samples are biased towards large firms can be said to all the seven countries.

Germany has a large amount of equity-like provisions that enable firms to borrow less. To demonstrate that we provide the balance sheet (averaged across firms) of the seven countries in 1994 in **Table 1** to crosscheck the reliability of the average data across years shown in **Table 2**. The two data sets show remarkable resemblance. **Table 1** shows that the UK (46%) has the highest level of shareholder funds followed by Denmark (41%), Sweden (36.4%) and Canada (34%), the US (28%), Germany (21.1%) and Italy (19%). Consistent with these observations, the countries that have low levels of equity also have high level of other liabilities: Germany (37.9%) and Italy (21%) followed by the US (19%). For example, Germany has a relatively low debt ratio corresponding to the high level of other liabilities.

### Insert Table 1

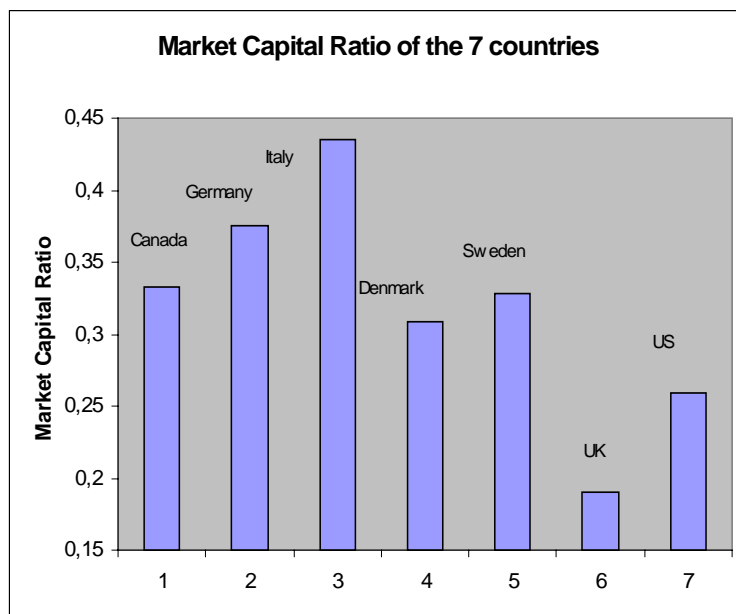
The capital ratios ( $\text{Debt}/(\text{Debt} + \text{Equity})$ ) of the seven countries exhibit a somewhat different pattern with the UK holding its rank, having the lowest capital ratio (see **Figure 2**). The differences in capital ratios and debt ratios are consistent with the differences in the level of other liabilities.

**Figure 2: Book capital ratio of the seven countries**



For the market capital ratio ( $\text{Debt}/(\text{Debt} + \text{Market value of equity})$ ) we find that the US and the UK have the lowest values. Denmark and Sweden are in the middle. Canada, Germany, and Italy have the highest values on Market capital ratio (see **Figure 3**). It could be explained by the fact that the US shares are values higher than other countries in the samples.

**Figure 3: Market Capital Ratio of the 7 countries**



## 6 Empirical Results

Using the GLS method we obtain significant results for book debt ratio (see **Table 3**). The results support our hypotheses of size, tangibility and profitability with respect to leverage in all seven countries. The findings for market-to-book ratio are inconclusive with Canada (0.021) and Italy (0.052) positively related to book debt ratio, Germany (-0.012) and the UK (-0.003) negatively related to book debt ratio. Denmark, Sweden, and the US show insignificant parameter values.

### Insert Table 3

The results also support the hypothesis that the higher the profitability is, the lower the leverage: all seven countries pose negative and significant parameter values that only differ in the magnitude. Denmark (-0.38) and Sweden (-0.23) show negative and significant parameter values, while Germany (-0.06) and the US (-0.04) show negative, significant but lower parameter values. The UK (-0.13), Canada (-0.16), and Italy (-0.10) are in the middle.

The results of tangibility on book debt ratio also support the hypothesis. All the seven countries pose positive and significant parameter values. Denmark (0.49) and Sweden (0.44) show much stronger relations compared to the US (0.23), Germany (0.21), the UK (0.19), Canada (0.17), and Italy (0.12). It shows that the level of tangible assets is more sensitive in determining book leverage in the two Nordic countries than in the other five countries. On average, a one-percentage increase in tangibility results in a bigger increase in the book debt ratio in Denmark and Sweden. This can be due to the fact that Nordic countries have more stringent lending rules w. r. t. collateral requirement.

