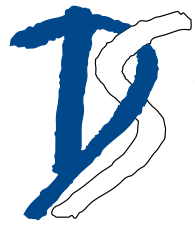

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Corporate Governance, Private Property and Investment

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To my parents,
for life-long and continuing
support and encouragement

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Jönköping, June 28, 2008

Johan Eklund

Abstract

Corporations have become the dominant organizational form in modern market economies, managing vast resources. Corporations are however associated with a number of governance problems. This dissertation deals with these corporate governance issues from an investment perspective. The dissertation comprises one introductory chapter and five, from each other independent, essays. These essays can be read independently, but are kept together by a corporate governance and investment theme. The essays mainly contribute to the empirical literature on corporate governance and investment behavior. In chapter 2 a measure of capital allocation, based on the acceleration principle, is estimated across 44 countries. Capital allocation is compared to ownership concentration and indicators of corporate governance. Support for the so-called economic entrenchment hypothesis is found, whereas the legal origin hypothesis is rejected. Chapters 3, 4 and 5 look at corporate governance and investment in Scandinavia, and Sweden in particular. Chapters 3 and 4 look into how ownership concentration affects firm investment performance. Performance is measured with marginal q. How dual-class shares affect this ownership-performance relationship is examined. Dual-class shares are, in chapter 4, found to reduce the so-called incentive effect and enhance the so-called entrenchment effect. The role of profit retentions for investment is examined in chapter 5. Scandinavian firms are found to rely on earning retentions to a higher degree than firms in other countries. Chapter 6 contains an analysis of how the quality of property rights and investor protection affect the cost of capital.

Content

CHAPTER 1
Introduction and Summary of the Thesis

1 Introduction

Corporations have become the dominant organizational form in modern market economies. Corporations are, however, associated with a number of governance problems. This dissertation deals with these corporate governance issues from an investment perspective. The dissertation is comprised of one introductory chapter and five, from each other independent, essays. These essays can be read independently, but are kept together by a corporate governance and investment theme.

This first chapter serves as an introduction to the literature on corporate governance, investment and capital accumulation. The next section provides a brief discussion of the different views of the corporation held by economists, and how these views may have influenced corporate governance. This discussion serves as a background to chapter 3, 4 and 5 in particular. In section 3, capital accumulation and investment theories are discussed. Neoclassical investment theory, accelerator theory and the so-called *Q*-theory of investment is derived from the profit function of the firm. These investment theories form the basis for the analysis in the following chapters. Particular emphasis is put on the measurement of Tobin's average *Q* and measurement of marginal *q*. This chapter ends with a summary of the remaining chapters and an overview of the main contributions of the thesis.

In chapter 2 a measure of capital allocation, based on the acceleration principle, is estimated across 44 countries. Capital allocation is compared to ownership concentration and indicators of corporate governance. Support for the economic entrenchment hypothesis is found, whereas the legal origin hypothesis is rejected. Chapters 3, 4 and 5 look at corporate governance and investment in Scandinavia, and Sweden in particular. Chapter 3 and 4 look into how ownership concentration affects firm investment performance. Investment performance is measured with marginal *q*. How dual-class shares affect this ownership-performance relationship is examined. Dual-class shares are, in chapter 4, found to reduce the incentive effect and enhance the entrenchment effect. The role of profit retentions for investment is examined in chapter 5. Scandinavian firms are found to rely on earning retentions to a higher degree

than firms in other countries. Chapter 6 contains an analysis of how the quality of property rights and investor protection affect the cost of capital. Weak protection of property is found to increase the cost of capital.

2 Corporate governance, private property and investment

Berle and Means' (1932) influential book, *The Modern Corporation and Private Property,* describes how listed American corporations in the beginning of the 20th century were increasingly being managed by professional managers, unaccountable to the shareholders[1]. Berle and Means fixed the picture of the publicly listed corporation as owned by a large number of shareholders, each individually having weak incentives to monitor managers (see Hessen, 1983). The separation of ownership and control create a wide array of agency and information problems that must be overcome in order for capital to be allocated efficiently. The investment behavior expected at firm level changes once firms become listed and ownership is separated from control. These insights have led to the emergence of so-called managerial theories of the firm[2] and a corporate governance[3] literature (i.e. Mueller, 2003 and 2008, Shleifer and Vishny, 1997,

[1] The fact that Berle and Means' (1932) book was published at the height of the Great Depression is likely to have contributed to the influence of the book. Mueller (2008) points out that most of the issues advanced by Berle and Means were in fact well known at the time of publication. In fact both Adam Smith (1776) and John S. Mill (1885) express concerns over the *"vigilance and attention"* of hired managers as compared to those having a personal interest in the success of the firm (see Mueller, 2008).

[2] Jensen and Meckling (1976) characterize most organizations as: *"legal fictions which serve as a nexus for a set of contracting relationships among individuals."* The corporation is merely one specific organizational form of: *"(…) legal fiction which serves as a nexus for contraction relationships and which also is characterized by the existence of divisible residual claims on the assets and cash flows of the organization which can generally be sold without permission of the other contraction individuals."* (Jensen and Meckling, 1976, p. 321). See also Fama (1980) and Alchian and Demsetz (1972) who recognized that the firm can be viewed as a set of contracts between the production factors.

[3] There are a number of definitions of corporate governance in the literature. OECD's (1999) definition is that: *"Corporate governance is the system by which business corporations are directed and controlled. The corporate governance structure specifies the distribution of rights and responsibilities among different participants in the corporation, such as, the board, mangers, shareholders and other stakeholders, and spells out the rules and procedures for making decisions in corporate affairs. By doing this, it also provides the structure through which the company objectives are set, and the means of attaining those objectives and monitoring performance."* See also Shleifer and Vishny (1997) who define corporate governance as: *"(…) the way in which suppliers of finance to corporations assure themselves of getting a return on their investment."*

and Tirole, 2001). Given asymmetric information in capital markets, managerial theories of the firm are based on the insight, that managers have the scope to cater to other objectives than profit maximization[4]. The extent to which managers can deviate from shareholder value maximization will depend on how well their interests are aligned with that of the shareholders. Jensen and Meckling's (1976) analysis suggests that this depends on the ownership claims of managers since deviations from profit/shareholder value maximization will affect the wealth of owner-managers. This positive relationship between managerial ownership and investment performance is usually referred to as the *incentive effect*. Concentrated managerial ownership may however come at a cost. Stulz (1988) has pointed out that with concentrated ownership comes the ability to extract value from the firm, at the expense of minority shareholders. This is referred to as the *managerial entrenchment effect* (or simply the *entrenchment effect*). (These effects are examined in chapter 3 and 4).

A key corporate governance issue is therefore how to best overcome agency problems and align managerial and shareholder objectives. Across the world very different institutional solutions have emerged to deal with corporate governance problems (see Morck and Steier, 2005, for a review of the global history). More recent studies also reveal that the Berle and Means' (1932) type of diffuse corporate capitalism is not the type of corporate ownership structure found in most countries. Instead, a rich variety of governance mechanisms and institutions can be found across the world[5]. American corporate capitalism, with its dispersed ownership as Berle and Means (1932) describe it, is merely one out of many possible forms of capitalism (Morck, et al., 2005). Outside of the United States even large companies have controlling shareholders, often accompanied by poor investor protection (La Porta et al., 1999). In most countries wealthy families are in control of nearly all large corporations, for overviews see Morck et al. (2005) and Morck and Steier (2005). Faccio and Lang (2002) examine about 5000 companies in 13 European countries and find that about 44 percent of all firms are controlled by families and about 37 percent are widely held. Shleifer and Vishny (1997 and 1986) suggest that ownership concentration in fact is a way of offsetting poor investor protection and weak private property rights. (The tradeoff between ownership concentration and protection of investors is discussed more in chapter 2). In many countries controlling owners maintain or leverage their control over the company through the use of so-called control enhancing mechanisms (CEM's). The most common control mechanisms are vote-differentiation of shares,

[4]The objective of profit or shareholder value maximization is mostly taken as given in the governance literature. For a recent popular critique of the corporate form and shareholder value primacy see, for example, Bakan (2004). In defense of shareholder value maximization see, for example, Friedman (1979).

[5] There is a long standing controversy over which governance system is the most efficient. See, for example, Roe (1993), Denis and McConnell (2003), Henrekson and Jakobsson (2003) and Kitschelt, et al. (1999).

pyramidal ownership structures and cross holdings. All these control enhancing mechanisms allow for a separation of control in terms of voting rights and the nominal ownership in terms of cash flow rights. By separating control from cash flow rights the ability of the controlling shareholder to control is enhanced, but at the same time the incentives are altered. These control enhancing mechanisms give the controlling owners the ability to extract value at the expense of other shareholders. CEM's, and dual-class shares in particular, are examined in chapter 3 and 4.

Morck et al. (2005) argue that highly concentrated ownership, where a few families control most of the corporate sector, in combination with weak property rights and investor protection may lead to *economic entrenchment*. Morck et al. (2005) define *economic entrenchment* as the macroeconomic counterpart to *managerial entrenchment*. The literature on economic entrenchment and the links between ownership concentration and private property rights is discussed further in chapter 2. How the quality of property right affect the cost of capital is discussed and empirically examined in chapter 6.

3 The perfect market vs. market regulations

The corporation has, as an institution, been enormously successful. Nonetheless, observers strongly disagree over the relative merits of the corporate form. Some argue that it is deeply flawed while others regard the corporation as an efficient organizational form. Much of the differences can be reduced to whether production is best organized by the market or if it is best understood as a planning problem. These opposing views of the corporation lead to different conclusions regarding corporate ownership and control. Reducing the production process to a planning problem eliminates the role of the entrepreneur, and new firm formation is not regarded as necessary for economic development. Instead, the market needs to be regulated in order to achieve an efficient outcome.

Ludwig von Mises (1932), a contemporary of Berle and Means, emphasizes the importance of managers having a personal interest in the corporation so that their objective coincides with that of the owners. Moreover, he rejects the idea that corporations could be adequately run by 'bureaucrats' (planners) without profit motive. Mises (1932) argues that:

> *"Success has always been attained only by those companies whose directors have predominant personal interest in the prosperity of the company. The vital force and the effectiveness of the joint stock company lie in a partnership between the company's real managers – who generally have power to dispose over part, if not the majority, of the share-capital – and the other shareholders. Only where these directors have the same interest in the*

prosperity of the undertaking as every owner, only where their interests coincide with shareholder's interests, is the business carried on in the interests of the joint stock company.

(…) Socialistic-etatistic theory will of course not admit this. It endeavors to force the joint stock company into a legal form in which it must languish. It refuses to see in those who guide the company anything except officials, for the etatist wants to think of the whole world as inhabited only by officials. It is allied with the organized employees and workers in their resentment-ridden fight against high sums paid to the management, believing that the profits of the business arise of themselves and are reduced by whatever is paid to the men in charge."

(von Mises, 1932, p. 210)

Along the same line, Friedrich A. von Hayek believed that:

"The existence of a multiplicity of opportunities for employment ultimately depends on the existence of independent individual who can take the initiative in the continuous process of reforming and redirecting organizations. It might at first seem that multiplicity of opportunities could also be provided by numerous corporations run by salaried managers and owned by large numbers of shareholders and that men of substantial property would therefore be superfluous. But though corporations of this sort may be suited to well-established industries, it is very unlikely that competitive conditions could be maintained, or an ossification of the whole corporate structure be prevented, without the launching of new organizations for fresh ventures, where the propertied individual able to bear risk is still irreplaceable."

(Hayek, 1960, p. 108-109)

Common for Mises and Hayek is the emphasis they put on the incentives of managers, and one can also get an inkling of the importance they put on the profit motive for economic progress. Their views, however, stand in sharp contrast to the views of Thorstein Veblen and John Kenneth Galbraith, to mention two other influential economists. In *The Engineers and the Price System*, Veblen (1921) argues that the separation of ownership and control would lead to the control being turned over from "monopoly" seeking owners/businessmen to growth and efficiency seeking management[6]. Veblen (1921) believed that if:

"(…) industry were completely organized as a systemic whole, and were then managed by competent technicians with an eye single to maximum production of goods and services; instead of, as now, being manhandled by

[6] See also Veblen (1923)

> *ignorant business men with an eye single to maximum profits; the resulting output of goods and services would doubtless exceed the current output by several hundred per cent."*
>
> *(Veblen, 1921, p. 75)*

Similar ideas are reflected in the works of Galbraith, perhaps most notably, in *The New Industrial State* (Galbraith, 1967). Many economists, in particular during the first half of the 20th, believed that modern industrial production would eventually become dominated by a few very large corporations. For example, in *Capitalism, Socialism and Democracy,* Joseph A. Schumpeter (1942) predicted that socialism would replace capitalism. However, in contrast to Karl Marx, Schumpeter believed that it was the superior performance of capitalism that would lead to socialism. These ideas contributed to shape the political visions in many countries, and led to industrial policies supporting large scale rational industrial production (see Stanislaw and Yergin (1998), and Henrekson and Jakobsson (2001) for a discussion of Schumpeter and the Swedish corporate governance model). Galbraith (1967) did not view modern industrial production as characterized by competitive forces, but rather by planning. Like Veblen, Galbraith believed that managers in the so-called "techno-structure", in contrast to profit maximizing entrepreneurs, will aim at firm growth and adopt values that are in line with those held by the society in large. The goal of industrial policy should therefore aim at expansion of output so that economies of scale could be fully exploited; profits should be reinvested, not paid out as dividends. Small firms were considered immaterial for economic development and the role of the entrepreneur was regarded equally unimportant[7].

The contrasting views, here represented by von Mises and Hayek on the one hand and Veblen and Galbraith on the other, lead to very different conclusions as to which corporate governance system to adopt. Ernst Wigforss, one of the leading Swedish social democratic ideologists and Minister of Finance, argued that large industrial corporations should become "social enterprises without owners", Wigforss (1952 and 1956)[8]. Wigforss' view, according to Henrekson and Jakobsson meant that in:

> *"(…) such enterprises individuals could still be shareholders, but the shareholders would no longer be residual claimants. Moreover, wages should be set in wage negotiations, dividends should be tied to the level of interest rate in capital markets and all 'excess profits' should remain within the companies."*
>
> *(Henrekson and Jakobsson, 2003, p. 76)*

[7] Here it is also worth noting that Alfred Marshall (1923) was concerned that the managerial led corporation instead would result in an *"excessive enlargement of scope"*. (Marshall, 1923, as quoted in Mueller, 2008).

[8] At that time these views were shared by the leading labor organization and the Social Democratic Party (see Henrekson and Jakobsson, 2003, and Högfeldt, 2004).

Some of the corporate governance mechanisms put into place in the Scandinavian countries can be understood from this perspective. For example, allowing for the use of control enhancing mechanism, such as dual-class shares, may be regarded as a form of "semi-planning" since these mechanisms allow for controlling owners without commensurate pecuniary interests. Chapter 3 and 4 show that firms using dual-class shares tend to over-invest, thus, retaining profits rather than paying out dividends. In line with these results, chapter five reports results showing that Scandinavian firms rely on retentions to a higher extent than firms in other countries.

Despite these controversies, the corporation still, after two centuries, still remains an economic enigma (Mueller, 2008). What is clear is that the corporation, as Berle and Means put it:

> *"(…) has divided ownership into nominal ownership and the power formally joined to it. Thereby the corporation has changed the nature of profit-seeking enterprise."*
>
> *(Berle and Means, 1932, p. 7).*

Arguably, the alluring profits are the driving force in competitive market economies and provide a fundamental, though not the only, motive for entrepreneurs. However, in the managerial led enterprise, it can no longer be expected that the profit motive is as strong as in the owner/entrepreneurial led firm[9]. A key question is therefore how the corporation, by its separation of ownership and control, alters investment behavior.

4 Theories of investment[10]

John M. Keynes and Irving Fisher, both argued that investments are made until the present value of expected future revenues, at the margin, is equal to the opportunity cost of capital. This means that investments are made until the net present value is equal to zero. An investment is expected to generate a stream of future cash flows, $C(t)$. Since investment, I, represents an outlay at time 0, this can be expressed as a negative cash flow, $-C_0$. The net present value can then be written as:

[9] A comprehensive discussion of profits and the profit motive in economic theory is beyond the scope of the dissertation. For a discussion of profits, the entrepreneur, uncertainty and equilibrium, see Blaug (1997) and Mueller (1976).

[10] This section is intended to give a brief introduction to the investment theories applied in later chapters, and is not intended as a general overview of theories of investment. Investment theories such as putty-clay models and real-option theories (i.e. Hubbard, 1994) are beyond the scope of this dissertation.

$$NPV = -C_0 + \int_0^{\infty} C(t)e^{(g-r)t}dt \qquad (1)$$

where *g* denotes growth rate and *r* the opportunity cost of capital (discount rate). As long as the expected return on investment, *i*, is above the opportunity cost of capital, *r*, investment will be worthwhile. When $r = i$ the $NPV = 0$. The return on investment, *i*, is equivalent to Keynes' *marginal efficiency of capital* and Fisher's *internal rate of return*. From equation (1) the *PV* of an investment, *I*, can be written as $C_1/(r-g)$, implying that $PV/I = 1$.