### Insert Table 4

The results for the book capital ratios are consistent with the results in the book debt ratio model (see **Table 4**). Again, the results between the market-to-book ratio (MBR)

and book capital ratio are not conclusive. Germany (-0.016) and UK (-0.005) have negative and significant values as in the book debt ratio model. Canada (0.013) and Italy (-0.005) become insignificant in book capital ratio model. It appears that the significant values in the book debt ratio model are mainly due to the other liabilities. The result for the US (-0.002), Sweden (-0.0005) and Denmark (-0.00002) remain insignificant as in the book debt ratio model. Since market-to-book ratio represents growth potential in our model, we can conclude that growth potential of a firm does not dictate its level of book leverage.

We cannot conclude that firms with growth potential thus having better access to equity market will indeed issue more equity as the pecking order theory predicts. We expect to find better match in the market leverage model.

The result for market leverage is shown in **Table 5**: the market-to-book ratio turns out negative and significant for six countries but not for Denmark (0.0013). It says by using market value of leverage we find a negative and significant relationship between MBR and market leverage in 6 out of 7 countries. It verifies the hypothesis that the higher the growth potential, the lower the market leverage. The strong results can be due to the high correlation of the two variables.

### **Insert Table 5**

From the quality of the estimation in the three models we can draw the conclusion that the variables proposed by Rajan and Zingales (1995) are important and representative to the characteristics of a firm. Capital structure decisions are endogenous to firms' profitability and tangibility and so on. We have also managed to show that our results are more conclusive compared to Rajan and Zingales (1995; see **Tables 6** and **Table 7**) where they typically obtain different signs for one variable in different countries. The GLS panel methods we use could have contributed to the quality of our analysis. Perhaps the collinearity of the right hand side variables causes problems in their estimations. Other reasons could be attributed to the different types of data we use. As mentioned before, Rajan and Zingales (1995) use data adjusted to accounting



difference. We argue that the debt equity ratio is best studied with unadjusted accounting data. As we have argued that different accounting practice is a response to a country's specific institutional environment such as tax code and bankruptcy code, etc.

### **Insert Table 6 and Table 7**

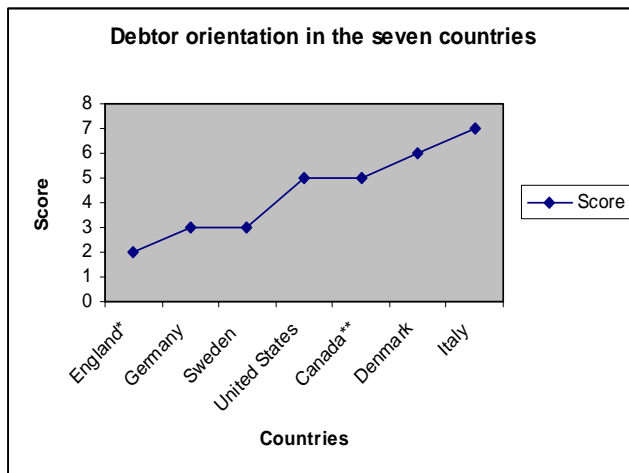
## **7 An Analysis of Institutional Differences**

The models explain the marginal relationships between the explanatory variables to the financial leverage. They nevertheless do not provide an explanation to the seemingly different levels of capital structures of the seven countries. For this purpose we follow the research method adopted in La Porta, et al., (1997): Law and Finance and opt for an institutional approach. The following framework attempts to categorize the country differences using a three-dimensional structure. The three dimensions are the governance type, the bankruptcy code orientation, and the total tax level of the country. As debtor oriented bankruptcy code provides incentives for debtors to renegotiate contracts within bankruptcy proceedings, while creditor oriented bankruptcy code facilitates post-petition lender control and the enforcement of the priority rule and collateral agreements, we expect a positive correlation between debtor orientation and the debt ratio. In this regard, we find that higher book debt ratio coincides with the favorable debtor treatment in bankruptcy codes in the seven countries. However, when using book capital ratio and market capital ratio, the rankings of the countries cannot explain Germany and Sweden, i.e. these two countries have higher than expected market capital ratios (see **Figure 4**). The third institutional variable is the governance type or the control type of a country. We define owner control as insider control. This is mostly associated with the relationship based system; we define management control as outsider control. This is mostly associated with the Anglo-American corporate governance system. Based on findings in literature about managerial incentives under these two systems, we predict insider

control to correspond to a higher borrowing capacity and thus leads to a higher leverage; outsider control corresponds to a lower leverage due to the possible loss of manager's job related human capital in the event of bankruptcy. We differentiate governance type by the level of ownership concentration of a country.

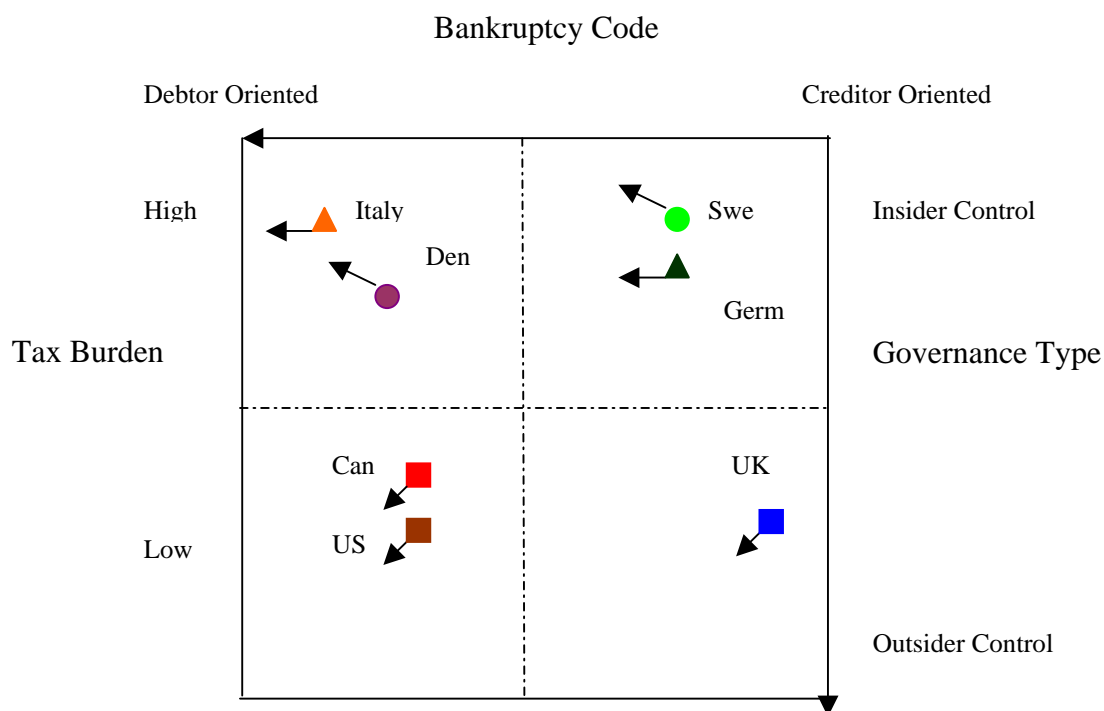
**Figure 4: Creditor/Debtor Orientation in the Corporate Insolvency Law: Based on Wood (1995). Scale: 1=most pro-creditor, 10=most pro-debtor**

\* Debtor orientation only for England. \*\* Except Quebec.



Continental Europe would come out as one group featuring insider control and a higher tax burden as shown in the upper quadrant in **Figure 5**. This group coincides with the French civil law tradition. They differ only in terms of bankruptcy code orientation. Sweden and Germany tend to be more creditor oriented in bankruptcy proceedings than Italy and Denmark. The countries of common law tradition occupy the lower quadrant with the UK in the third quadrant, the US and Canada in the fourth quadrant, featuring lower tax burdens and outsider control governance type as shown in **Figure 5**.

**Figure 5: Institutional differences in the seven countries**



The two major dimensions, i.e. the governance type and the bankruptcy code orientations jointly locate the countries on the three dimensional diagram. The arrows that point to the scale on the left side from low to high show the levels of the tax burden, the third dimension.

The choice of tax rates is somewhat arbitrary. We choose the tax rates that delineate the real tax burden of the firms incorporated in a country. The company tax rate does not adequately show the tax burden of a firm because there are other social security contributions that a firm has to comply with. Rajan and Zingales (1995) use the highest personal marginal tax rate as an indication to the tax burden of a firm. It is based on the belief that management falls into the highest tax brackets. It does not reflect the average tax burden of firms in one country. We choose the total tax revenue as percentage of GDP as the indicator of the tax burden carried by the firms in the seven countries. The rank of tax burden is as follows: In 1995 Denmark

(49.4%) and Sweden (47.6%) have the highest tax burdens, followed by Italy (41.2%), Germany (38.2%), Canada (35.6%), the UK (34.8%), and the US (27.6%). The difference between the highest score and the lowest score is 22.2 percentage points (OECD, 2002). This coincides with the governance type of the countries i.e. owner control corresponds to a higher tax burden. In general Anglo-American governance system corresponds to lower tax burden while relation-based governance system has higher tax burden. Higher tax ratio provides incentive for firms to borrow due to the tax advantage associated with debt financing. The figures suggest that firms in countries with higher tax burdens also have higher levels of borrowing, except Germany where the other liabilities in the balance sheet is a form of long term debt financing.