Fisher referred to the discount rate as the *rate of return over costs* or the *internal rate of return*. Keynes, on the other hand, called it the *marginal efficiency of capital*, (Baddeley, 2003, and Alchian, 1955). Keynes (1936) argued that investments are made until *"there is no longer any class of capital assets of which the marginal efficiency exceeds the current rate of interest"* (as quoted in Baddeley, 2003, p. 34). The fundamental difference between the "Keynesian view" and Fisher ("Hayekian view") lies in the perception of risk and uncertainty, and how expectations are formed. Keynes did not regard investment as an adjustment process toward equilibrium. Hayek (1941) and Fisher (1930), on the other hand, regarded investment as an optimal adjustment path towards an optimal capital stock. In the Keynesian theory investment are not determined by some underlying optimal capital stock.[11] Instead genuine or *radical* uncertainty takes a central position. Keynes believed that humans were *"animal spirited"* and that this, combined with irrational and volatile expectations, made the thought of investment as an adjustment process toward equilibrium futile.

From Keynes and Fisher modern investment theories have emerged, incorporating various aspects of Keynes and Fisher. The net present value rule for investment has become a standard component of corporate finance. Jorgenson's (1963) neoclassical theory of investment basically formalizes ideas put forward by Fisher. Keynes' work on subjective probabilities foreshadowed modern probabilistic approaches, such as Markowitz (1952), which has led to the emergence of a very large literature on portfolio choice. Arguably, Keynes has also influenced the so-called accelerator theory of investment, known for its applications to business cycles by Samuelsson (1939a and b). Clearly, Keynes also inspired Tobin and Brainard in their development of Tobin's *Q* (Brainard

[11] Keynes (1936) and many economists after him argue that the crucial issue is how individuals form expectations. In a world of "Knightsian" uncertainty probabilities of alternative outcomes cannot be calculated. According to some economists this leads to erratic shifts in expectations which render the notion of an optimal capital stock meaningless. For a discussion of expectations, the efficient market hypothesis, and its implications for investment theory, see section 4.4 and in particular note 21.

and Tobin, 1968, and Tobin, 1969) to incorporate expectations. The methodology to measure marginal *q* developed by Mueller and Reardon (1993) also belongs to this line of thought. All these approaches to investment are applied in this dissertation. The accelerator principle is applied in chapter 2 and to some extent also in chapter 5. Chapters 3, 4 and 5 rely heavily on the *Q*-theory of investment; in particular marginal *q*. Chapter 6 applies a capital asset pricing approach, which is a development from Markowitz (1952).

4.1 Neoclassical theory of investment

In this section we derive the relationship between the *neoclassical theory*, *accelerator principle* and *Tobin's Q-theory* of investment. All three theories assume optimization behavior on behalf of the decision maker (investor). The *neoclassical* and *Tobin's* theory of investment explicitly assumes profit/value maximization. The *accelerator* theory of investment assumes this implicitly, by assuming that investment is determined by an optimal capital stock.

The starting point for Jorgenson's (1963, 1967 and 1971) neoclassical investment theory is the optimization problem of a firm. Maximizing profits in each period will yield an optimal capital stock. Assuming that the production function can be written as a conventional Cobb-Douglas function[12]:

$$Y(t) = f\big(K(t), L(t)\big) = AK^{\alpha}L^{1-\alpha} \tag{2}$$

where $Y(t)$ is firm output, K is capital and L denotes labor, all in period t. The profit function for a representative firm can then be expressed as follows:

$$\pi(t) = p(t)Y(t) - s(t)I(t) - w(t)L(t) \tag{3}$$

$\pi(t)$ denotes profit, $p(t)$ is the price of output, $s(t)$ is the price of capital and $w(t)$ is the wage. Assuming profit maximization, the current value of a firm, V(0), can be written as:

[12] This assumes so-called putty-putty technology which means that the substitutability between capital and labor is complete. For a discussion on these so-called of putty-clay and clay-clay models where the substation between the production factors are allowed to vary between zero and one, see Baddeley (2003) and Precious (1987).

$$V(0) = \quad E_{\Phi_0} \int_0^{\infty} \pi(t) e^{-rt} dt =$$
$$E_{\Phi_0} \int_0^{\infty} \left[p(t)Y(t) - s(t)I(t) - w(t)L(t) \right] e^{-rt} dt \tag{4}$$

s.t. $dK / dt = I(t) - \delta K(t) = \dot{K}(t)$
and $K(0)$ is given.

The term E is an expectations operator conditional on the information set, Φ, available for the firm in each period. We leave this aside for now and return to the role of expectations and the efficient market assumption in section 4.4. To avoid clutter and simplify, the time notations are dropped from now on.

To maximize $V(0)$ the first step is to set up a Lagrangian:

$$L = V(0) + \int_0^{\infty} \lambda \left[(I - \delta K) - \dot{K} \right] e^{-rt} dt \tag{5}$$

which gives:

$$L = \int_0^{\infty} \left[pY - sI - wL + \lambda (I - \delta K) - \lambda \dot{K} \right] e^{-rt} dt \tag{6}$$

From this we obtain the familiar *current value* Hamiltonian[13]:

$$H = pf(K, L) - sI - wL + \lambda (I - \delta K) \tag{7}$$

where the Lagrangian multiplier $\lambda(t)$ is our costate variable. It should be noted that $\lambda(t)$ represents the shadow price of capital. Differentiating the Hamiltonian, we obtain the following first order conditions:

$$\frac{\partial H}{\partial I} = -s + \lambda = 0 \tag{8}$$

[13] For more details on dynamic optimization and the Hamiltonian, see Intriligator (1971) and Chiang (2000).

This condition holds that the opportunity cost of capital shall be equal to the shadow price of capital.

$$\frac{\partial H}{\partial L} = pf_L' - w = 0 \tag{9}$$

This condition simply says that the labor should be employed until the marginal revenue of labor equates with the wage. Recalling the maximum principle (Intriligator, 1971) we get:

$$\frac{\partial H}{\partial \lambda} = \frac{\partial K}{\partial t} = I - \delta K = 0 \tag{10}$$

which says that in equilibrium net investment should be zero and gross investment equal to the depreciation of *K*. Finally, the marginal condition for capital is:

$$\frac{\partial H}{\partial K} = pf_K' - \lambda\delta = 0 \tag{11}$$

The *canononical* equation (Intriligator, 1971) requires that $\dot{y} = -\partial H/\partial K$, where *y* is the control variable such that $y = \lambda e^{-rt}$ at time *t*. Thus:

$$-\frac{\partial H}{\partial K} = \frac{d}{dt}\left[e^{-rt}\lambda(t)\right] = \frac{\partial \lambda}{\partial t} - r\lambda \tag{12}$$

This means that equation (11) can be written as:

$$-pf_K' + \lambda\delta = \frac{\partial \lambda}{\partial t} - r\lambda \tag{13}$$

From equation (8) we know that $s = \lambda$, which implies that $\partial s/\partial t = \partial \lambda/\partial t$. This also means that $\partial H/\partial K$ can be stated in the following way:

$$pf_K' + s\delta = \frac{\partial s}{\partial t} - rs \tag{14}$$

Rearranging this we obtain:

$$pf'_K = s\left[\delta + r - (\partial s/\partial t)/s\right] \tag{15}$$

Since pf'_K is the marginal rate of return on capital, mrr_k, equation (11) can be rewritten as the marginal product of capital:

$$f'_K = s\left[\delta + r - (\partial s/\partial t)/s\right]/p \tag{16}$$

Note that $f'_K = \partial Y/\partial K$. Jorgenson's (1963) user cost of capital, c, is defined as: $s\left[\delta + r - (\partial s/\partial t)/s\right]$, which means that:

$$pf'_K = c \tag{17}$$

This can now be used to derive the optimal capital stock, K^*, and the investment function. Using Cobb-Douglas technology the marginal product of capital becomes:

$$\frac{\partial Y}{\partial K} = f'_K = \alpha K^{\alpha-1} L^{1-\alpha} \tag{18}$$

which in turn can be expressed as:

$$\frac{\partial Y}{\partial K} = \frac{\alpha Y}{K} \tag{19}$$

Multiplying by p_t and recalling equation (17) we get:

$$\frac{\partial H}{\partial K} = p\frac{\alpha Y}{K} = c \tag{20}$$

Solving for K we obtain an expression for the optimal capital stock:

$$K^* = \frac{p\alpha Y}{c} \tag{21}$$

It is now easy to see that K^* depends on output, price of output and the user cost of capital, *c*. Thus, investment become the change in capital between two periods:

$$I = \frac{p\alpha Y}{c} - K^*(t-\tau) \tag{22}$$

Note, that this assumes that $K(t)$ adjusts instantaneously and fully to $K^*(t)$. Assuming that the adjustment to the optimal capital stock is only partial each period this can be incorporated into equation (22) by introducing an adjustment parameter that depends on the difference between actual and desired capital, see e.g. Mueller (2003). Since the neoclassical theory assumes that the capital adjusts immediately and completely to the desired capital stock the investment function is essentially eliminated[14]. It has therefore been suggested that Jorgenson's theory is in fact a capital theory and not an investment theory.

4.2 Accelerator theory

The accelerator approach is often associated with a Keynesian approach which is primarily due to its assumption of fixed prices[15]. The acceleration principle was however first suggested by Clark (1917) and is well known for its applications by Samuelsson (1939a and b) to business cycles. The accelerator is, in fact, merely a special case of the neoclassical theory of investment where the price variables have been reduced to constants. If the price of output is assumed to be constant and the price variables *s* and *r* in Jorgenson's (1963) user cost of capital, $\left(c = s\left[\delta + r - (\partial s/\partial t)/s\right]\right)$, are fixed, equation (21) reduces to following:

$$K^* = \alpha Y \tag{23}$$

[14] Investments are only defined as a flow over time; in this case it means that investments are the flow between t-τ and t.

[15] Assuming fixed prices means that the factor substitution elasticity becomes zero, whereas in Jorgenson's neoclassical theory the factor substitution elasticity is one. This issue is addressed in so-called putty-clay models where in the short run the elasticity is zero, but in the long run the elasticity is one. These models are beyond the scope of this dissertation.

This is simply the well-known accelerator principle where the desired capital stock is assumed to be proportional to output. Investment in any period will therefore depend on the growth in output:

$$I = \alpha \dot{Y} \tag{24}$$

Given flexible prices and partial adjustment toward the desired capital stock each period investment depend on prices of output and input and interest rates (cost of capital). Vernon Smith (1961) demonstrates what he calls the: *"logical inseparability" of 'marginal efficiency' and the 'accelerator' determinant of investment expenditures".* Smith (1961) used calculus of variation to derive his results[16].

Again, this version of the accelerator assumes a complete and instantaneous adjustment of the capital stock. An alternative is the so-called flexible accelerator that includes lags in the capital stock. Eisner and Strotz (1963) suggest that these lags are because the unit price of capital, $s(t)$, increases with the adjustment speed, (see also Lucas, 1967). Allowing for lags in the adjustment of the capital stock, however, make the neoclassical theory virtually indistinguishable from the accelerator theory (see Eisner and Strotz, 1963, and Eisner and Nadiri, 1968)[17].

Furthermore, it is worthwhile to note that even though the accelerator principle is often coupled with a Keynesian approach, Keynes himself, as noted above, was very skeptical towards approaches like this. First, Keynes was very critical towards formal models of economic behavior. Second, and more fundamentally, Keynes did not believe that investment is determined as adjustment towards equilibrium[18].

4.3 Q-theory of investment

There are two fundamental problems with both the accelerator theory and the neoclassical theory of investment. First, by implication, both theories hold that $K_t^* = K_t$ in each period meaning that the adjustment of the capital stock, to its desired level, is instantaneous and complete each period. The solution to this is to add an adjustment cost function to the optimization problem, (see Gould, 1968, Lucas 1967 and Treadway, 1969). The second problem is that

[16] It should be noted that Smith (1961) derived this relationship prior to Jorgenson (1963).

[17] The error terms will also become autocorrelated.

[18] If expectations are volatile and humans "animal spirited" this leads to constant shifts in the Keynesian investment demand schedule, which makes the notion of investments as determined by an desired capital stock meaningless since the desired stock of capital keeps shifting before equilibrium is reached.

expectations play no role in the neoclassical and accelerator theories. A solution to this problem was offered by Brainard and Tobin (1968) and Tobin (1969): investment is made until the market value of assets is equal to the replacement cost of assets. Furthermore, by adding a marginal adjustment cost function to the profit function the neoclassical theory becomes logically equivalent to the *Q*-theory. The *Q*-theory of investment as suggested by Brainard and Tobin (1968) and Tobin (1969) was, in some ways, foreshadowed by Keynes (1936). Keynes (1936), for example, argued that stock markets will provide guidance to investors and that: *"There is no sense in building up new enterprise at a cost greater than at which an existing one can be purchased,"* (Keynes, 1936, as quoted in Baddeley, 2003, p. 39).

Adding an adjustment cost function to the profit function, the firm value (equation (4)) can be written as:

$$\begin{aligned} V(0) = & \quad E_{\Phi_0} \int_0^\infty \pi(t) e^{-rt} dt \\ = E_{\Phi_0} & \int_0^\infty \left[p(t)Y(t) - s(t)I(t) - \vartheta(I(t))s(t)I(t) - w(t)L(t) \right] e^{-rt} dt \end{aligned} \tag{25}$$

where $\vartheta(I(t))$ is the marginal adjustment cost function. Setting up the Hamiltonian and differentiating yield the same marginal conditions for *K*, *L*, and λ as before. *Mutatis mutandis*, the *current value* Hamiltonian is written as:

$$H = pf(K,L) - sI - \vartheta(I)sI - wL + \lambda(I - \delta K) \tag{26}$$

As can be easily seen the marginal conditions are all the same as under neoclassical theory with the exception for investment. This condition now reflects the adjustment cost:

$$\frac{\partial H}{\partial I} = -s - \vartheta(I)s - \vartheta'(I)sI + \lambda = 0 \tag{27}$$

This can be written:

$$\lambda = s\left[\vartheta(I) + \vartheta'(I)I + 1)\right] \tag{28}$$

Since λ is the shadow price of capital and *s* is the cost of one additional unit of capital the quotient λ/s is, in other words, the marginal return on capital relative

to the cost of capital. Therefore, dividing by s and defining marginal q as $q_m = \lambda/s$, equation (27) can be written as:

$$q_m = \vartheta(I) + \vartheta'(I)I + 1 \tag{29}$$

This allows us to define investment as an implicit function of q_m:

$$I = \varphi(q_m) \tag{30}$$

Differentiating with respect to capital and investment yields a differential equations system.[19] Solving for the optimal capital stock will give the same optimum as under neoclassical theory of investment. The difference is that investment is determined as the optimal adjusted path to the optimal capital stock. In short, the *Q*-theory incorporates all the assumption of the neoclassical theory of investments but puts a restriction on the speed of capital stock adjustment by adding an adjustment cost function. Solving for the optimal capital stock under *Q*-theory of investment will yield the same optimal capital stock as the neoclassical. More interestingly, investment is worthwhile as long as $\lambda/s = q_m > 1$. When $q_m = 1$ there are no more profitable investment opportunities and $K_t = K_t^*$.

Note, the q_m should be interpreted as the *marginal return on capital relative to the opportunity cost of capital.* Marginal *q*, in other words, measures the return on investment relative to the opportunity cost of capital; the quotient λ/s is a *marginal* version of Tobin's *Q*. Typically, Tobin's *Q* is measured as the market-to-book ration, this, however, translates to a measure of the *average return on capital,* which is different from $\lambda/s = q_m$. Hayashi (1982) demonstrates that average *Q* will be equal to marginal *q* only under very restrictive assumption; the firm must be a price taker and the production and installment functions must be homogenous[20]. The methods to measure marginal *q* and average *Q* are discussed in the next section.

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[19] Differentiating q_m gives: $\frac{\partial q_m}{\partial t} = (r+\delta)q_m - \frac{\partial s_t / \partial t}{s_t} - \frac{p_t f_K'}{s_t}$, and since I is a function of q_m we can write: $\frac{\partial K}{\partial t} = I_t - \delta K_{t-1} = \varphi(q_m) - \delta K_{t-1}$.

[20] The elasticity of capital with respect to output, which can be derived from the accelerator principle, in equilibrium will also be one. This point is further developed in chapter 2.

4.4 Measuring Tobin's average Q and marginal q

Tobin's average *Q,* measured as the market-to-book ratio, has become very popular as a measure of investment opportunities. However, there are a number of measurement problems associated with both Tobin's average *Q* and the marginal *q*.

Tobin's average *Q*, Q_a, is defined as the total market value, M_t, divided by the replacement cost of the firm capital at time *t*, K_t:

$$Q_{a,t} = \frac{M_t}{K_t} \tag{31}$$

$Q_{a,t}$ is measured by the total market value of assets, M_t, over the book value of assets. M_t is the market value of debt and equity. In this the numerator and the denominator may both contain measurement errors. To begin, the market value is essentially the expected net present value of all cash flows.

$$M_t = E\left(\int_0^\infty C(t)e^{-rt}dt \,\middle\|\, \Phi_t\right) \tag{32}$$

For listed firms the market value of equity is usually straightforward to obtain. The market value of debt is however typically not available. If the value of the firm is maximized in equation (4) the market value will be equal to the expected value of the future cash flows. However, the market may at any point in time make errors in their valuation of the firm. This can be incorporated into the analysis by adding an error term, μ_t to M_t. If the efficient market hypothesis holds, this means that Φ contains all historical, public and private information relevant for the value of the firm. If this information is discounted into the

market evaluation of the firm then $M_t = V_t$. The efficient market hypothesis also holds that $E(\mu_t) = 0$.[21]

The second potential source for measurement error is how to obtain a correct value for the replacement value of the capital stock. The usual solution is to use the accounted book value of the capital. Since this is typically an incorrect measure of the replacement cost of capital the market-to-book value becomes difficult to interpret. It is for example not possible to evaluate performance of firms that have a market-to-book ratio in close proximity to one. Badrinath and Lewellen (1997) argue that the problems of finding accurate measures of the replacement cost of assets makes conventional market-to-book measures flawed and arbitrary.

Q_a measures the average return on the capital over its cost of capital. However, for adjustments of the capital stock the marginal return on capital is more relevant. Marginal q measures the marginal return on capital. Marginal q, q_m, can be derived from Tobin's average Q, see Mueller and Reardon (1993) for the original derivation. The marginal return on capital is then:

$$q_{m,t} = \frac{\Delta M_t}{\Delta K_t} = \frac{M_t - M_{t-1} - \delta M_{t-1}}{K_t - K_{t-1}} \tag{33}$$

where $-\delta$ is the depreciation rate. For empirical purposes a *multi-period weighted average* of (33) can also be derived:

$$\overline{q}_m = \frac{M_{t+n} - M_{t-1}}{\sum_{j=0}^{n} I_{t+j}} + \frac{\sum_{j=0}^{n} \delta_{t+j} M_{t+j-1}}{\sum_{j=0}^{n} I_{t+j}} - \frac{\sum_{j=0}^{n} \mu_{t+j}}{\sum_{j=0}^{n} I_{t+j}} \tag{34}$$

[21] Note that from the efficient market hypothesis we have: $E(\mu_t) = 0$ and $E(\mu_t, \mu_{t-1}) = 0$, and therefore also $E\left(\sum_{j=0}^{n} \mu_{t+j}\right) = 0$. More recent research suggests that in the short run the efficient market hypothesis fails (i.e. Farmer and Geanakoplos, 2008 and Lo, 2004). Casti (2008) argues that once one recognizes the possibility that investors are forming expectation based on assumptions regarding the behavior of other investors, this leads to a world of induction rather than deduction. In computer models of stock markets taking this behavior (i.e. trading based on technical analysis) into account prices have been found to settle down in random fluctuations around its fundamental value. Within these oscillations very complex patterns overshooting, crashes et cetera are found (see Arthur et al., 1996).

Note that it is necessary to assume a depreciation rate in both equation (32) and (33). However, it is also possible to estimate q_m and $-\delta$ simultaneously. Since the market value in period *t* can be written as:

$$M_t = M_{t-1} + PV_t - \delta M_{t-1} + \mu_t \tag{35}$$

where PV_t is the present value of the cash flows generated by investment in period *t*, and μ_t the standard error term. The net present value rule of investment stipulates that investment should be made up to the point where $PV_t = I_t$. This implies the $PV_t/I_t = 1$, which can be rewritten as $PV_t/I_t = q_m$ (see section 3; equation 1). By dividing both sides of equation (35) by M_{t-1} and rearranging it we get the following equation:

$$\frac{M_t - M_{t-1}}{M_{t-1}} = -\delta + q_m \frac{I_t}{M_{t-1}} + \frac{\mu_t}{M_{t-1}} \tag{36}$$

This equation can be empirically estimated with actual accounting data and share price information. The equation assumes that the capital market is efficient in the sense that market value is unbiased estimates of future cash flows. As *t* grows larger the term μ_t / M_{t-1} will approach 0. For more details and derivation of marginal *q* from the net present value rule of investment see also chapter 4 and chapter 5, Appendix 2.

Marginal *q*, q_m, has also a number of advantages over market-to-book measures of average *Q*. Above all, a marginal performance measure is more appropriate than an average Tobin's *Q*, when testing hypotheses about managerial discretion since average measures of performance confuse average and marginal returns (see Gugler and Yurtoglu, 2003). Moreover, q_m has a straightforward interpretation. Not having a correct measure of the replacement cost of assets makes the interpretation of Tobin's *Q* problematic. In Figure 1, *i* is the return on investment, *r* is the cost of capital, *I* is investment, and $q_m = (i/r)$ is marginal *q*. If managers invest in a project that yields a return that is less than the cost of capital, $q_m < 1$, which means that managers are over-investing ($q_m < 1$ see Figure 1). That is, the investment has a return less than the cost of capital, which means that the shareholders would have been better off if the firm instead had distributed these funds directly to them. For the firm to maximize shareholder-value, q_m must be equal to one. Conversely, if $q_m > 1$ managers are not investing enough. This means that the marginal investment has a return in excess of the cost of capital and that the firm should have invested more ($q_m > 1$ in Figure 1).

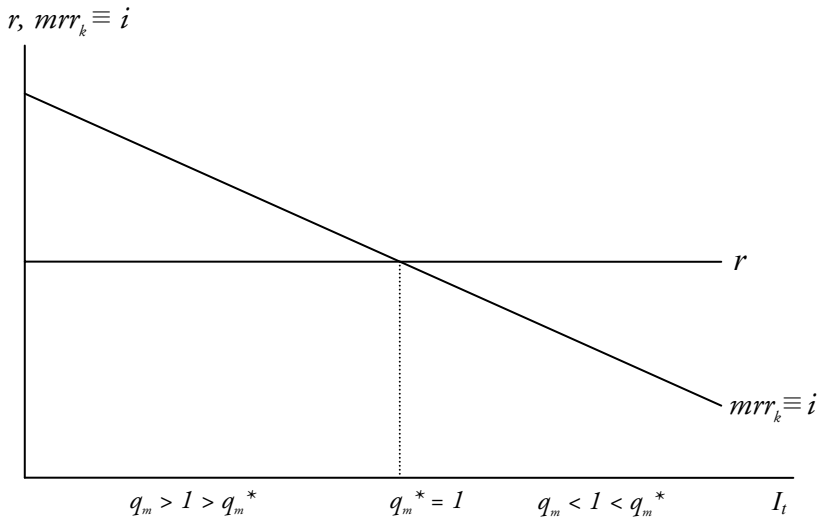

Figure 1 Return on investment, cost of capital and marginal *q*

The drawback of marginal q is that it if the market fails to value correctly a firm in one period this may lead to re-evaluations in subsequent periods. This means that the error component, μ, contains a potentially large re-evaluation factor. However, as the number of annual observations increase one should expect this component to approach zero (see note 21). This also means that the single period version of q_m may contain relatively large valuation errors which makes it less appropriate as performance measure or control for investment opportunities (this phenomenon is observed in chapter 5)

Another advantage of marginal q over Tobin's Q and other performance measures is that it reduces the endogenity problems. For more details see Gugler and Yurtoglu (2003) and chapter 3 and 4. Naturally, one problem with both marginal q and average Q is that, in most cases, it is not possible to obtain market values for unlisted firms.

5 Outline and contributions of the thesis

The reminder of the thesis is divided into five chapters. Each of these chapters contributes to the empirical literature on corporate governance, ownership structure and investment behavior.

Chapter 2 Ownership, Economic Entrenchment and Allocation of Capital

This paper (co-authored with Sameeksha Desai) contributes to the literature by using the accelerator approach to derive a measure of the efficiency of capital allocation: elasticity of capital with respect to output (sales). The starting point for the paper is the insight that for an economy to allocate capital efficiently, capital must be (re)allocated from declining sectors to more profitable and growing sectors of the economy. This process is affected by the concentration of corporate control, which, in turn, is affected by market institutions, such as protection of private property and legal protection of investors. The elasticity of capital with respect to output is estimated using a panel of about 12,000 firms (about 62,000 observations) across 44 countries. We argue that this provides a measure of what Tobin (1984) called the functional efficiency of capital markets. The results show that there is a negative relationship between aggregate ownership concentration in a country and the functional efficiency of capital allocation. The results are consistent with the economic entrenchment hypothesis, but the legal origin hypothesis is rejected. Furthermore the measure that is used in chapter 2 is unaffected by the level of economic development, which makes it interesting from a methodological perspective.

Chapter 3 Ownership Structure, Control and Firm Performance: the Effects of Vote-differentiated Shares[22]

This paper (co-authored with Per-Olof Bjuggren and Daniel Wiberg, 2007) contributes to the literature on ownership, control and performance by exploring these relationships for Swedish listed companies. We find that firms, on average, are making inferior investment decisions and that the use of dual-class shares have a negative effect on performance. Marginal q is used as a measure of economic performance. The study adds to earlier studies (i.e. Cronqvist and Nilsson, 2003) by investigating how the separation of vote and capital shares creates a wedge between the incentives and the ability to pursue value-maximization. The relationships between the performance and different ownership characteristics, such as ownership concentration and foreign ownership, are also investigated. Foreign ownership is found to have a positive effect on marginal q.

[22] Published 2007 in *Applied Financial Economics*, vol. 17, p 1323-1334.

Chapter 4 Corporate Governance and Investment in Scandinavia: Ownership Concentration and Dual-Class Share Structure[23]

This paper examines the return on investment and the effect of ownership concentration for a panel of listed Scandinavian firms. Again, the methodology to measure marginal *q* is used. The main contribution of this paper is to analyze how deviations from the one share-one vote principle affect the investment behavior of firms. This is an important since many studies are inconclusive as to the effects of dual-class shares. Adams and Ferreira (2008) for example survey the empirical one share-one vote literature and conclude that the empirical evidence is inconclusive, mainly due to empirical difficulties, and that further research is necessary. Chapter 4 contributes to the literature by empirically demonstrating that deviations from the one share-one vote principle alter the incentives of the controlling owner. The main finding in chapter 4 is that ownership concentration improves performance whereas dual-class shares reduce the incentive effect and enhance the entrenchment effect. On average, firms with dual-class shares over-invest, whereas firms with proportionality between ownership and control, invest efficiently. Since the ownership performance relationship is affected by the use of dual-class shares this indicates that the direction of causality runs from ownership to performance. The results are in line with the findings of Claessens et al. (2002). The interpretation of the results is that dual-class shares reduce the incentive effect and enhance managerial entrenchment.

Chapter 5 Q-theory of Investment and Retentions: Evidence from Scandinavian Firms

This paper uses a panel of listed Scandinavian firms to examine the importance of retentions as a determinant of investment. In the conventional investment theories the investment decision is independent from the financing decision. Going back to Kuh and Meyer's (1957) seminal study, retentions are often found to be important determinant of investment. High dependence on retentions to fund investment signals a relative high degree of market frictions. Scandinavian firms are found to depend on retentions to a very high degree, more so than other developed economies. As control for investment opportunities marginal *q*, average *Q* and sales accelerator is used. Independent of this, and after robustness checks, investment remain almost strictly proportional to retentions. This high dependence on retentions suggests that the Scandinavian capital markets allocate capital inefficiently. These market

[23] A version of this paper is forthcoming in Bjuggren, P-O. and Mueller, D. C., (eds.) (2008), *The Modern Firm, Corporate Governance and Investment*, Edward Elgar, Cheltenham, UK.

frictions appear too large to be elucidated *per se* by information asymmetries or managerial discretion phenomena. Furthermore, this chapter applies sales accelerator, average Q and marginal q to control for investment opportunities. The single period marginal q fails to explain investment; one possible interpretation is that the error component in the market valuation is large.

Chapter 6 The Cost of Legal Uncertainty[24]

The paper (co-authored with Per-Olof Bjuggren) adds to the literature by estimating the effect of insecure property rights on the cost of capital. In the conventional capital asset pricing models (CAPM) only one risk factor is considered. Starting with neoclassical investment theory, we argue that the quality of property rights is reflected in the cost of capital. We use monthly stock market indices for 49 countries over a period of 10 years to estimate a CAPM model. To the CAPM model we add an institutional risk factor represented by the property right indices. An Arbitrage Pricing Theory (APT) is not suitable because the level of property right protection (institutional risk) is time invariant. We find that the quality of property rights account for significant cross country differences in the cost of capital. Using a world market portfolio to estimate the systemic risk of national portfolios, little of the required rate of return is explained in developing countries as compared to developed countries. Furthermore, the explanatory power of the CAPM model depends on the institutional quality. This indicates that national stock markets become less synchronous with the world market as institutions deteriorate. The interpretation is that with strong institutions more firm specific information is available which leads to more risk being priced as firm specific risk. This finding is consistent with Morck et al. (2000), who find that stock prices co-movement is higher in poor economies than in rich economies. Lack of transparency at firm level shifts firm-risk to managers (Jin and Myers, 2006).

[24] A version of this paper is forthcoming in Bjuggren, P-O. and Mueller, D. C., (eds.) (2008), The Modern Firm, Corporate Governance and Investment, Edward Elgar, Cheltenham, UK.

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CHAPTER 2
Ownership, Economic Entrenchment and Allocation of Capital

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Abstract: In an efficient economy, capital should be quickly (re)allocated from declining firms and sectors to more profitable investment opportunities. This process is affected by the concentration of corporate control, which in turn is affected by market institutions. We employ a panel of 12,000 firms across 44 countries to estimate the functional efficiency of capital markets. We adapt a measure for the efficiency of capital allocation using the accelerator principle. Our empirical results show that weak property rights and highly concentrated ownership reduce the functional efficiency of capital markets. Findings support the economic entrenchment hypothesis but not the legal origins hypothesis.

JEL classifications: G32, L20, P00

Keywords: Allocation of capital, accelerator principle, ownership, functional efficiency, economic entrenchment

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1 Introduction

In order for an economy to function effectively, capital must be allocated to its truly most productive, value-creating end. This implies that capital is swiftly (re)allocated from sectors and firms with poor future prospects to those with high expected future returns. This process is termed the *functional efficiency* of capital markets[25] (Tobin, 1984) and has important implications for the overall performance and growth of the economy (Levine, 1997). As a fundamental input for production, the mechanisms through which firms access and manage capital are crucial for firm performance. When firms are incorporated, they are able to raise large amounts of capital but face problems of agency and incentives because control of assets is separated from ownership. The ability of capital markets to solve these problems ultimately affects the rate of economic growth[26]. Investors must be able to overcome these problems and ensure a return on their investments.

For this reason, an important component of the corporate governance literature addresses mechanisms through which agency and incentive problems may be overcome[27]. Corporate governance systems include formal law, such as securities law, regulatory regimes, banking structures and legal traditions (Söderström et al., 2003). The way such systems allocate resources among stakeholders affects both the structure and composition of ownership, as well as access to financial capital. This, in turn, affects investment decisions that ultimately have consequences for firm performance and economic growth.

Recent comparative research on corporate governance suggests that distribution of control over capital assets is a crucial determinant of the functional efficiency of capital markets. In particular, high ownership

[25] Note that this term is different from the standard term *market efficiency*, which refers to how efficiently information is compounded into share prices. The term *functional efficiency* refers to how effectively capital is allocated to its highest value use. For a discussion of the various types of capital market efficiencies see Tobin (1984). See also Morck, et al. (2005).

[26] For example, Beck, et al. (2000) show that it is the type and nature of investments, rather than the overall level, that is important for growth. See also Levine (2004) for a review of the theoretical and empirical literature on how different capital markets allocate capital, handle information asymmetries, treat agency problems and affect growth.

[27] The implications of separating ownership from control were noted as early as Adam Smith, who observed that the "stewards of rich men," i.e., managers, had other objectives than their "masters," i.e., owners of corporations (1776). For more current reviews of the corporate governance literature, see Shleifer and Vishny (1997), Denis and McConnell (2003) and Gugler et al. (2004a).

concentration (family control) under weak market institutions may favor the status quo, leading to economic entrenchment (Morck et al., 2005).

Economic entrenchment hinders growth for at least two related reasons. First, high ownership concentration means that a few families can hold control of a large portion of the economy, which affects the immediate allocation of capital. For example, a new firm with no connection to a controlling family would be slow to receive capital tied up in firms controlled by the family, even if the existing firms perform poorly. Second, the process through which institutions become endogenous is affected by political power. This is relevant because economic control can translate into political influence (Morck et al., 2005; Pagano and Volpin, 2005), thus affecting institutions in the future.

Research on corporate governance and especially ownership is motivated by the pervasive agency problem. To this end, we advance this literature by clarifying the relationship between ownership, basic market institutions and the allocation of capital. We analyze how the allocation of capital is affected by the concentration of corporate control in general and family ownership in particular, as well as the quality of corporate governance institutions. Although a wide range of corporate governance institutions exist, we refer primarily to the quality of property rights and investor protection in this paper. We employ an accelerator approach to derive a measure of the efficiency of capital allocation: *Elasticity of capital with respect to output (sales).* Our method is similar to Wurgler (2000) but with the important difference that our approach is consistent with the accelerator principle, also referred to as the capital stock adjustment principle[28]. We use a panel of about 12,000 firms over a minimum of five years across 44 countries.

In the next section, we discuss how corporate governance structures, especially ownership, can lead to economic entrenchment. In section three, we derive and discuss our measure of the functional efficiency of capital markets. We describe the data in section four and present and analyze results in section five. In section six, we conclude and outline relevant policy implications for the allocation of capital.

2 Ownership and economic entrenchment

In the seminal book *The Modern Corporation and Private Property*, Berle and Means (1932) describe the ownership structure of the corporation as diffused. They argue that dispersion of ownership shifts corporate control from owners

[28] Wurgler (2000) measures the functional efficiency of capital markets by calculating the elasticity of industry investments with respect to industry value-added. He shows that the elasticity of investments depends on financial development. As we focus on ownership and corporate governance issues, the relationship between financial markets and capital allocation is beyond the scope of this paper. See Wurgler (2000) and Levine (2004) for more on this relationship.

to managers. As this occurs, managers become unaccountable to owners and gain incentives to cater to objectives other than shareholder value or profit maximization. This description of the corporation has been influential in motivating a large literature on managerial objectives[29]. Much research on corporate governance has focused on the behavior of managers with different incentives based on the extent of owner participation. Jensen and Meckling (1976) show that dispersion of ownership leads to diversion of interests. At the firm level, more concentrated ownership provides large controlling owners with incentives to monitor managers and exercise control (Jensen and Meckling, 1976). DeMarzo and Urosevic (2006) note that if the stake of a large shareholder is high enough, they have the incentive to work, thereby performing what they consider the key social function of monitoring firm activity. From this, we might expect a positive incentive effect of ownership concentration at the firm level. However, Stulz (1988) shows that as insider ownership concentration increases, the scope for controlling owners to exploit minority investors also increases. The ability of insiders to extract value from the corporation at the expense of other shareholders is referred to as managerial entrenchment, or simply as the entrenchment effect.