Bankruptcy codes influence firms' financing decisions. Debtor oriented bankruptcy codes protect debtors and aim at maximizing the defaulter's assets, thus benefiting the unsecured creditors. Creditor oriented bankruptcy codes allow a creditor to protect himself against insolvency by security or set off (Wood, 1995). This indicates that creditor oriented bankruptcy codes discourage borrowing while debtor oriented bankruptcy codes encourage borrowing in general. The resulting ranking of the countries is similar to Rajan and Zingales (1995) who focus on the status of management in the event of bankruptcy and rights of secured creditors. Germany and the UK have most creditor oriented bankruptcy codes. Italy, Denmark and Canada have most debtor oriented bankruptcy code. The US is in the middle. In countries with debtor oriented bankruptcy codes, the management often stays in control in reorganization. However, whether management/debtors staying in control in bankruptcy procedures is not an adequate measure of debtor/creditor orientation. For example, Italian code is highly debtor oriented but debtors are removed from control in the event of bankruptcy. We use measure of debtor orientation from Wood (1995) as shown in **Figure 4**.

Insider controlled firms usually borrow more according to many empirical studies conducted on continental European countries such as Sweden, Italy, Germany, and Denmark (see Holmén, 1998). Outsider controlled firms tend to borrow less,

especially if the bankruptcy code is creditor oriented. The reason is that in the event of bankruptcy, creditor oriented bankruptcy codes offer less leniencies towards debtors, and management is likely to lose firm specific human capital. This has given rise to the low debt ratio of the UK firms. We refer to Rajan and Zingales (1995, Table 7: Salient Features of the Bankruptcy Code in Different Countries), Wihlborg, Gangopadhyay and Hussein (2001), and Wood (1995) for more detailed information on bankruptcy codes orientations. We categorize the US, Canada, Italy and Denmark as debtor oriented while the UK, Germany, and Sweden as creditor oriented. Debtor oriented bankruptcy codes are likely to be associated with more borrowing especially when coupled with insider control. This phenomenon can be found in Italy where debtor orientation score is high, insider control is the governance type and the borrowing level is also relatively high.

According to La Porta, Lopez-de-Silanes and Shleifer (1998), widely held firms in the US, the UK, and Canada are more common. Denmark, Germany, Sweden, and Italy have more family and owner controlled firms using pyramiding structures and differential voting rights as means of control.

In **Figure 5**, Sweden, Denmark, Italy and Germany are categorized as insider controlled system, while the UK, Canada, and the US as outsider controlled system. This pattern explains that countries with insider controlled system have higher debt levels, with Germany being exception for the reason explained before. Debtor oriented countries borrow more but less so if outsider control is the dominating governance type (see **Figure 6**). For example, firms in the US and Canada borrow less compared to firms in Italy due to outsider control in the US. This leaves the UK as the only country with a creditor oriented bankruptcy system and management control as dominating feature, which explains the lower debt level in the UK (also see Rajan and Zingales, 1995).

### **Insert Figure 6 and Figure 7**

Last but not least, the structure of the financial system can have crucial influence on leverage. A bank-based system favors relationship financing and a higher leverage; A

stock market-based system facilitates arms length financing and a lower leverage. The degree of stock market development has implications on the leverages too (see **Table 8**). The size of the stock market capitalization w. r. t the GDP indicates the degree of reliance on outside capital indicated by the size of the stock market. The UK (1.13) and the US (0.8) have the highest scores. Sweden (0.62) and Canada (0.59) are in the middle. Denmark (0.34), Germany (0.24), and Italy (0.17) have lower scores indicating less-developed stock markets. Systematic studies are needed to provide policy suggestions concerning market development and the road towards a convergent bank codes and tax codes in Europe.

**Table 8: Stock Market Capitalization/GDP ratio (1990-1995)**

Country Name	UK	Germany	Sweden	United States	Canada	Denmark	Italy
Market Capitalization/GDP	1.13	0.24	0.62	0.8	0.59	0.34	0.17

Source: World Bank on-line database. Available at [www.worldbank.org](http://www.worldbank.org)

**Insert Figure 8**

## 8 Concluding Remarks

Our study of the listed firms in the seven selected countries provides empirical evidence that the elements that influence capital structure are identical, even though the average debt ratios differ across countries. Borrowing is significantly related to variables such as size, profitability, tangibility, and market-to-book ratio. Country characteristics such as accounting rules and legal environments such as bankruptcy laws and tax code can explain the differences in the levels of leverage. Stringent bankruptcy procedures or creditor oriented bankruptcy code facilitates more equity financing than debt financing. A high level of insider control facilitates a higher debt ratio in consistence with other studies. If the global trend is towards a dispersed ownership and management control, chances are that leverages are going to decrease over time. With the tax codes in Europe converging, and the tax advantage of borrowing decreasing compared to retained earnings especially in Nordic countries as in Denmark and Sweden, borrowing is becoming less attractive.

Moreover, a neutral tax code should not influence firms' choices of financing. A tax code that favors borrowing through tax deduction would bias towards a higher debt ratio. To the extent that financial systems are evolving towards stock market oriented system, we can predict that leverage will decrease over time.

The limitation of the paper lies in the model we choose and the variables we use. Another way to study firms' capital structure is to use variables such as bankruptcy possibilities of firms as measured by Altman's z-score (Altman, 1988). We suspect this will give the same results as we have obtained using proxies. Nevertheless it is a dimension to be explored later. A second point is that capital structure can be studied in a simultaneous equation system as we have explored in a follow-up study.<sup>13</sup>

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<sup>13</sup> See Klaus and Chen, 2004.



## Appendix: Statistics and Empirical Results

**Table 1: Aggregated balance sheet structure of the seven countries (100%)**

	UK 1994	USA 1994	Germany 1994	Sweden 1994	Canada 1994	Italy 1994	Denmark 1994
TOTAL ASSETS*	1	1	1	1	1	1	1
Cash & equivalent	0.072	0.032	0.063	0.051	0.050	0.034	0.085
Debtors	0.165	0.075	0.136	0.1541	0.090	0.136	0.160
CURRENT ASSETS	0.480	0.31	0.489	0.486	<b>0.246</b>	<b>0.475</b>	<b>0.52</b>
Financial Assets	0.024	0.096	0.080	0.098	0.210	0.070	0.065
Tangible Assets	0.482	0.39	0.4068	0.3619	0.480	0.415	0.39
Intangible Assets	0.017	0.08	0.035	0.05	0.053	0.046	0.018
FIXED ASSETS	0.520	0.572	0.521	0.51	<b>0.740</b>	<b>0.530</b>	<b>0.478</b>
Misc. other assets	0.000	0.118	0.000	0.004	<b>0.014</b>	<b>0.000</b>	<b>0.000</b>
Creditors due after 1 yr	0.152	0.250	0.196	0.1649	<b>0.340</b>	<b>0.177</b>	<b>0.195</b>
Long term debt	0.132	0.232	0.1912	0.1646	0.250	0.156	0.188
Creditors due within 1 yr	0.317	0.280	0.214	0.3528	<b>0.230</b>	<b>0.420</b>	0.310
Short term debt	0.051	0.035	0.059	0.095	0.040	0.150	0.080
Trade creditors	0.122	0.058	0.074	0.083	0.077	0.120	0.075
Other liabilities	0.070	0.190	0.379	0.118	<b>0.085</b>	<b>0.210</b>	<b>0.090</b>
SHAREHOLDER FUNDS	0.460	0.280	0.211	0.364	<b>0.340</b>	<b>0.190</b>	<b>0.410</b>
Total liabilities & shareholders' funds	1	1	1	1	1	1	1

\*(1=100%)