The net effect therefore depends on the balance between the positive incentive effect and the negative entrenchment effect. Morck et al. (1988) provide empirical support for both effects by finding a non-linear relationship between ownership concentration and Tobin's *Q*. This is inconsistent, however, with the research of Demsetz and Lehn (1985) and Himmelberg et al. (1999).

Despite its role in the managerial economics literature, the widely held corporation described by Berle and Means (1932) is largely an Anglo-Saxon form of corporate organization. Few corporations across the world have dispersed ownership structure, even in developed countries. La Porta et al. (1999) find one large controlling (ultimate) owner for corporations across 27 developed economies, and Faccio and Lang (2002) find that family control dominates in continental Europe. Across countries, firms ranging in size are found to have controlling shareholders[30]. Claessens et al. (2000) find extensive family control in the majority of East Asian corporations, where problems of agency are greatest[31]. A growing literature shows that family control often is

[29] The literature on managerial objectives addresses the maximizing behavior of managers. This includes hypotheses on maximization behavior related to sales (Baumol 1959), staff and "on-the-job-consumption" (Williamson 1963) and firm growth (Marris 1964). See also Scitovsky (1943).

[30] Most controlling shareholders belong to wealthy families (La Porta et al., 1999). Caprio et al. (2007) find a controlling shareholder, usually a wealthy family, for 75% of the ten largest banks in 44 countries.

[31] The authors find the ten largest families in the Philippines and Indonesia control of more than half of corporate assets – 52.5% in the Philippines and 57.7% in Indonesia. It is similarly high in Thailand and Hong Kong, at 46.2% and 32.1% respectively (Claessens et al., 2000).

inferior to professional management (Morck et al., 2000; Perez-Gonzales, 2001). Anderson and Reeb (2003) examine S&P 500 firms and find that family firms have a lower Tobin's Q than non-family firms.

The ability of these controlling shareholders to maintain control depends on the institutional context of the country. Two institutions are particularly important in explaining cross country variation in ownership concentration: Property rights and investor right protection[32]. Shleifer and Vishny (1997) argue that very high ownership concentration may simply be reflective of poor investor and property protection. Ownership concentration may substitute in institutional environments where investors are poorly protected (La Porta et al., 1998). Therefore, high ownership concentration can be an equilibrium outcome in the presence of a weak institutional environment. If formal property rights weaken or the protection of minority shareholders is further reduced, this would result in an upward shift in ownership concentration. In countries where small investors are insufficiently protected, only large owners can realistically expect any return on investments (La Porta et al., 1998). Further, weak institutional environments do not adequately protect the security of transactions, which can create disincentives to exchange, and control-enhancing mechanisms such as control pyramids may simply be rational adaptations to poorly functioning markets (Morck et. al., 2005). Laws protecting shareholders are shown to increase firm valuations (La Porta et al., 2002) and small investors may prevent the expropriation of bank resources by large shareholders (Caprio et al., 2007). Bebchuk (1999) shows that poor investor protection increases opportunities for extraction of private benefits and thereby renders dispersed ownership structures unstable.

La Porta et al. (1998) examine ownership concentration across 49 countries and find a strong negative correlation between investor protection and aggregate ownership concentration. They conclude that in countries with insufficient legal protection of shareholders, small and diversified investors will be of minor importance. Further, they find that the quality of legal protection of investors differs systematically across countries of varying legal origin. Whereas Anglo-Saxon legal origin countries have the strongest protection, German and Scandinavian legal origin countries assume an intermediate position and French-origin countries have the poorest protection of investors. Gugler et al. (2004b) use the rankings by La Porta et al. (1998) across a sample of some 19,000 companies across 61 countries. They find that legal origin is the most important determinant of return on investments and in fact, it dominates differences in ownership structure.

Morck et al. (2005) argue that the diffused ownership of the Anglo-Saxon corporation is merely one possible end-point of capitalism. The other end-point

[32] Legal protection of shareholders (outsiders) is associated with larger stock markets (La Porta et al., 1997), higher market-to-book values (Claessens et al., 2002; La Porta et al., 2002) and higher dividend payout ratios (La Porta et al., 2000). See also Shleifer and Wolfenzon (2002).

is *oligarchic capitalism,* where firms are controlled by a few families through various control enhancing mechanisms[33]. The spectrum between these end-points comprises systems with more or less concentrated ownership. Control-enhancing mechanisms allow owners to control firms without maintaining a proportional share of the equity. This disproportionality between cash flow rights and control rights alters the incentives of controlling owners, which reduces the incentive effect and enhances managerial entrenchment (Claessens, et al., 2002; Eklund, 2008). Eklund (2008) uses a measure of Tobin's marginal *q* to show that vote-differentiation of shares significantly reduces the incentive effect and enhances the entrenchment effect. In general, firms with proportional ownership structures tend to invest efficiently whereas firms where control instruments separate cash flow from control tend to over-invest.

This can lead to economic entrenchment, whereby market forces are unable to operate. As defined by Morck et al. (2005), economic entrenchment is the macro-economic counterpart[34] to firm-level managerial entrenchment (Stulz, 1988). This ultimately leads to inefficient allocation of resources, stunted entrepreneurship, capital market development and growth (Morck et al., 2005). Extensive use of control instruments may prevent capital from being reallocated to promising new ventures. For example, nascent entrepreneurs need credit but if capital cannot be released from its current activities, the economy demonstrates entrenchment[35]. Competition and the process of creative destruction are curbed in entrenched economies, causing persistent misallocation of assets[36]. Morck et al. (2005) argue that family ownership in the presence of weak property rights and investor protection preserves status quo and lowers the functional efficiency of capital markets.

In fact, a number of authors assume that weak property rights benefit corporate insiders and the controlling owner at all times (Morck et al., 2000; Rajan and Zingales, 2003). The allocation of capital is affected by the way in which formal property rights govern transactions and the transfer of assets. In this sense, formal property rights are a necessary precondition for low transaction costs. According to de Soto (2000), an optimal property rights

[33] The most common control enhancing mechanisms are: Dual-class shares, pyramid ownership and cross holdings. Outside of Anglo-Saxon countries these mechanisms are very common.

[34] We use the term economic entrenchment in a broad sense. Morck et al. (2004) (the NBER version of their 2005 JEL article) define economic entrenchment as: *"(…) economy as exhibiting economic entrenchment if it has a highly oligarchic flavor of capitalism and exhibits signs of enduring economic inefficiency."*

[35] See Schumpeter (1934) for an early analysis of the role of credit in economic development.

[36] Compare this with Mueller's (1977) approach to assess the efficiency of the market system by examining the persistency of profits.

regime allows people to assemble their assets into increasingly valuable combinations[37].

Morck et al. (2005) identify three effects of changes in private property rights: transferal effect, cost of capital effect and competition effect. First, if private property improves, wealth is transferred from the users of capital to its suppliers. Depending on the direction of change, wealth can be transferred between insiders and suppliers. Second, property rights affect the cost of capital. If private property rights weaken, the cost of capital for both insiders and entrepreneurs will increase. Finally, improvements in property rights will enhance competition. This depends on the cost of capital. If property rights improve and the cost of capital is therefore reduced, new projects become viable and more entrepreneurs will enter the market[38].

This survey of the literature indicates at least two important reasons for concentration of ownership. At this firm level, large shareholders will have both the incentives and ability to monitor managers. This reduces agency costs. At the country level, ownership concentration can substitute for poor investor protection and weak property rights. As these rights improve, the equilibrium level of ownership concentration is reduced. Based on this primacy of corporate governance institutions in preventing or enabling economic entrenchment, we develop the following primary hypothesis:

> **Hypothesis:** Countries with high ownership concentration, in combination with weak property rights and investor protection, will have poorer functional efficiency of capital markets.

3 The accelerator principle and capital stock adjustment

Investments are defined as the flow of expenditure intended to maintain or increase the capital stock in a firm. If expected returns to firm capital decline, this implies that desired capital stock also declines. The efficient allocation of capital requires shifts from industries and firms with poor prospects to more promising investment opportunities. In a perfectly competitive frictionless economy, capital will be efficiently allocated because investments immediately respond to changes in volume and quality of investment opportunities. That is:

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[37] de Soto notes: *"Formal property's contribution to mankind is not the protection of ownership… Property's real breakthrough is that it radically improved the flow of communications about assets and their potential. It also enhanced the status of their owners, who became economic agents able to transform assets within a broader network"* (1990).

[38] For a discussion of these three effects on financial development, see Morck et al. (2005).

Investment will be made at the point where marginal return matches the real interest rate.

Wurgler (2000) estimates the industry elasticity of investments with respect to industry value-added. Elasticity indicates the speed of capital reallocation and in effect, is a way to estimate the functional efficiency of capital allocation. We derive a measure built from Wurgler's (2000) approach but with several important distinctions.

We estimate the *elasticity of capital* with respect to *output,* using *sales* as the measure of output. Assuming constant prices, like Keynes, changes in sales will be proportional to changes in output. We make the crucial assumption that changes in sales provide an approximation for future sales and thus, future demand for capital (investment opportunities). C*eteris paribus*, higher elasticity of capital with respect to sales means a quicker response to changes in future expected returns. Therefore, this means more efficient capital allocation.

To capture the time structure of investments and responses to changes in expectations, we employ an accelerator model of investment. Several different proxies for output are used as accelerators in the literature[39]. Tinbergen (1938; 1939) suggests that investment depend on level of profits, arguing that current profits are good predictors of future profits. Jorgenson and Siebert (1968) use gross value-added and Kuh (1963) use both retained earnings and sales. Our rationale for using sales rather than value-added is the inconsistency and unreliability of definition and data for measurements of firm value-added across countries. The accounting data is simply not reliable enough to ensure a consistently defined value-added across countries[40]. Further, profits would not be useful in this case because we expect profits to have asymmetric effects on investment across countries, depending on the extent of market frictions (Hubbard, 1998). If firms in one country suffer relatively more from financial constraints, it is more difficult to raise external funds and will, for example, reflect in greater sensitivity of investment with respect to profits (as compared to other countries).

In accelerator models, the desired level of capital, K_t^*, is determined by output, Y_t:

$$K_t = kY_t \tag{1}$$

[39] For a discussion of accelerator models of investment and review of empirical work, see Jorgenson (1971).

[40] Value-added is defined as compensation to production factors and can be calculated in two ways: 1) Sales – costs for intermediary goods, 2) Profits + cost of labor. From an accounting perspective, sales are relatively unproblematic, whereas costs of intermediary goods and labor expenses are counted differently across countries. For this reason, the two alternative calculations of value-added typically do not match.

where k is the capital coefficient (capital-output ratio)[41]. For simplicity, we assume K_t^* to be equal to actual capital, K_t. This means that net investment, I_t and (K_t - K_{t-1}), are proportional to changes in the desired stock of capital, $K_t^* - K_{t-1}^*$. Net investment, NI_t, can be expressed in the following way:

$$NI_t = \lambda(Y_t - Y_{t-1}) \tag{2}$$

In this formulation, net investment is proportional to an accelerator λ. If $K_t^* = K_t$ then $\lambda = k$. This is an equilibrium assumption which is typically not fulfilled, but this is not relevant for our purposes (see Jorgenson, 1971; Tinbergen 1938; 1939)[42].

For gross investment, we add replacement investment which are proportional to old capital, δK_{t-1}. We obtain gross investment in this manner:

$$I_t = \delta K_{t-1} + \lambda \Delta Y_t \tag{3}$$

We divide both sides of equation (3) with K_{t-1} to obtain:

$$\frac{I_t}{K_{t-1}} = \delta + \lambda \frac{\Delta Y_t}{K_{t-1}} \tag{4}$$

Since $K_t^* = kY_t$ this can be reformulated into the following:

$$\frac{I_t}{K_{t-1}} = \delta + \lambda^* \frac{\Delta Y_t}{Y_{t-1}} \tag{5}$$

where $\lambda^* = (\lambda/k)$, which is the *elasticity of capital* with respect to *output* (as reflected by sales). This is also useful for empirical applications because it achieves a normalization that reduces heteroskedasticity, which makes equation 4 possible to estimate empirically. Note that if $K_t^* = K_t$ in every point in time, then $\lambda = k$ which means that $\lambda^* = 1$.

[41] See Kaldor's (1963) famous statement that this capital-output ratio remains approximately constant overtime.

[42] This assumption can be relaxed by using a flexible accelerator which allows for lags in the adjustment of the capital stock. However, using the simple accelerator as we do means that the coefficient will reflect relative adjustment costs.

We estimate the following equation for each country:

$$\frac{I_{i,t}}{K_{i,t-1}} = \delta + \alpha_i + \theta_t + \lambda^* \frac{\Delta S_{i,t}}{S_{i,t-1}} + \varepsilon_{i,t} \quad (6)$$

where λ^* is the elasticity of capital with respect to sales, *I* is investment made by firm *i* in period *t*, *K* is capital stock in period *t-1* and *S* is sales in period *t*. Since we use panel data and are primarily interested in country-specific estimates of elasticity of capital, we use a *fixed effects* model with *firm* and *time effects* (α_i and θ_t) for all estimations of λ^*. The time effects resolve possible cyclic trends of investment and the firm effects control for unobserved heterogeneity across firms. This is appropriate because we are interested in country averages, and previous studies show that investment decisions are subject to market frictions. These are, in turn, affected by firm- and industry-specific attributes (see Hubbard, 1998; Bjuggren et al., 2007).

We consider our amendments to Wurgler (2000) appropriate for measuring capital allocation at the firm level[43].

[43] The original method used by Wurgler (2000) to measure elasticity of investment is inconsistent with the accelerator principle. His measure of the elasticity of investment with respect to value added, η, is estimated in the following way:

$$\ln\left(\frac{I_{ict}}{I_{ict-1}}\right) = \alpha_c + \eta_c \ln\left(\frac{V_{ict}}{V_{ict-1}}\right) + \varepsilon_{ict}$$

where I and V are industry investment (gross fixed capital formation) and value added respectively. The subscripts denote industry, country and time respectively. Presumably he uses this approach for empirical reasons, since he uses aggregated industry data. However, one may still expect a high correlation between η and λ^*, (see Table 9 in Appendix 3 for a comparison between marginal *q*, η and λ^*). For the elasticity of capital to be equal to the elasticity of investment, it is necessary that: $\Delta K_t^* = \Delta I_t$. This is the case only if $I_{t-1} = \delta K_{t-1}$ which implies that: $K_{t-1}^* = K_{t-1}$. For other alternative specifications of elasticity's, see Clements and Theil (1987).

4 Data and methodology

For our purposes, we derive new estimations of the elasticity of capital. We employ existing institutional measures.

4.1 Elasticity of capital

To estimate the elasticity of capital, we use firm level accounting data on investment, capital stock and sales collected from Standard & Poor's Compustat Global (see Table 1 for sources and definitions of data). Gross investment is measured as:

$$I = After\ tax\ profit - dividends + depreciation + \Delta Equity + \Delta Debt + R\&D$$

This measure of investment is appropriate because it adequately reflects actual investment, which other accounting measures of investment do not. Using gross investment is also more appropriate than using net investment because it is not possible to obtain reliable estimates for replacement investment. Arguably, other expenditures such as advertising and marketing should also be included in investment (Mueller and Reardon, 1993) but the data is typically not available consistently across countries. For this reason, we exclude it.

The measure of capital is also selected to be consistent across countries. All financial firms are excluded from the sample since the nature of investment in these firms differs from non-financial firms. To adjust for differences in inflation, variables are adjusted to 2000 constant prices, using inflation data from International Financial Statistics (IMF). A total of 11984 firms are included, corresponding to 61292 observations. In order to minimize the weight of possible outliers, observations for each country are cut five percent in each end of the distribution[44]. Naturally, the usual accounting caveats apply. Estimated elasticity $\hat{\lambda}_j^*$'s are reported in Table 3. We have grouped countries by legal origin as defined by La Porta et al. (2003).

4.2 Institutional measure

In order to test the primary hypothesis, we select several indicators on institutional quality and ownership concentration. Definitions and sources are presented in Table 1. We use key institutional variables that have been

[44] Trimming the data leads to a consistent definition of outliers and makes the results more robust. It is also possible to apply some sort of robust estimation technique, such as median regression or iteratively reweighed least squares. The results obtained using these techniques are essentially the same as with the simple trimmed OLS.

identified in the literature. The property rights index is from Holmes et al. (1997) and is also used by La Porta et al. (2003). Anti-director or minority shareholder protection is measured by the Pagano and Volpin (2005) index, which is an extended and recoded version of the original index used by La Porta et al. (1998). This new version[45] covers the period 1993 to 2001, and we use the average for the entire period.