**Table 2: Sample statistics (Mean, Standard Deviation, Minimum, Maximum)**

Means	Canada	Germany	Italy	Denmark	Sweden	UK	USA
	(409)	(836)	(666)	(427)	(371)	(689)	(1968)
Book Leverage (TD/TA)	0.2777 0.1655 0.0000 0.8185	0.2191 0.1944 0.0000 1.3429	0.2673 0.1597 0.0000 0.8956	0.2665 0.1583 0.0000 0.6886	0.2530 0.1812 0.0000 0.7109	0.1639 0.1447 0.0000 0.7245	0.2544 0.1401 0.0004 1.6359
Capital Ratio (TD/(TD+SHF))	0.3818 0.2027 0.0000 0.9419	0.4000 0.2850 0.0000 1.0000	0.4561 0.2470 0.0000 0.9974	0.3798 0.2110 0.0000 0.9148	0.3728 0.2410 0.0000 0.8938	0.2663 0.2127 0.0000 0.9918	0.4218 0.2198 0.0001 1.0000
Market Leverage TD/(TD+MCAP)	0.3326 0.2281 0.0000 0.9973	0.3755 0.3025 0.0000 0.9927	0.4356 0.2425 0.0000 0.9798	0.3090 0.2442 0.0000 0.9651	0.3284 0.2546 0.0000 0.9921	0.1907 0.2046 0.0000 0.9855	0.2587 0.1912 0.0002 0.9952
Size	7.2035 1.5473 -2.0715 10.2459	13.0322 1.8966 7.5549 19.5868	13.1914 1.9546 3.6889 23.1185	6.9249 1.5640 2.8007 10.0564	8.4492 1.4376 5.2734 11.9568	11.1070 2.0836 0.0000 16.1550	8.0970 1.3134 1.4670 11.9704
Market-to-Book Ratio ((MCAP+TD)/TA)	1.0605 0.7400 0.0030 8.4767	1.1095 3.3386 0.0007 54.7731	0.7018 0.4178 0.1016 3.8436	2.6839 8.9202 0.2780 102.3854	1.4214 5.2863 0.0440 66.5879	1.7729 5.5314 0.0430 129.3824	1.6547 4.1918 0.0343 94.5016
TANGIBILITY	0.5312 0.2359 0.0006 0.9892	0.3462 0.1795 0.0085 0.9612	0.3131 0.2018 0.0124 0.9335	0.3516 0.1642 0.0000 0.9084	0.3835 0.2060 0.0005 0.9034	0.3690 0.2196 0.0030 0.9599	0.4216 0.2239 0.0011 0.9720
EBITDA	0.1080 0.1393 -1.4678 0.9780	0.1050 0.1672 -1.1557 1.9059	0.1145 0.2361 -0.6426 2.5032	0.1149 0.0831 -0.3399 0.6162	0.1041 0.0714 -0.1218 0.5973	0.1113 0.1704 -2.1888 0.6819	0.2010 0.2722 -0.3332 3.4175

**Table 3: GLS panel results for book leverage (TD/TA) (Estimate, Standard Error, Prob>|T|)**

BL	Canada	Denmark	Germany	Italy	Sweden	UK	USA
INTERCEPT	0.0055	0.0043	0.0064	-0.0075	0.0009	-0.0038	0.0028
	0.0062	0.0052	0.0044	0.0044	0.0050	0.0044	0.0024
YEAR	0.3803	0.3978	0.1534	0.086	0.8537	0.3812	0.2387
	-0.0072***	-0.0071***	0.0059***	-0.0044**	-0.0132***	-0.0039**	-0.0014
Size	0.0020	0.0019	0.0019	0.0019	0.0021	0.0016	0.0008
	0.0004	0.0003	0.0023	0.0189	<0.0001	0.0168	0.1057
MBR	0.0261***	0.0211***	0.0084***	0.0173***	0.0187***	0.0109***	0.0202***
	0.0023	0.0022	0.0011	0.0010	0.0021	0.0011	0.0009
TANGIBILITY	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
	0.0213**	0.0004	-0.0123***	0.052***	-0.0023	-0.0026***	0.0005
EBITDA	0.0086	0.0008	0.0016	0.0106	0.0013	0.0005	0.0007
	0.014	0.6011	<0.0001	<0.0001	0.0722	<0.0001	0.44
R2	0.1658***	0.4856***	0.2058***	0.1189***	0.4409***	0.193***	0.225***
	0.0254	0.0333	0.0258	0.0248	0.0282	0.0225	0.0102
R2-adj	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
	-0.1688***	-0.3818***	-0.06131***	-0.1012***	-0.2317***	-0.1339***	-0.044***
R2	0.0431	0.0577	0.0219	0.0218	0.0597	0.0206	0.0089
	0.0001	<0.0001	0.0054	<0.0001	0.0001	<0.0001	<0.0001
R2-adj	0.5932	0.6924	0.4238	0.6748	0.7270	0.4576	0.7232
R2-adj	0.5881	0.6888	0.4203	0.6723	0.7232	0.4536	0.7225

**Table 4: GLS panel results for book capital ratio (Estimate, Error, Prob>|T|)**

BL	Canada	Denmark	Germany	Italy	Sweden	UK	USA
INTERCEPT	0.0098	0.0073	0.0054	-0.0104	-0.0048	-0.0071	0.004
	0.0086	0.0071	0.0062	0.0062	0.0072	0.0066	0.0044
	0.2538	0.3071	0.3771	0.0939	0.5037	0.283	0.3648
YEAR	-0.0098***	-0.0092***	0.0099***	-0.0064**	-0.0235***	-0.0027	0.002
	0.0026	0.0026	0.0028	0.0027	0.0029	0.0025	0.0016
	0.0003	0.0005	0.0004	0.0177	<0.0001	0.286	0.2175
Size	0.0478***	0.0446***	0.0209***	0.0379***	0.0412***	0.025***	0.0389***
	0.0028	0.0035	0.0016	0.0015	0.0031	0.0017	0.0016
	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
MBR	0.0131	-0.00002	-0.016***	-0.0053	-0.0005	-0.0054***	-0.0024
	0.0113	0.00124	0.0022	0.0155	0.0017	0.001	0.0016
	0.2459	0.9884	<0.0001	0.7310	0.7717	<0.0001	0.1483
TANGIBILITY	0.1144***	0.4404***	0.2674***	0.1122***	0.4676***	0.1196***	0.2372***
	0.0318	0.0403	0.0408	0.0372	0.0374	0.0304	0.0178
	0.0004	<0.0001	<0.0001	0.0026	<0.0001	<0.0001	<0.0001
EBITDA	-0.2639***	-0.6493***	-0.0808**	-0.2183***	-0.4429***	-0.275***	-0.0489***
	0.0565	0.0778	0.0334	0.0318	0.0821	0.0385	0.0153
	<0.0001	<0.0001	0.0159	<0.0001	<0.0001	<0.0001	0.0014
R2	0.6684	0.7012	0.5434	0.7345	0.7414	0.4886	0.6822
R2-adj	0.6643	0.6976	0.5407	0.7325	0.7379	0.4849	0.6814

**Table 5: GLS panel results for market leverage (Estimate, Standard Error, Prob>|T|)**

ML	Canada	Denmark	Germany	Italy	Sweden	UK	USA
INTERCEPT	0.0096	0.00008	-0.0048	-0.0009	-0.0069	0.0011	0.0018
	0.0083	0.007	0.0052	0.0071	0.0082	0.0059	0.0022
	0.2501	0.9913	0.3513	0.8946	0.4021	0.8535	0.406
YEAR	-0.0141***	-0.016***	0.0072***	-0.0066*	-0.0215***	-0.0057***	-0.0048***
	0.0026	0.003	0.0024	0.0028	0.0032	0.002	0.0008
	<0.0001	<0.0001	0.0031	0.0206	<0.0001	0.0045	<0.0001
Size	0.0487***	0.038***	0.0225***	0.0397***	0.0374***	0.0148***	0.0260***
	0.0032	0.0034	0.0017	0.0016	0.0029	0.0013	0.0011
	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
MBR	-0.0632***	0.0013	-0.0059***	-0.1878***	-0.0074***	-0.0073***	-0.021***
	0.0104	0.00143	0.0019	0.0134	0.0018	0.001	0.0021
	<0.0001	0.362	0.0017	<0.0001	<0.0001	<0.0001	<0.0001
TANGIBILITY	0.1881***	0.501***	0.2379***	0.2838***	0.4496***	0.175***	0.195***
	0.0321	0.0503	0.0416	0.038	0.0418	0.0259	0.013
	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001
EBITDA	-0.3447***	-0.744***	-0.1153***	-0.2073***	-0.4297***	-0.346***	-0.056***
	0.0455	0.079	0.0297	0.0290	0.0897	0.032	0.0085
	<0.0001	<0.0001	0.0001	<0.0001	<0.0001	<0.0001	<0.0001
R2	0.5733	0.5666	0.5073	0.6787	0.6474	0.361	0.6306
R2-adj	0.568	0.5614	0.5043	0.6763	0.6426	0.3560	0.6297

**Table 6: Parameter estimations by Rajan and Zingales (1995) for Book Leverage**

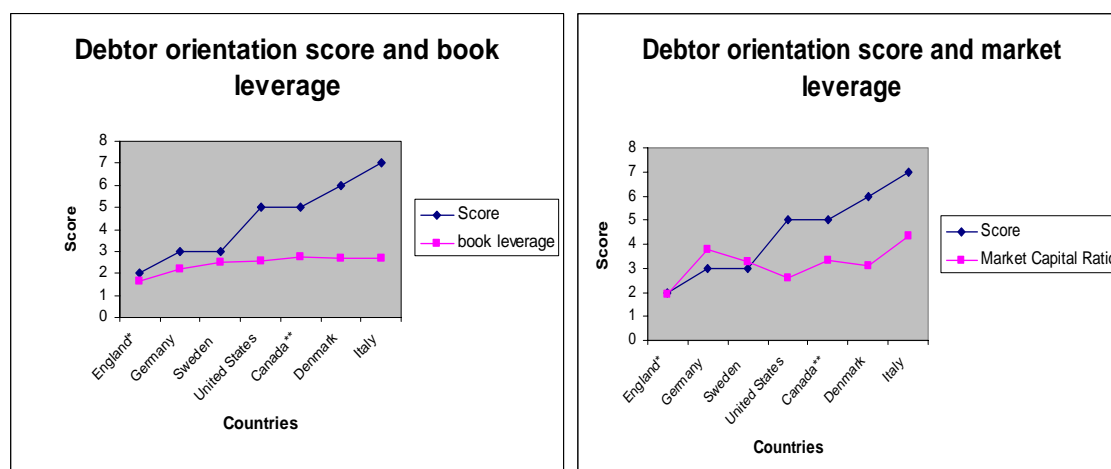
Book leverage	Canada	Germany	Italy	UK	USA
Tangibility	0.26**	0.42**	0.36	0.41***	0.50***
MBR	-0.11***	-0.20**	-0.19	-0.13	-0.17***
Sales	0.08***	-0.07***	0.02	0.026	0.06***
Profitability	-0.46***	-0.15	-0.16	-0.34	-0.41***
N	264	175	96	533	2079