As a measure of the quality of the legal system, we use the *Law and order* index from *International Country Risk Guide* (ICRG), averaged over the period 1982 to 1995. This index was also used by La Porta et al. (1998). Essentially, the index measures quality of property rights; the correlation between the two indexes is 0.74. We also add legal origins as a dummy variable, using the following classification (from La Porta et al., 1999, 2003): English-origin, German-origin, French-origin, Scandinavian-origin and Socialist/Communist-origin[46].

For *ownership concentration* we use two country-level measures, constructed by La Porta et al. (1998): Mean and median of the three largest owners in the ten largest firms. They compute combined cash flow rights for the three largest owners in each firm. In addition, we add two measures for *family control* of corporations, also compiled by La Porta et al. (1999), (see Tables 6 and 7 in Appendix 1). They measure family control as the share of the 20 largest firms in each country that are controlled by families. Two measures are constructed, assuming control is inferred at the levels of 10 percent and 20 percent of ownership. In this case, ownership concentration is measured as control-rights and not cash flow rights. This is appropriate considering that investment decisions are influenced by the level of control and not cash flow rights. In addition we have also included family data on Indonesia, the Philippines, Taiwan and Thailand from Claessens et al. (2000). We recognize the problems with measures of ownership concentration and family control in La Porta et al. (1998; 1999). For example, they are likely to underestimate concentration of control in some countries by not explicitly considering pyramidal ownership structures and cross-holdings. Another problem is that these measures may be biased due to differences in absolute size of corporations across countries (for a discussion, see La Porta et al., 1999). The measures may for example reflect the fact that large corporations are likely to have less concentrated ownership simply because it requires more capital, all else equal (see Kumar et al., 1999). However, despite these problems we believe that these measures provide a

[45] The new index is also called the LLSV Pagano-Volpin anti-director index. The index is based on a questionnaire sent to legal experts in each country included in the study conducted by Pagano and Volpin in 2005.

[46] The legal origins hypothesis is now a dominant stream in the research on corporate governance (La Porta et al., 1999, 2003). Arguably, it is also important from an evolutionary perspective, depending on how path-dependency is treated in economic systems.

reasonable approximation of the concentration of corporate control across countries.

We also use standard controls for level of economic development and level of economic growth. For economic development, we take the logarithm of 1995 GDP levels. For economic growth, we use average GDP growth between 1980 and 2002. The GDP data was collected from the World Development Indicators. Taiwan is missing from this dataset, so we have used its corresponding value from La Porta et al. (1997). See Appendix 2 for a correlation matrix of the variables.

Table 1 Variables and data

Investment, *I*	Measured as: *I = after tax profit (IB) + depreciation (DP) – dividends (DVC) + ΔEquity (SSTK less PRSTKC) + ΔDebt (ΔDT) + R&D (XRD).* Compustat Mnemonics: Measures within brackets. Data ranges from 1997 to 2005. Number of years differs across countries with not less than 6 years for any given country. *Source: Standard and Poor, Compustat Global.*
Firm sales, *S*	Firm sales. Compustat Mnemonics: SALE. Source: Standard and Poor, Compustat Global.
Firm capital, *K*	Defined as net cost or valuation of tangible fixed property used in the production of revenue. Compustat Mnemonics: *PPENT*[47]. *Source: Standard and Poor, Compustat Global.*
Ownership concentration (mean and median)	Measured as average percentage and median of shares (cash flow rights) held by the three largest shareholders in the ten largest firms in each country. *Source: La Porta et al. (1998)*
Family control (10 and 20 percent)	Measured as the share among the 20 largest firms in each country that are controlled by families. If a family has *control-rights* above a certain level the firm is assumed under family control. Control is inferred at 10 and 20 percent of control-rights. Data for 27 countries is from La Porta et al. (1999). Data for Indonesia, Philippines, Taiwan and Thailand is from Claessens et al. (2000). Contol is also inferred at 10 and 20 percent, but data is for all available firms. *Source: Claessens et al. (2000); La Porta et al. (1999*)

[47] This is a narrow definition of capital. An alternative is total assets (*AT*). *PPENT* is one component of *AT*. Accounting methods differ more with respect to *AT* than *PPENT*, the treatment of intangible assets. However, the correlation is high so choosing one has a minor scaling effect.

Legal origin	Dummy variable: German, French, English and Scandinavian and Socialistic. The commercial code or Company law is used to identify legal origin. *Source: La Porta et al. (1998), Socialist/Communist origin (La Porta et al., 2003).*
Shareholder protection (Volpin-Pagano LLSV Index of Anti-director rights)	Index ranges from 1 to 6.The index is a summary of: 1) proxy by mail allowed, 2) deposit of share not required prior to shareholders meeting, 3) cumulative voting allowed, 4) oppressed minority mechanism, 5) less or equal 10 percent for calling an extraordinary meeting, 6) preemptive rights. The index is Pagano-Volpain updated and extended version of the La Porta et al. (1998) anti-director index. Pagano and Volpin (2005) extend the index to cover the period 1993-2001. This is based on questionnaires sent to legal experts in each country (47). *Source: Pagano and Volpin (2005)*
Property rights	Index of quality of protection ranges from 1 to 5.5, where 5.5 is the strongest protection. *Source: Holmes et al. (1997)*
Law and order	Measures country law and order tradition. 6 is strongest. Average for 1982-1995. *Source: International Country Risk Guide (ICRG)*
Log GDP	The logarithm of GDP 1995. *Source: World Development Indicators. (Taiwan from La Porta et al., 1997)*
Growth of GDP	Average of annual GDP growth rates between 1980-2002. *Source: World Development Indicators. (Taiwan from La Porta et al., 1997)*

5 Results

We estimate average capital elasticity $\hat{\lambda}^*$ for each country (see Table 3). As a first step, we empirically evaluate the robustness of our model as compared to Wurgler (2000). The merit of our model is reflected in the correlations for our control variables (see Table 8). Current GDP is positively and significantly correlated in Wurgler's measure (0.44) but *not* with our measure[48]. Therefore, we suggest our measure is less sensitive to differences in the level of economic development and is more robust for cross-country study. This is especially meaningful, given major differences in economic development across countries[49]. Note that both measures show a negative significant relationship with GDP growth. When we regress Wurgler's estimates for investment elasticity on our measure of capital elasticity, the resulting regression coefficient is close to one (see Appendix 3).

Next, we test the legal origin hypothesis (La Porta et al., 1998) by regressing legal-origin dummies on our elasticity measure $\hat{\lambda}^*$. The all-country average $\hat{\lambda}^*$ is 0.98, which is not statistically different from an average of 1.0. We obtain the following averages based on legal origin: English origin is 0.81, French origin is 0.84, German origin is 1.10, Scandinavian origin is 1.53 and Communist/socialist origin is 0.74, (see Table 2). Scandinavia is the only legal origin category which deviates significantly from the all-country average. It remains significant at 10 percent if the high elasticity of Norway is removed. Clearly, the within-legal origin variation is greater than the between-origin variation. Our ranking does not indicate what is consistent from the current literature on legal origins.

[48] Marginal q is, in effect, another measure of the functional efficiency of capital markets, developed by Mueller and Reardon (1993). It measures the return on investments relative to the opportunity cost. We also compare our elasticity measure with the estimates of marginal q by Gugler, et al. (2004b), (see Table 9 in Appendix 3). Somewhat surprisingly, we find no significant correlation. However, marginal q is significantly correlated with ownership concentration, property rights and shareholder protection (see Appendix 2).

[49] For example, Norway has the highest elasticity of capital (2.34), likely due to the expansion of the oil industry. We do not treat Norway as an outlier because our measure of elasticity of capital allocation is not sensitive to the level of economic development (current GDP) and we have no reason to believe that the results are due to any measurement errors.

Table 2 Elasticity of capital and legal origin

Legal origin:	Dependent variable: $\hat{\lambda}_j^*$
Constant	0.979 (13.81)
English	-0.166 (-1.53)
French	-0.143 (-1.37)
German	-0.006 (-0.04)
Scandinavian	0.549 (3.25)
Socialist/communist	-0.235 (-1.39)
R^2	0.23
F-value	2.99
No. observations	44

*, ** and *** indicate significance at 10, 5 and 1 percent respectively. The dependent variable is country specific capital elasticity and explanatory variables are legal origin dummies. The dummy variables have been constrained to sum to zero, so legal origin coefficients are interpreted as deviations from the all-country mean. Ordinary Least Squares (OLS) was used as estimator.

Table 3 contains estimations for equation (6) for each country. Again, it is a fixed effects model with firm and time effects. Separate country coefficients are reported in Table 3. Clearly, the within-group variation is substantial. In fact, only Scandinavian origin countries differ significantly from the all-country average when we regress legal-origin dummies on our measure of capital allocation (see Appendix 3). Further, we do not find any significant difference between common (English origin) and civil law (French, German and Scandinavian) countries (for detailed discussion see La Porta et al., 1999).

We also find that weak protection of private property in combination with high concentration of ownership, in particular family ownership, hampers the (re)allocation of capital. The intuition is that, all else equal, low capital elasticity is reflective of high transaction costs. This empirical result is consistent with the economic entrenchment hypothesis, which has important implications because most corporations around the world have at least one controlling owner (La Porta et al., 1999). This is typically achieved through mechanisms such as pyramid ownership and dual-class shares. This contradicts the Berle and Means' (1932) notion of dispersed ownership. The importance of property rights is not surprising and supports the idea that ownership concentration can be leveraged as a substitute for protection when investors are inadequately protected (La Porta et al., 1998). For example, Mexico has 100 percent family ownership, a

weak score of 3 on the property rights index and the weakest score of 1 for anti-director rights, so our estimate of capital elasticity is fairly low at 0.715. Indonesia has 69 percent family ownership, a weak score of 3 on the property rights index and a weak score of 2 on the anti-director rights index, and we estimate low capital elasticity at 0.342.

We test the impact of minority shareholder protection, protection of property rights and law and order on ownership (see Table 4). Interestingly, shareholder protection significantly reduces ownership concentration but has no significant impact on family ownership. Not surprisingly, current GDP has a significant negative effect on ownership concentration, but no significant effect on family ownership. GDP growth also has no effect on family ownership.

We test the effect of our institutional variables and controls on our measure of elasticity of capital (see Table 5). We repeat the regressions with and without legal origin dummies. Without accounting for legal origin, the following variables are noteworthy: Property rights and law and order both have a positive and significant effect on elasticity of capital. When dummies for legal origins are included, these effects *do not change*. In fact, the results are strikingly similar: Without legal origin dummies, we get a result of 0.237 (significant at the 0.01 level) for property rights, and this actually falls to 0.2 (significant at the 0.05 level) when we include legal origin dummies. Similarly, we see a positive significant effect of 0.164 (at the 0.01 level) for law and order without legal origin dummies, but this falls to 0.132 when included.

The correlation matrix for all variables is in Table 8. Property rights and law and order have a positive and significant correlation (at the 5% level) with elasticity of investments, at 0.43 and 0.61 respectively. For the sake of model comparison, we have also included in Table 8 the original elasticity of industry investments with respect to industry value-added, as calculated by Wurgler (2000). The most interesting comparison between our measure of elasticity of capital with Wurgler's measure of elasticity of industry investment is the correlation with our control variables. GDP growth is significant and negatively correlated with both our measure (-0.34) and with Wurglers's measure (-0.4). However, current GDP is positively and significantly correlated with Wurgler's measure (0.44) but *not* with our measure. Again, this suggests that our measure is not sensitive to current level of economic development but is sensitive to changes (growth).

Table 3 Capital elasticities with respect to sales $\hat{\lambda}_j^*$

Country	$\hat{\lambda}_j^*$	t-value	Std. Err.	R^2	No. firms	No. obs.	Period
Australia	0.621	13.7	0.045	0.09	377	2047	1999-2005
Canada	0.849	15.0	0.057	0.14	303	1646	1999-2005
Hong Kong	0.756	8.24	0.092	0.12	101	550	1999-2005
India	0.687	13.6	0.051	0.17	169	912	1999-2005
Ireland	1.464	6.99	0.210	0.26	33	178	1999-2005
Israel	0.609	2.05	0.297	0.06	26	140	1999-2005
Malaysia	0.400	16.4	0.024	0.15	524	2371	1999-2005
New Zealand	0.829	3.02	0.275	0.07	52	234	2000-2005
Pakistan	0.367	3.09	0.119	0.12	26	164	1998-2005
Singapore	0.776	18.9	0.041	0.25	301	1363	2000-2005
South Africa	1.064	6.26	0.170	0.09	114	512	2000-2005
Thailand	0.523	9.91	0.053	0.13	217	1182	1999-2005
United Kingdom	1.276	18.8	0.068	0.09	691	3774	1999-2005
United States	1.160	42.5	0.027	0.16	2137	11642	1999-2005
English legal origin[a]	***0.884 (0.813)***	***54.7***	***0.016***	***0.11***	***5071***	***26715***	**-**
Argentina	0.600	7.73	0.078	0.37	21	114	1999-2005
Belgium	1.266	8.05	0.157	0.18	72	400	1999-2005
Brazil	0.551	8.41	0.066	0.15	96	524	1999-2005
Chile	0.431	7.96	0.054	0.20	80	438	1999-2005
Colombia	0.283	1.88	0.151	0.13	10	54	1999-2005
France	1.575	14.8	0.106	0.10	362	1976	1999-2005
Greece	1.034	9.96	0.104	0.27	55	296	1999-2005
Indonesia	0.342	4.92	0.069	0.07	170	764	1999-2005
Italy	0.937	8.14	0.115	0.11	160	738	2000-2005
Mexico	0.715	8.58	0.083	0.31	57	308	1999-2005
The Netherlands	1.595	11.2	0.142	0.15	113	620	1999-2005
Peru	0.675	8.89	0.075	0.44	18	123	1997-2005
The Philippines	0.645	12.8	0.050	0.31	69	373	1999-2005
Portugal	1.219	6.62	0.184	0.30	26	140	1999-2005
Spain	0.942	11.8	0.080	0.25	76	410	1999-2005
Turkey	0.567	2.53	0.224	0.06	29	156	1999-2005
French legal origin[a]	***1.155 (0.836)***	***27.6***	***0.042***	***0.10***	***1414***	***7434***	**-**
Austria	1.167	7.47	0.156	0.25	43	248	1999-2005
Germany	1.579	18.7	0.085	0.12	431	2344	1999-2005
Japan	0.603	38.5	0.016	0.24	2860	13230	2000-2005
South Korea	0.817	21.4	0.038	0.35	203	927	2000-2005
Switzerland	0.946	12.6	0.075	0.21	142	782	1999-2005
Taiwan	0.725	16.0	0.045	0.26	180	972	1999-2005
German legal origin[a]	***1.098 (0.973)***	***48.6***	***0.023***	***0.13***	***3859***	***18503***	**-**
Denmark	0.977	7.08	0.138	0.12	86	470	1999-2005
Finland	1.619	9.21	0.176	0.20	84	454	1999-2005
Norway	2.340	5.38	0.435	0.07	89	404	2000-2005
Sweden	1.177	6.91	0.170	0.05	173	961	1999-2005
Scandinavian legal origin[a]	***1.279 (1.528)***	***11.2***	***0.115***	***0.06***	***432***	***2289***	**-**
China	0.482	30.5	0.016	0.21	1130	6108	1999-2005
Hungary	0.730	4.41	0.165	0.29	11	60	1999-2005
Poland	1.331	5.88	0.227	0.29	19	119	1998-2005
Russia	0.434	3.42	0.127	0.36	12	64	1999-2005
Socialist/communist legal origin[a]	***0.492 (0.744)***	***31.2***	***0.016***	***0.20***	***1172***	***6351***	**-**
Average / total[a]	***0.914 (0.902)***	***77.5***	***0.012***	***0.10***	***11948***	***61292***	-

Note: Country categorization into legal origin follows La Porta et al. (2003). Elasticities are estimated with fixed effects model with firm and year effects. [a] These are weighted averages. Note that this gives different weights to countries. Simple averages $\hat{\lambda}_j^*$ are in brackets.

There are several possible explanations for a capital elasticity greater than one. First, indivisibilities of production factors may make the production function discontinuous, so output cannot be produced proportionally to capital. This is typically the case for firms with economies of scale in production. This may explain the high capital elasticity for Norway. During the sample period, Norwegian growth was strong and presumably driven by the expansion of the oil industry. Second, "excessive expectations" may affect estimates of capital elasticity. If investors and managers have excessive expectations on returns to their investments, this can cause an elasticity to be larger than one. For example, Manne (1945) argues that the accelerator principle works differently at different stages of a business cycle, as firms are more responsive to changes in output during periods of economic expansion. If this is the case, we might expect a positive relationship between capital elasticity and growth rates. However, our panel of firms has no less than six annual observations for any country and we use a fixed-effect estimation, which should control for possibly cyclical investment behavior. Finally, an elasticity greater than one could arise from measurement error. If I_t or K_t contain measurement errors, this can create scaling effects so estimated capital elasticity deviates from its true value. However, this is unlikely to be a problem in our study since our variables were specifically defined to provide consistent estimation across countries. This is the reason we replace value-added with sales as our measure of output. Any measurement error will be consistent across all countries, since elasticity is a relative measure of the efficiency of capital allocation. Thus, our results are ultimately still unaffected. For example, we use a narrow measure of capital that includes only fixed tangible assets. This augments the measure of capital elasticity across all countries.

Note that the elasticity of capital is only a measure of how efficiently capital is allocated between industries. It is not a direct measure of how effectively an economy channels capital to entrepreneurs and new ventures. However, it is safe to expect that if established firms allocate capital effectively, this is also reflective of access of entrepreneurs and new ventures to external capital. For example, Wurgler (2000) shows that highly elastic investments are positively correlated with financial development.

Before we can report the effects of ownership, private property and investor protection on capital allocation, further clarification is needed on the links between variables. In Table 4 we report regressions of institutional variables on ownership measures. As noted previously, the dependent variables (ownership concentration and family control) were collected from La Porta et al. (1998, 1999) and Claessens et al. (2000). By and large, our results (see Table 4) replicate the results of La Porta et al. (1998, 1999). Not surprisingly, property rights and law and order are highly correlated (0.74). However, these indices are not significantly correlated with investor right protection. All three institutional variables have a negative effect on ownership concentration and the degree of family control. GDP has a negative effect on ownership concentration. This

may be due to several factors. There may be reverse causality where high concentration of ownership reduces economic development. Growth in GDP has no robust effect on concentration of ownership or family control. This suggests that it is not possible to use all the explanatory variables simultaneously when examining the effect on elasticity of capital. This would lead to serious multicollinearity. Keeping this in mind, we analyze the effect of these variables on capital elasticity. Results are reported in Table 5 A and B.

Law and order and property rights improve capital elasticity. Ownership concentration and family control significantly reduce capital elasticity. This means that the quality of private property improves resources allocation whereas ownership reduces it. The results are robust for mean and median of ownership concentration, and family control is robust when control is inferred at 10 percent and at 20 percent. Shareholder protection does not have an effect on capital elasticity, other than through indirect effects on ownership, as reported in Table 4.

Table 4 **Ownership concentration and corporate governance**

	Dependent variable: Ownership concentration				Dependent variable: Family ownership			
	Mean ownership		Median ownership		Control inferred at 10%		Control inferred at 20%	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Constant	196.0***	219.7***	225.0***	255.8***	187.2**	290.5***	185.7**	254.04***
	(5.57)	(6.17)	(5.20)	(6.02)	(2.63)	(3.87)	(2.64)	(3.17)
Shareholder protection	- 2.90**	- 3.07**	- 3.56**	- 3.82**	- 5.55	- 2.80	- 6.13*	- 4.42
	(- 2.03)	(- 2.24)	(- 2.03)	(- 2.33)	(- 1.67)	(- 0.87)	(- 1.87)	(- 1.31)
Law and order	- 3.19***		- 4.13***		- 7.89**		- 9.75***	
	(- 2.73)		(- 2.87)		(- 2.66)		(- 3.33)	
Property rights		- 7.53***		- 10.16***		- 19.81***		- 21.08***
		(- 3.70)		(- 4.19)		(- 3.83)		(- 3.91)
Log GDP	- 10.44***	- 11.14***	- 12.43***	- 13.18***	- 8.75	- 13.97**	- 7.81	- 10.53
	(- 3.26)	(- 3.59)	(- 3.16)	(- 3.56)	(- 1.36)	(- 2.15)	(- 1.23)	(- 1.55)
Growth GDP	- 2.10***	- 1.07	- 2.24**	- 0.88	2.81*	2.11	2.27	3.72
	(- 2.71)	(- 1.06)	(- 2.35)	(- 0.73)	(1.73)	(0.91)	(1.41)	(1.54)
R^2	0.52	0.53	0.51	0.56	0.45	0.55	0.50	0.56
No observations	40	39	40	39	31	30	31	30
F-value	9.40	9.78	9.08	10.87	5.39	7.55	6.52	7.80
VIF (mean)	1.13	1.13	1.13	1.13	1.09	1.22	1.09	1.22

*, ** and *** indicates significance at 10, 5 and 1 percent respectively. Dependent variables are ownership concentration (1 - 4) and family control (5 - 8) respectively. Explanatory variables are shareholder protection, law and order, property rights, GDP level and growth in GDP. Ordinary Least Squares (OLS) have been used as estimator.

Table 5 A Allocation of capital, legal origin and ownership

Dependent variable: Elasticity of capital, $\hat{\lambda}_j^*$						
	Regressions without legal origin dummies					
	(1)	(2)	(3)	(4)	(5)	(6)
Constant	0.809 (0.65)	- 0.148 (- 0.10)	2.133 (1.16)	2.237 (1.27)	2.367 (1.45)	2.253 (1.38)
Shareholder protection	-0.030 (-0.59)	- 0.033 (- 0.58)				
Law and order	0.164*** (3.98)					
Property rights		0.237*** (2.85)				
Ownership concentration mean			-0.013** (-2.18)			
Ownership concentration median				-0.012** (-2.45)		
Family ownership, control inferred at 10%					-0.009** (-2.66)	
Family ownership control inferred at 20%						-0.008** (-2.58)
Log GDP	-0.031 (-0.27)	0.042 (0.33)	-0.028 (-0.19)	-0.043 (-0.31)	- 0.077 (- 0.56)	- 0.070 (- 0.51)
Growth GDP	-0.046* (-1.69)	-0.096*** (-2.32)	-0.090*** (-2.76)	-0.089*** (-2.80)	-0.036 (-1.04)	-0.042 (-1.21)
R^2	0.43	0.33	0.23	0.26	0.30	0.29
No observations	40	39	40	40	31	31
F-value	6.48	4.12	3.78	4.27	3.81	3.64
VIF (mean)	1.13	1.13	1.42	1.38	1.20	1.17

Note: *, ** and *** indicates significance at 10, 5 and 1 percent respectively. Our dependent variable is the elasticity of capital with respect to sales ($\hat{\lambda}_j^*$). Regressions 7 to 12 also include legal origin dummies. Ordinary Least Squares (OLS) have been used as estimator.

Table 5 B Allocation of capital, legal origin and ownership

Dependent variable: Elasticity of capital, $\hat{\lambda}_j^*$						
	Regressions with legal origin dummies					
	(7)	(8)	(9)	(10)	(11)	(12)
Constant	0.020 (0.01)	-1.248 (-0.80)	0.222 (0.11)	0.605 (0.30)	1.527 (0.92)	1.304 (0.79)
Shareholder protection	-0.018 (-0.29)	-0.033 (-0.50)				
Law and order	0.132*** (2.72)					
Property rights		0.200** (2.15)				
Ownership concentration mean			-0.006 (-0.79)			
Ownership concentration median				-0.006 (-1.13)		
Family ownership, control inferred at 10%					-0.010*** (-2.86)	
Family ownership control inferred at 20%						-0.009*** (-2.81)
Log GDP	0.040 (0.31)	0.141 (1.08)	0.097 (0.60)	0.066 (0.41)	-0.029 (-0.20)	-0.012 (-0.09)
Growth GDP	-0.037 (-1.21)	-0.068 (-1.56)	-0.063* (-1.84)	-0.065* (-1.93)	0.002 (0.05)	-0.003 (-0.09)
R^2	0.49	0.45	0.36	0.38	0.48	0.48
No observations	40	39	40	40	31	31
F-value	4.33	3.61	3.14	3.31	3.73	3.66
VIF (mean)	1.75	1.71	1.81	1.75	1.55	1.52

Note: *, ** and *** indicates significance at 10, 5 and 1 percent respectively. Our dependent variable is the elasticity of capital with respect to sales ($\hat{\lambda}_j^*$). Regressions 7 to 12 also include legal origin dummies. Ordinary Least Squares (OLS) have been used as estimator.

When we include legal origin dummy variables, the negative effect of ownership concentration becomes insignificant but the other variables remain significant. The results are robust even if our control variables, log GDP and GDP growth, are omitted. We include them nonetheless because they reveal the advantages of our accelerator method. As one might expect, the existing level of economic development (measured as GDP) has no impact on capital elasticity. However, economic growth (GDP growth) significantly reduces capital elasticity. This makes sense and can be interpreted with respect to the dynamics of economic growth: The pressure for structural change is reduced as growth rates increase. Obviously, it should be noted that the direction of causality between resource allocation and economic growth is ambiguous.

Further research is needed in this area. One important question concerns the effect of control-enhancing mechanisms on investment behavior at the firm level. A second question is the historic development of corporate governance institutions, and how political economy conditions have made them endogenous at the country level. For example, the extent to which property rights and investor protection are endogenous to ownership structure is still largely unresolved (see Morck et al., 2005).

6 Conclusions

We examine the effect of ownership concentration and related market institutions on the allocation of capital in the economy. We measure elasticity of capital for 44 countries with a panel of about 12,000 firms and 61,000 observations. We advance the literature in two ways. First, we make a methodological contribution using the accelerator principle to derive a measure of the efficiency of capital allocation: *Elasticity of capital with respect to output.* The accelerator principle is applicable because if desired capital stock is proportional to output, changes in output will reflect changes in desired capital stock. We measure output with sales to achieve consistent estimates across countries. Therefore, a low elasticity of capital with respect to sales is a sign of relatively high capital adjustment costs. This measure is related to Wurgler's approach at the industry level (2000), which estimates elasticity of investment but not of capital. In contrast, our approach aligns with the accelerator principle. Our measure of elasticity requires firm level data for investment, capital stock and sales. This is a comprehensive definition of investment that reflects the actual cash available for managers to invest, thereby reducing problems related to accounting measures of investment. All three measures are selected to ensure consistent definition across countries.

Second, we empirically test two streams currently dominating in the current research on corporate governance literature. On the one hand, we find support for the economic entrenchment hypothesis. On the other hand, our

empirical results do not support the hypothesis that legal origin is a key determinant of growth.

We find that protection of private property is important for capital allocation. The obvious policy implication is that property rights should be strengthened in order to improve capital allocation. This is consistent with the institutional approach to economic growth. However, we stress the importance of acknowledging the difference between *enacting* and *enforcing* institutions. For example, clauses may be written into law but poorly enforced or easily circumvented by informal institutions such as corruption. This is likely the case for India for example, where the highest value of 5 on the Volpin-Pagano-LLSV Anti-director rights index is countered by lower values of 2.5 for law and order and 3 for property rights. We also find that family control and ownership concentration negatively influence capital allocation. We use aggregate ownership measures collected by La Porta et al. (1998, 1999) and Claessens et al. (2000). Economies with highly concentrated ownership structures display clear signs of economic entrenchment and persistent misallocation of capital. We argue that it is not ownership concentration *per se* that creates inefficiencies in the allocation of capital but rather, the condition of its governing institutions. Therefore, strong private property and investor protection reduce equilibrium concentration ownership and improve the allocation of capital. Finally, legal origin has no significant impact on our measure of capital allocation.

In the long run, strengthening key institutions will shift the equilibrium towards maximum returns on investments because these improvements facilitate the movement of capital to more productive purposes. This has significant implications for policies designed to encourage innovation in high-growth industries, not least because entrepreneurs require capital that would otherwise be tied up in other industries. Thus, we suggest that when institutions improve the allocation of capital, firms are better positioned for innovation and growth. This translates into overall better economic performance.

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Appendix 1

Table 6 Corporate governance indicators

Country[4]	Volpin-Pagano-LLSV Anti-director rights	Law and order	Property rights	$\hat{\eta}_j$	Marginal q, $q_{m,j}$	GDP Growth	Log GDP
Australia	4	6.00	5	0.68	0.94	3.31	11.57
Canada	5	6.00	5	0.58	1.16	2.72	11.76
Hong Kong	5	4.93	5	0.95	0.78	5.38	11.15
India	5	2.50	3	0.10	0.80	5.63	11.55
Ireland	4	4.68	5	0.67	1.10	5.42	10.82
Israel	3	2.89	4	0.26	1.27	4.19	10.95
Malaysia	4	4.07	4	0.29	0.86	6.27	10.95
New Zealand	4	6.00	5	0.90	0.86	2.45	10.78
Pakistan	5	1.82	4	0.26	0.40	5.13	10.78
Singapore	4	5.14	5	0.49	0.97	6.99	10.92
South Africa	5	2.65	3	-	0.97	2.01	11.18
Thailand	2	3.75	5	-	0.64	6.00	11.23
United Kingdom	5	5.14	5	0.81	0.85	2.26	12.05
United States	5	6.00	5	0.72	1.05	2.90	12.87
English origin	***4.29***	***4.40***	***4.5***	***0.56***	***1.02***	***4.33***	***11.33***
Denmark	2	6.00	5	0.85	0.65	1.84	11.26
Finland	3	6.00	5	0.56	0.96	2.60	11.11
Norway	4	6.00	5	0.58	1.04	3.12	11.17
Sweden	3	6.00	4	0.85	0.65	2.02	11.40
Scandinavian origin	***3***	***6.00***	***4.8***	***0.71***	***0.78***	***2.40***	***11.24***
Austria	2	6.00	5	0.84	0.71	2.26	11.37
Germany	1	5.54	5	0.99	0.57	1.94	12.39
Japan	4	5.39	5	0.82	0.86	2.57	12.72
South Korea	2	3.21	5	0.65	0.70	6.81	11.69
Switzerland	2	6.00	5	-	0.64	1.52	11.49
Taiwan	3	5.11	-	-	1.26	11.56	12.34
German origin	***2.33***	***5.21***	***5***	***0.83***	***0.74***	***4.44***	***12.00***
Argentina	4	6.00	5	-	0.78	3.31	11.57
Belgium	0	6.00	5	0.80	0.51	2.08	11.44
Brazil	3	3.79	3	-	0.25	2.42	11.85
Chile	5	4.21	5	0.29	1.24	5.13	10.81
Colombia	3	1.25	3	0.13	0.43	2.98	10.97
France	3	5.39	4	0.89	0.57	2.11	12.19
Greece	2	3.71	4	0.64	0.54	1.71	11.07
Indonesia	2	2.39	3	0.22	0.84	5.40	11.31
Italy	1	5.00	4	0.65	0.64	1.93	12.04
Mexico	1	3.21	3	0.34	0.50	2.77	11.46
The Netherlands	2	6.00	5	0.57	0.69	2.37	11.62
Peru	3	1.50	3	0.65	0.11	1.90	10.73
The Philippines	3	1.64	4	0.31	1.00	2.67	10.87
Portugal	3	5.21	4	0.54	0.46	2.95	11.03
Spain	4	4.68	4	0.87	0.54	2.75	11.77
Turkey	2	3.11	4	0.24	0.52	3.79	11.23
French origin	***2.56***	***3.94***	***3.9***	***0.51***	***0.59***	***2.89***	***11.37***
China	-	-	-	-	0.45	9.48	11.85
Hungary	-	-	-	-	-	1.19	10.65
Poland	-	-	-	-	-	-	11.04
Russia	-	-	-	-	-	-	11.60
Socialist origin	***-***	***-***	***-***	***-***	***-***	***5.52***	***11.29***
Average / total	***3***	***4.43***	***4***	***0.65***	***0.75***	***3.61***	***11.42***

Note: $\hat{\eta}_j$ is the elasticity of industry investment with respect to industry value-added, as estimated and reported by Wurgler (2000). Marginal q are estimates of the return on investments, i, relative the cost of capital, r ($q_m = i/r$). The estimates of marginal q have been collected from Gugler et al. (2004b). Both Wurgler (2000) and Gugler et al. (2004b) report estimates for more countries than are included in our sample.

Table 7 Measure of ownership concentration

Country[a]	Family ownership (control inferred at 10%)	Family ownership (control inferred at 20%)	Ownership mean (3 largest)	Ownership median (3 largest)
Australia	10	5	28	28
Canada	30	25	40	24
Hong Kong	70	70	54	54
India	-	-	40	43
Ireland	15	10	39	36
Israel	50	50	51	55
Malaysia	-	-	54	52
New Zealand	45	25	48	51
Pakistan	-	-	37	41
Singapore	45	30	49	53
South Africa	-	-	52	52
Thailand	57	62	47	48
United Kingdom	5	0	19	15
United States	20	20	20	12
English origin	***35***	***30***	***41***	***40***
Denmark	35	35	45	40
Finland	10	10	37	34
Norway	25	25	36	31
Sweden	55	45	28	28
Scandinavian origin	***31***	***29***	***37***	***33***
Austria	15	15	58	51
Germany	10	10	48	50
Japan	10	5	18	13
South Korea	35	20	23	20
Switzerland	40	30	41	48
Taiwan	66	48	18	14
German origin	***29***	***21***	***34***	***33***
Argentina	65	65	28	28
Belgium	50	50	54	62
Brazil	-	-	57	63
Chile	-	-	45	38
Colombia	-	-	63	68
France	20	20	34	24
Greece	65	50	67	68
Indonesia	69	72	58	62
Italy	20	15	58	60
Mexico	100	100	64	67
The Netherlands	20	20	39	31
Peru	-	-	56	57
The Philippines	42	45	57	51
Portugal	50	45	52	59
Spain	25	15	51	50
Turkey	-	-	59	58
French origin	***48***	***45***	***53***	***53***
China	-	-	-	-
Hungary	-	-	-	-
Poland	-	-	-	-
Russia	-	-	-	-
Socialist origin	***-***	***-***	***-***	***-***
Average / total	***38***	***33***	***45***	***44***

Note: Data on family ownership is from La Porta et al. (1999). Data for Indonesia, the Philippines, Taiwan and Thailand is from Claessens et al. (2000). Data on ownership concentration is from La Porta et al. (1998). For descriptions see text and Table 1.