**Table 7: Parameter estimations by Rajan and Zingales (1995) for Market Leverage**

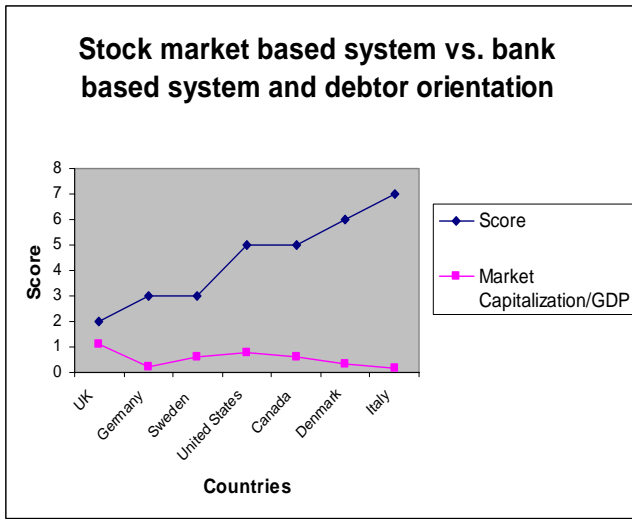
Market leverage	Canada	Germany	Italy	UK	USA
Tangibility	0.11	0.28*	0.48**	0.27***	0.33***
MBR	-0.13***	-0.21***	-0.18*	-0.06**	-0.08***
Sales	0.05***	-0.06***	0.04	0.01	0.03***
Profitability	-0.48***	0.17	-0.95	-0.47**	-0.6***
N	275	176	98	544	2207

**Figure 6: Debtor orientation and leverage (TD/TA and market capital ratio) for the seven countries.**

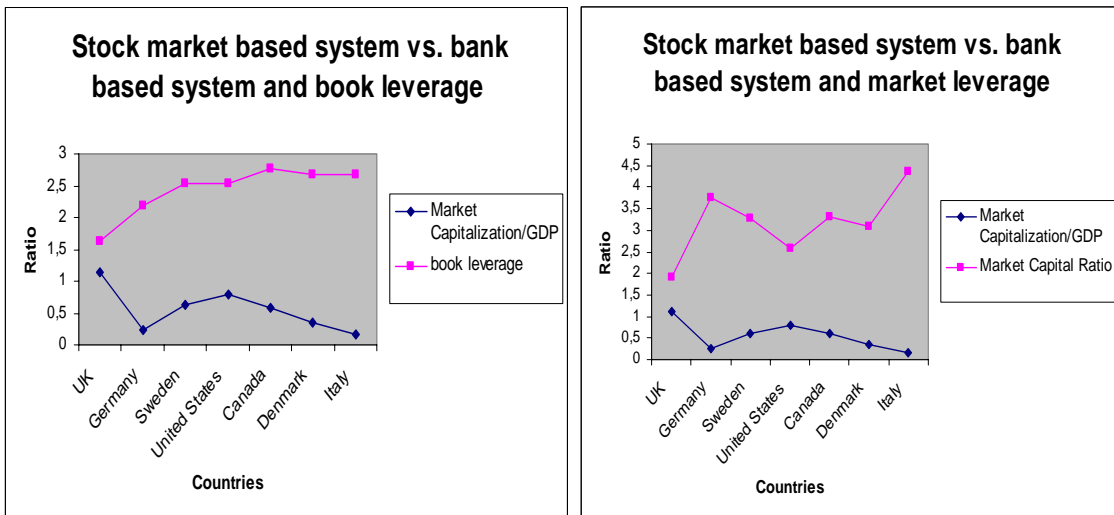
\* Debtor orientation only for England. \*\* Except Quebec.



**Figure 7: Stock market based system vs. bank based system and debtor orientation for the seven countries.**



**Figure 8: Stock market based system vs. bank based system and leverage (TD/TA and market capital ratio) for the seven countries.**



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