Appendix 2

Table 8 Correlation matrix

	$\hat{\lambda}_j^*$	Ownership (mean)	Ownership (median)	Family ownership (10%)	Family ownership (20%)	Property rights	shareholder protection	Law and order	Log GDP	GDP growth	Marginal q, q_m
$\hat{\lambda}_j^*$	1										
Ownership (mean)	- 0.27	1									
Ownership (median)	- 0.32	0.96	1								
Family ownership (10%)	- 0.48*	0.53*	0.59*	1							
Family ownership (20%)	- 0.49*	0.54*	0.57*	0.95*	1						
Property rights	0.43*	- 0.51*	- 0.55	- 0.60*	- 0.61*	1					
shareholder protection	- 0.20	- 0.21	- 0.20	- 0.30	- 0.29	- 0.10	1				
Law and order	0.61*	- 0.44*	- 0.46*	- 0.54*	- 0.61*	0.74*	- 0.17	1			
Log GDP	0.16	- 0.54*	- 0.54*	- 0.34	- 0.38*	0.19	- 0.02	0.41*	1		
GDP growth	- 0.34*	- 0.26	- 0.22	0.27	0.30	0.17	0.10	- 0.17	0.03	1	
Marginal q, q_m	0.12	- 0.40*	- 0.47*	- 0.19	- 0.17	0.44*	0.33*	0.24	0.28	0.28	1
$\hat{\eta}_j$	0.53*	- 0.32	- 0.34	- 0.38	- 0.50*	0.59*	- 0.03	0.71*	0.44*	- 0.48*	- 0.13

Note: * indicates significance at 5 percent. $\hat{\eta}_j$ is the elasticity of industry investment with respect to industry value added estimated by Wurgler (2000). Marginal q are estimates of the return on investment, i, relative the cost of capital, r ($q_m = i/r$). The estimates of marginal q are from Gugler et al. (2004b). See text and Table 1 for definitions.

Appendix 3

Table 9 Elasticity of capital, elasticity of investment and marginal *q*

Explanatory variables:	Dependent variable: $\hat{\lambda}_j^*$	
Constant	0.405** (2.38)	0.759*** (3.88)
$\hat{\eta}_j$	0.929*** (3.49)	-
$q_{m,j}$	-	0.192 (0.78)
R^2	0.28	0.01
No. observations	34	44

Note: *, ** and *** indicate significance at 10, 5 and 1 percent, respectively. In this table our measure of capital allocation is compared with Wurgler (2000) measure of investment elasticity ($\hat{\eta}_j$), and Gugler et al. (2004b) marginal *q* ($q_{m,j}$). Ordinary Least Squares (OLS) is used as estimator.

CHAPTER 3
Ownership Structure, Control and Firm Performance

The Effects of Vote-Differentiated Shares

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Abstract: This paper contributes to the literature on ownership, control and performance by exploring these relationships for Swedish listed companies (1997-2002). We find that firms, on average, are making inferior investment decisions and that the use of dual-class shares have a negative effect on performance. Marginal *q* is used as a measure of economic performance. It was presented in an article by Mueller and Reardon in 1993 and has recently been used in empirical studies of ownership and performance by, among others, Gugler and Yurtoglu (2003). Frequently Tobin's *Q* is used in studies of this type, but Tobin's *Q* has a number of disadvantages which can be circumvented by employing a marginal *q*. This study adds to earlier studies by investigating how the separation of vote and capital shares creates a wedge between the incentives and the ability to pursue value-maximization. The relationships between the performance and different ownership characteristics such as ownership concentration and foreign ownership are also investigated.

JEL Codes: G30

Keywords: Ownership, dual-class shares, firm performance, marginal *q*

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1 Introduction

In their famous book, *The Modern Corporation and Private Property*, Berle and Means (1932) discuss the problems related to the separation of ownership from control in large American corporations. The core of the discussion lies in ownership of large companies being so dispersed that no single owner holds more than a tiny fraction of the listed shares in each one of them. As a consequence, no single shareholder has the ability or the incentive to exercise control over the company, which in turn leads to companies being inefficiently run. The lack of ability refers to the fact that, when ownership is widely dispersed, a single owner cannot individually have much influence on the way the company is being run. The lack of incentive, on the other hand, implies that, even if an owner has the possibility to promote changes, he or she will most probably refrain from exercising this possibility since, (s)he will have to share the gains with all other shareholders, despite the fact that the efforts exerted have been exclusively personal. Thus, a problem of rational ignorance arises.

In Sweden, this problem is somewhat different since firms are allowed to have vote-differentiated shares, i.e. voting rights are frequently separated from the amount of capital invested. Consequently there is a possibility to retain control over a company by owning a relatively small fraction of the shares (equity). It seems reasonable to believe that this special characteristic of the Swedish stock market will have a certain impact on the performance of Swedish firms and create a special set of incentives that need to be considered. A wider spectrum of questions than the ones posed by Berle and Means (1932) can therefore be raised. The purpose of this paper is to empirically address the impact of the relationship between the structure of ownership and control, and firm performance for Swedish listed firms.

The novelty of this paper is that we make a distinction between the ability of owners to exercise control and the incentives the owners have to pursue profit-maximization. We argue that the wide use of dual-class shares, with strong separation of voting power and capital share creates a wedge between the incentives and the ability to pursue shareholder value-maximization.

To estimate the effects of ownership characteristics and vote-differentiation we use marginal q as performance measure. Marginal q is more appropriate for this purpose as compared to Tobin's Q, because it measures marginal performance instead of average performance.

The paper is organized in six sections. A theoretical discussion, where we attempt to shed some light on the existing theories on the relation between ownership and performance, is provided in Section two. In Section three, the impact of portfolio and control incentives on ownership and performance is discussed from an exit and voice perspective. Section four presents the method

and variables used, and marginal q is derived. In Section five, our findings are presented and analyzed. Conclusions summarize the paper in Section six.

2 The impact of ownership and control structure on firm performance

The literature on corporate governance has primarily focused on large firms. One seminal contribution to this field was made by Berle and Means (1932), who devoted a whole book to the alleged detrimental effects of the separation of ownership and control, focusing on large corporations (joint stock companies) with dispersed ownership. However, the picture painted by Berle and Means apply primarily to Anglo Saxon countries. In Scandinavia and Continental Europe the ownership structure is much more concentrated (see e.g. Morck et al., 2005). The more concentrated ownership structure has implications on performance. Gugler and Weigand (2003) found for Germany that large dominating owners affected firm performance separately and exogenously. Hence, concentration of control to dominating owners is of special interest when European data is used.

Another study that also demonstrates the relevance of ownership structure in the allocation of firms' resources is Alonso, et al. (2005). They use a dataset, similar to this study, of 101 large non-financial publicly-traded Spanish firms and also a similar panel-data approach. However, the study takes no account of any formal separation between capital ownership and vote control. In fact, Spain is one of few European countries in which dual-class shares are not used, see Table 1.

A theoretical foundation for the agency problem inherent in the division of ownership and control is provided by Jensen and Meckling (1976). By developing a model of how the interests of management and owners diverge when ownership and control are separated, the detrimental effects on firm value of a separation of ownership and control are rigorously demonstrated. In Jensen's and Meckling's model, the utility function of a controlling manager is assumed to have firm value and on-the-job consumption as the only two arguments. On-the-job consumption is at the expense of firm value.

As outside owners are not working in the firm, shareholder value is presumably the only argument in their utility function. This means that on-the job consumption does not enter into the utility functions of the outside owners. As a result, there is a divergence of the interests between the controlling managers/owner and the outside owners.

In countries like Sweden, which allow for vote-differentiation of shares, it is important to make a distinction between the ability and the incentives to maximize firm value. The ability of the shareholder to exercise control of the management is determined by the voting power that can be exercised at the shareholders' meeting. The incentives to exercise value-increasing control are,

however, linked to what portion of the equity of the firm that a shareholder owns. Ownership of a large portion of equity means that a large portion of increases in firm value can be appropriated by an active shareholder.

Using UK data from the financial industry, Mudambi and Nicosia (1998) find evidence which support this so-called entrenchment effect. However, they do not test whether the formal separation of ownership and control have an effect on performance. A formal divergence of ownership and control that dual-class shares imply complicates the analysis. It is intuitive that such vote-differentiation will change the predictions of the Jensen and Meckling model.

In Sweden the vote-differential can be as large as 1:10 (the so-called A-share carries 10 times more votes than a so-called B-share), and a further separation of capital and votes can be achieved by a pyramidal ownership structure. In contrast to, for example, the US and the UK; dual-class shares are frequently used in Sweden - about 55 percent of all listed firms use vote-differentiation (Tson Söderström et al., 2003). In fact, Sweden has the highest share of firms with vote-differentiated shares in Europe, see Table 1.

Table 1 Vote-differentiation in Europe

Country	Number of Firms	Number of firms with dual-class shares	Share of firms with dual-class shares
Belgium	130	0	0.00
Portugal	87	0	0.00
Spain	632	1	0.00
France	607	16	0.03
Germany	704	124	0.18
Austria	99	23	0.23
Ireland	69	16	0.23
Great Brittan	1953	467	0.24
Denmark	210	70	0.33
Finland	129	47	0.36
Italy	208	86	0.41
Sweden	334	185	0.55
Total	**5162**	**1035**	**0.20**

Source: Bennedsen and Nielsen (2002), in: Tson Söderström et al. (2003)

Proponents defend the system with the argument that it constitutes a way for owners to influence the management of large firms. On the other hand, it can, at the same time, be claimed that a disadvantage of the system is the disproportion between capital share and control potential that arise with vote-differentiated shares. As an effect investors, other than the controlling shareholder, will benefit the most from effective control of the firm. The cost of catering to other than value maximizing objectives will thus be lower in a dual-share system than in a system with one share, one vote. The enhanced ability to control and distort value maximizing incentives are thus two opposing forces that must be considered in an analysis of the system. Furthermore, due to the specific characteristics of the Swedish stock market, with dual-class shares and often a pyramid ownership structure, there is virtually no active market for corporate control.

Agnblad et al. (2001) have argued that these specificities of the Swedish corporate governance model might be economically more important than the effects of minority protection. Or to use their words:

> *"The Swedish corporate governance model with its strong separation between ownership and control locks in owners for long periods of time, even from one generation to another. The widespread use of dual-class shares and pyramids can thus have substantial costs in terms of loss in dynamics in ownership and control."*
>
> *(Agnblad et al., 2001, p. 230)*

3 Portfolio and control investment

In the modern corporate finance literature a portfolio perspective is presented. Risk and return are stressed as the only utility arguments that matter. The important risk is the systematic risk which it is impossible to diversify away from. The control aspect of stock ownership is disregarded in this theory. Owners and managers are assumed to have no other goal than to maximize the value of the firm. What the investor has to care about is only how to find combinations of assets that maximize the return given the level of risk or vice versa. In this paper, a different approach is used where the control aspect is also taken into consideration. Different types of owners are assumed to have different preferences for the portfolio and control aspects of stock ownership.

Hence it is assumed that a portfolio theory perspective is likely to be especially useful in analyses of the behavior of institutional investors such as mutual funds. A feature of the globalization of the economy is that investment companies are offering mutual funds with assets from all parts of the globe. This strive towards world-wide coverage is partly motivated by the advantages of international diversification on return and risk. The globalization trend

shows up in the increase of foreign ownership in most capital markets around the world.

It is further assumed that foreign owners, predominantly in the form of foreign institutional investors such as pension funds etc., are primarily interested in the capital aspect of shares. They do not have any special interest in the voting power a share represents. Consequently, we expect this type of investors in an economy like Sweden's with vote-differentiated shares to be biased towards acquiring shares with lower voting power.

Investors acting in accordance with general portfolio theory are likely to frequently make adjustments in the composition of their portfolio in response to changes in stock performance in different markets. An exit from poorly performing shares and markets to better performing shares and markets can be expected. With large amounts to invest abroad the behavior of these types of foreign investors is likely to have both a real stock price effect as well as a signaling effect to other investors regarding the valuation of a specific firm. Using Hirschman's terminology global investment companies and their mutual funds is likely to be characterized by exit-type behavior (Hirschman, 1970).[50] This reasoning leads us to formulate hypothesis 1.

> **Hypothesis 1:** The share of foreign ownership will be higher in well performing firms.

Controlling owners, defined as the largest single owner, either in vote or equity, are investors that can be guided by many different incentives. Being more or less intimately involved in the control of the company, in which they have the largest ownership stake, it can be assumed that they are concerned about both the value of the firm and the opportunity to benefit from perks and other amenities. Such an assumption is justified by the fact that they usually belong to the type of investors that have both the knowledge and power to enforce firm actions as well as benefit from other than value-maximizing uses of the resources of the firm. Even though they can enforce value-maximizing behavior directly, it is not self-evident that value-maximizing behavior is always their most important objective. In fact, many observers (i.e. Scitovsky, 1943, Knight, 1965) of the owner-led firm have stated that such owners might have many other objectives than profit or shareholder value-maximization (for a discussion, see Mueller, 2003). To Schumpeter (1934), the entrepreneur (owner) even resembles a medieval knight setting out to create a *"private kingdom"* or a *"dynasty"*. Vote-differentiated shares provide an opportunity to create a kingdom at a low cost. At least in short-term perspective owners aiming at control may exert influence that can be at odds with value-maximization.

[50] A similar interpretation of the behavior of investors according to Hirschman's classification can be found in Hedlund (1984).

Hypothesis 2: In a vote-differentiated stock market there will be a negative relationship between owner concentration and investment performance.

The incentive structure of the owners is, of course, different in firms that do not allow vote-differentiated shares. In these firms, the controlling owner's wealth is connected to the capital share invested in the firm. The controlling owner's wealth-maximization objective is thus more in line with the shareholders value-maximization objective. Here, the predictions of the Jensen and Meckling (1976) model are expected to hold, with a positive, albeit not linear, relationship between the controlling owner's ownership stake and the interests of the shareholders.

As mentioned before, the Swedish stock market is characterized by an ownership structure with unusual strong separation of ownership and control. The Swedish stock market regulations allow separation of ownership and control both through the use of vote-differentiated shares, pyramid ownership structures and cross shareholdings. Through vote-differentiation it is possible to get control over the firm with a modest share of the equity capital. As far as the incentives for enforcing value-maximization are primarily related to capital share, a vote-differential can be expected to have a negative impact on performance. The costs of using the control power for other ends than value-maximization decrease with vote-differentiation. In some cases, it might even be that the enhanced control power is used to foster business interests in other firms controlled by the dominating owners. Consequently, one might expect that the use of a control instrument in vote-differentiated firms will have a negative effect on investment performance. To see if this supposition is justified we formulate hypothesis 3.

Hypothesis 3: The use of vote-differentiated shares will have a negative effect on firm's investment performance.

The next section describes the method and variables used to test our hypothesis.

4 Method and variables

To test the effects of the Swedish ownership structure we adopt the methodology of Gugler and Yurtoglu (2003) and the marginal q developed by Mueller and Reardon (1993). However, marginal q is derived in a slightly different way. In standard textbooks on corporate finance, such as Brealey and Myers (1991), the net present value rule is introduced as the criterion to be used when a firm evaluates investments. The criterion requires for each project a comparison between the negative cash flow of the investment (I) and the present value (PV) of future cash flows (CF_t) generating

($PV = \sum_{t=1}^{n} CF_t \frac{1}{(1+r)^t}$). The difference between *PV* and *I* is called net present value (*NPV*). The rule says that all projects with a positive *NPV* shall be undertaken (or in other words accept all projects with $NPV = PV - I > 0$).

The reason for a firm to make investments in projects with $NPV > 0$ is that shareholders are made better off compared to alternative uses of the funds. (Hence, the wealth of the shareholder is not increased by a distribution of the funds directly to the shareholders by means of repurchase of shares or dividends.) The referred shareholders are the ones that are outsiders in the sense of not working in the firm. As suppliers of capital they are mainly interested in the return on the firm's investments. These shareholders cannot benefit from on-the-job-consumption in the way described by Jensen and Meckling (1976). All their consumption takes place outside the firm. (Projects with $NPV < 0$ can only benefit insiders like the management of the firm in the form of on-the-job consumption.)

The market value of the firm M_t bears a direct relation to the sum of the present values of all the running projects that the firm has invested assets in over time. In an efficient stock market the market value of the firm is equal to the sum of the present values of these projects. The present value (PV_t) of investment (I_t) during a time period will increase the market value of the firm if PV_t is larger than the depreciation of assets from earlier investments (i.e. $M_t - M_{t-1} = PV_t - Depreciation$, see e.g. Gugler et al., 2002).

Considering that the market can make errors in the estimation of future cash flows the expression for change in market value in a period *t* can be written as

$$M_t - M_{t-1} = PV_t - Depreciation + \mu_t \tag{1}$$

where μ_t represents the error the market makes in the estimation of market values. In an efficient market, actors make unbiased estimates of the error term and μ_t has an expected value of zero and a nominal distribution around zero.

The net present value rule prescribes that managers shall invest in projects up to the point where $NPV = 0$. Otherwise, the management is not acting in the interest of the shareholders. A $NPV = 0$ implies that $PV_t = I_t$ or that

$$\frac{PV_t}{I_t} = 1 \tag{2}$$

In the same fashion $NPV > 0$ (unused profitable investment opportunities) implies $\frac{PV_t}{I_t} > 1$, and $NPV < 0$ (managerial discretion of on-the-job

consumption character) implies $\frac{PV_t}{I_t} < 1$. Like Gugler et al. (2002) we can rewrite (2) as

$$\frac{PV_t}{I_t} = q_m \tag{3}$$

with $q_m = 1$ for the project last accepted indicating an efficient investment level, $q_m > 1$ implying that the firm is not investing enough, and $q_m < 1$ implying managerial discretion.

Inserting (3) in (1) gives

$$M_t - M_{t-1} = q_m I_t - Depreciation + \mu_t \tag{4}$$

As pointed out by Gugler et al. (2002) it can easily be seen from (3) and (4) that q_m is related to Tobin's Q in a way that justifies the denomination marginal q (q_m). While Tobin's Q reflects the market value (M_t) divided by the replacement cost of all assets of the firm, q_m shows the relationship between the cost of a change in the stock of assets and the subsequent change in market value. The marginal character is evident.

By dividing both sides of (4) by M_{t-1} a normalization that is useful in empirical testing is accomplished. We get

$$\frac{M_t - M_{t-1}}{M_{t-1}} = -\delta + q_m \frac{I_t}{M_{t-1}} + \frac{\mu_t}{M_{t-1}} \tag{5}$$

where δ is the depreciation rate.

Equation (5) assumes that the capital market is efficient in the sense that future cash flows are unbiased estimates. As t grows larger the term μ_t / M_{t-1} will approach 0.

The marginal q, q_m, has a number of advantages. First, as mentioned previously, a marginal performance measure is more appropriate than an average Tobin's Q, when testing hypotheses about managerial discretion. Secondly, q_m has a straightforward interpretation. If managers invest in a project that yields a return that is less than the cost of capital ($r_t < i_t$), q_m will be < 1, which means that managers are over-investing. Conversely, if $q_m > 1$ managers are not investing enough, i.e. projects that earn returns higher than the cost of capital are not pursued. Thus for the firm to be profit-maximizing, q_m must be equal to one.

In order to estimate equation (5) we need data on the market value of firms and their investments. The market value of a firm is defined as all debt plus the total value of all its outstanding shares at the end of time *t*.

Finally, a few words about how investment is calculated. According to the originators, Mueller and Reardon (1993) and Gugler et al. (2002), total investment is defined as

$$I = \textit{After tax profits} + \textit{Depreciation} - \textit{Dividends} + \Delta\textit{Debt} + \Delta\textit{Equity} + \textit{R\&D} + \textit{ADV}$$

where ΔD and ΔE are funds raised using new debt and equity issues. *R&D* and *ADV* (advertising expenditures) are also forms of investment, which may contribute to a company's market value.

The data used in the regressions is provided by UC-Select and consists of accounting data for 95 firms listed on the Stockholm Stock Exchange in the period 1997-2002. The data on ownership concentration and type of owners are taken from the Swedish SIS-Ownership database[51].

The ambition was to produce a balanced panel data set. In order to get a balanced data set several criteria were applied to the selection of firms. Excluded from the sample were firms with accounting periods less and/or different than a full calendar year running from January to December. To be included in the sample the firms also needed to have stock market data reported by Affärsvärlden, which is the major Swedish database on stock market data. As a result of this second criterion, only firms listed on the so-called A and O lists of the Stockholm Stock Exchange were included. The last selection criterion was that the companies in the sample had to be listed on any of these two lists for all of the five years 1997-2002. Banks and financial firms were also excluded because of the nature of their investments.

The above-stated criteria ensure liquidity in the share and that valid comparisons can be made for exactly the same firms for all years. When all the criteria were satisfied the test population had decreased substantially from around 300 companies to 95.

To test our hypothesis that the investment performance of firms with vote-differentiated shares is lower than the investment performance in firms without dual-class shares (hypothesis V), the sample firms were divided into two groups, firms with or without vote differential. Striking is the low number of Swedish firms with no vote differential, only 21 of 95 firms compared to the remaining 74 firms with vote-differentiated shares. This simple arithmetic confirms the strong and stable ownership structure described in section two as the general model applied to most Swedish firms.

Table 2 offers a description of the variables used in the study. Owing to the prevalence of vote-differentiated shares in Swedish listed firm, separate

[51] Sundin, A. and Sundqvist S-I. (1998-2002).

ownership measures are provided for the distribution of both votes and equity. CR1 and CR5 refer to capital share (equity), while VR1 and VR5 refer to the shares of votes controlled by 1 and 5 owners respectively.

An ownership category of special interest is foreign owners represented by CRFOR and VRFOR. CRFOR refers to capital share controlled by foreign owners and VRFOR refers to the number of votes controlled by foreign owners. For further discussion, see section 3. A description of the variables is provided in Table 1.

Table 2 Description of variables

CR1	Percentage of equity owned by the largest shareholder
CR5	Percentage of equity owned by the five largest shareholders
VR1	Percentage of votes controlled by the largest shareholder
VR5	Percentage of votes controlled by the five largest shareholders
VOTDIF	Dummy variable for vote-differentiation of shares. 1 if the firm makes use of a dual class system, 0 if not
CRFOR	Percentage of equity owned by foreign investors
VRFOR	Percentage of votes controlled by foreign investors

Appendices 1 and 2 contain correlation matrices and descriptive statistics for each year, respectively. For obvious reasons, CR1, CR5, VR1, and VR5 display a fairly high correlation. CRFOR and VRFOR are, as expected, negatively correlated with these variables.

In order to test our hypothesis regarding ownership structure and firm performance we structured three panel data estimations. First, we made Ordinary Least Square (OLS) estimations for all equations, estimating the effects of ownership concentration and the dual-class share system. The same equations were then estimated using a fixed effects model with period and group effects, and a random effects model. A balanced panel data set consisting of 475 observations was used for all the estimations.

For the regressions made with $(M_t - M_{t-1})/M_{t-1}$ as the dependent variable, I_t/M_{t-1} is used as an explanatory variable. In addition to this interaction-terms of I_t/M_{t-1} and relevant variables are employed in order to test the effects of ownership concentration and vote-differentiation. Thus, the equation estimated here has the following general form: $Y = \beta_1 + \beta_2 X + \beta_3 XZ$ and the marginal effect (dY/dX) is therefore $\beta_2 + \beta_3 Z$ which in this case has the economic interpretation q_m. Based on this we estimate the two following empirical equations (6 and 7):

$$\frac{M_t - M_{t-1}}{M_{t-1}} = -\delta + \beta_1\left(\frac{I_t}{M_{t-1}}\right) + \beta_2\left[CR_i\left(\frac{I_t}{M_{t-1}}\right)\right] + \beta_3\left[CRFOR\left(\frac{I_t}{M_{t-1}}\right)\right] + \beta_4\left[VOTDIF\left(\frac{I_t}{M_{t-1}}\right)\right] + \varepsilon_i \qquad (6)$$

$(\approx 1) \qquad (< 0) \qquad (> 0) \qquad (< 0)$

$$\frac{M_t - M_{t-1}}{M_{t-1}} = -\delta + \beta_1\left(\frac{I_t}{M_{t-1}}\right) + \beta_2\left[VR_i\left(\frac{I_t}{M_{t-1}}\right)\right] + \beta_3\left[VRFOR\left(\frac{I_t}{M_{t-1}}\right)\right] + \beta_4\left[VOTDIF\left(\frac{I_t}{M_{t-1}}\right)\right] + \varepsilon_i \qquad (7)$$

$(\approx 1) \qquad (< 0) \qquad (> 0) \qquad (< 0)$

Since we estimate these equations for both the single largest owner and the five largest owners we estimate in total four equations. Following from our hypothesises we expect the first β to be approximately equal to one, the effect of ownership concentration (CR_i and VR_i) we expect to be negative, foreign ownership (CRFOR and VRFOR) is expected to be positive, and the use of vote-differentiated shares (VOTDIF) is expected to have a negative impact. It should be noted that the error term ε_i is a standard regression error term and is not the same as the error term, μ_i, in the theoretical equation (5). The intercept δ is, as noted earlier, the rate of depreciation and therefore not relevant for the interpretation of q_m[52].

5 Findings and analysis

In our sample close to 70 percent of the firms have vote-differentiated shares. Furthermore, the largest single owner has, on average, a capital share around 25 percent and foreign owners on average a capital share around 18 to 19 percent in the Swedish listed firms, (see Appendix 2). Appendix 2 shows that the ownership concentration in terms of vote shares widely exceeds the capital share concentration. The largest owner has, on average, a vote share of 37 to 39 percent compared to the 25 percent capital share. This is far from the dispersed ownership of large corporations that Berle and Means (1932) analyzed. According to them, firms with dispersed ownership had less than 20 percent of the shares (votes) controlled by one owner. This is the statistical background to our hypotheses of the impact of ownership on investment performance in a vote-differentiated stock market. To test our hypotheses, we employ three estimation procedures, for the case when only the largest owner's shares of capital and votes, and for the case when the five largest owners' share of capital and votes are studied.

The results from these regressions are presented in Tables 3 and 4. Table 3 A contains the results for CR1, CRFOR and VOTDIF. Table 3 b contains the results for VR1, VRFOR and VOTDIF. In Table 4, CR1 and VR1 have been replaced with CR5 and VR5 respectively.

[52] Note that when differentiating with respect to investments, I_t, the depreciation rate, δ, disappear, and hence have no relevance for the interpretation of q_m.

Table 3 Regression results (the largest shareholder)

Estimation method	OLS		Fixed effects model with group and period effects		Random effects model	
	Coeffic.	*t*-Value	Coeffic.	*t*-Value	Coeffic.	*t*-Value
A: Dependent variable: $(M_t - M_{t-1})/M_{t-1}$						
I_t/M_{t-1}	0.852	4.89	1.437	5.59	1.126	5.37
$(I_t/M_{t-1})CR1$	-0.009	-2.94	-0.014	-3.44	-0.011	-3.09
$(I_t/M_{t-1})CRFOR$	0.016	3.36	0.018	2.36	0.016	2.86
$(I_t/M_{t-1})VOTDIF$	-0.449	-3.37	-0.769	-3.88	-0.557	3.54
R^2	0.171		0.369		0.171	
Adj. R^2	0.164		0.194		-	
F-value	24.22		2.11		-	
No. observations	475		475		475	
B: Dependent variable: $(M_t - M_{t-1})/M_{t-1}$						
I_t/M_{t-1}	0.831	4.95	1.467	6.09	1.043	5.33
$(I_t/M_{t-1})VR1$	-0.006	-2.79	-0.011	-3.57	-0.008	-3.08
$(I_t/M_{t-1})VRFOR$	0.013	2.61	0.011	1.47	0.012	2.08
$(I_t/M_{t-1})VOTDIF$	-0.332	-2.19	-0.640	2.94	-0.430	-2.44
R^2	0.155		0.359		0.155	
Adj. R^2	0.148		0.181		-	
F-value	21.64		2.02		-	
No. observations	475		475		475	

The OLS-estimates are significant for all variables and confirm the results in the two other models. However, the fixed effects model, which takes into account both period and group dummy effects, is theoretically correct because we wish to study individual firms during the stated period. Also, since its explanatory value is higher (R^2 equal to 0.369), we continue our analysis focusing mainly on the results from the fixed effects model. The results are very stable, thus, all three estimation procedures yield very similar result. The Hausman test also indicates that the fixed effects model is the best estimation.

Table 4 Regression results (the five largest shareholders)

Estimation method	OLS		Fixed effects model with group and period effects		Random effects model	
	Coeffic.	*t*-Value	Coeffic.	*t*-Value	Coeffic.	*t*-Value
A: Dependent variable: $(M_t - M_{t-1})/M_{t-1}$						
I_t/M_{t-1}	1.036	4.75	1.702	5.60	1.269	5.04
$(I_t/M_{t-1})CR5$	-0.009	-3.00	-0.015	-3.58	-0.011	-3.19
$(I_t/M_{t-1})CRFOR$	0.017	3.58	0.021	3.00	0.018	3.22
$(I_t/M_{t-1})VOTDIF$	-0.436	-3.24	-0.725	-3.60	-0.537	-3.37
R^2	0.172		0.371		0.172	
Adj. R^2	0.165		0.196		-	
F-value	24.33		2.12		-	
No. observations	475		475		475	
B: Dependent variable: $(M_t - M_{t-1})/M_{t-1}$						
I_t/M_{t-1}	0.874	3.99	1.546	5.19	1.097	4.40
$(I_t/M_{t-1})VR5$	-0.006	-1.90	-0.010	-2.58	-0.007	-2.17
$(I_t/M_{t-1})VRFOR$	0.016	3.24	0.017	2.43	0.016	2.80
$(I_t/M_{t-1})VOTDIF$	-0.373	-2.31	-0.685	-2.98	-0.467	-2.50
R^2	0.148		0.348		0.148	
Adj. R^2	0.141		0.168		-	
F-value	20.41		1.93		-	
No. observations	475		475		475	

When looking at capital share, one owner, an average Swedish firm with dual-class shares has an estimated q_m = 0.653[53] (0.658 for capital share five owners (CR5)). This is remarkably consistent with the findings of Gugler et al. (2002), who estimate an average q_m for Sweden to 0.65. This implies that firm managers invest in projects that earn on average 34.7 per cent less than the cost of capital. Thus, they must be interpreted as investment failures. For hypothetical firms with low ownership concentration we estimate q_m's that are closer to one. This also holds, *mutatis mutandis*, for firms with only one class of shares. That is, as the ownership concentration increases, the investment performance declines.

[53] The number is attained by plugging in the regression coefficient estimates from the fixed effects model with respect to the capital share regression (A).

According to hypothesis 1, it is expected that foreign ownership will have a positive impact on investment performance. This is confirmed with high significance in all the three estimation models, both when using the ownership concentration of the largest single owner and the aggregate ownership of the five largest together; see Tables 3 and 4. The positive and significant impact of foreign ownership on performance confirms earlier findings on Swedish data made in Bjuggren and Bohman (2002). The summary statistics (Appendix 2) also shows that foreign owners have a low share of votes given their share of invested capital (CRFOR is low compared to VRFOR). Foreign owners are thus biased towards shares with lower voting power.

In line with the reasoning regarding the special characteristics of the Swedish ownership structure, one would expect a negative impact of concentrated ownership on investment performance of Swedish listed firms (hypothesis 2). This negative relationship is significant in all the estimations. What this tells us is that the Swedish model of ownership structure with its characteristics of strong controlling owners and separation of vote and capital shares suffers from some drawbacks.

The dual-class share system allows investors to maintain control of firms with a relatively small share of equity. In our sample, the concentration of votes is higher than the concentration of capital (equity) for both measures of ownership concentration, CR1 and CR5, as compared to VR1 and VR5 respectively. Controlling owners are thus biased towards shares with higher voting power.

A possible explanation for the negative relationship between ownership concentration and performance is the possibility for controlling owners to exploit minority investors and cater to other than shareholder value-maximization objectives. A dominating owner may actively choose investments in line with personal interests rather than those of the remaining shareholders, i.e. choose investments that do not benefit shareholders in general. As already noted, the single largest shareholder in the firms studied has an ownership stake which controls on average around 38 percent of the votes. This is in most cases enough to control the firm and benefit personally at the expense of minority shareholders.

When the estimations are made for the aggregate ownership stakes of the five largest shareholders (CR5 and VR5), this picture becomes even clearer, see Table 4. On average, five owners control together more than 61 percent of the votes in the sample firms (see summary statistics in Appendix 2). It is apparent that the Swedish stock market is less dispersed in ownership than one might first expect. The effect of the aggregate ownership stakes of the five largest shareholders on investment performance is also in line with hypothesis 2, that is, significantly negative when estimated in any of the models.

The third variable that is tested is vote-differential. In firms which have dual-class shares minority misappropriation and less than efficient use of the firms' resources are a more likely event. In line with this reasoning one would

expect a negative effect of vote-differential on investment performance and valuation (hypothesis 3). Indeed, in all three estimation models and for every ownership category used we find a negative and significant effect of vote-differential on investment performance.[54]

Finally, a caveat about causality can be made. The holdings by foreign investors might be associated with problems of reversed causality. Foreign portfolio investors are likely to be well apt to identify well performing firms and invest in them. Similarly, foreign investors are likely to leave firms that are underperforming. To put it differently, portfolio inventors are likely to exit an underperforming firm rather than to exercise voice.

6 Conclusions

There are many facets to ownership structure which makes it a difficult topic to study. The dual-class share system is one aspect of corporate governance that potentially has far-reaching consequences for the long-run performance of industries. We have chosen to look at the Swedish ownership structure from three different perspectives. Besides the more traditional variables on ownership concentration, we also look at the ownership of foreigners and the impact of vote-differentiation, and the dual-class share system in general. A distinction is made between capital share and voting share.

An important result is the negative impact of vote-differentiation and ownership concentration on firm value and investment performance. The Swedish model of corporate governance does not seem to function so well. We also found that foreign ownership seems to be susceptible to how well a firm performs. A positive relationship between foreign ownership and investment performance and firm value is found. Furthermore, for foreign owners there is a bias towards ownership of shares with lower voting power. A portfolio type of behavior is put forward as an explanation for these results.

As this study adds to a rather new tradition of using marginal q as performance, it is also worth noting that the low marginal q obtained (implying poor investment performance) is remarkably consistent with the earlier results obtained by Gugler et al. (2002).

[54] Separate regressions were estimated when the sample firms were divided into two subsets, with or without vote-differential. These regressions supported the findings in Tables 3 and 4. As the results were generally the same, these regressions are excluded but are available upon request; suffice to say the results in Table 3 and 4 are confirmed.

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Appendix 1

Correlation matrix 1998

	CR1	CR5	CRFOR	VR1	VR5	VRFOR
CR1	1	0.835	-0.498	0.753	0.607	-0.413
CR5		1	-0.551	0.669	0.740	-0.456
CRFOR			1	-0.392	-0.378	0.822
VR1				1	0.831	-0.542
VR5					1	-0.606
VRFOR						1

Correlation matrix 1999

	CR1	CR5	CRFOR	VR1	VR5	VRFOR
CR1	1	0.826	-0.440	0.765	0.648	-0.389
CR5		1	-0.485	0.672	0.792	-0.417
CRFOR			1	-0.355	-0.390	0.877
VR1				1	0.831	-0.473
VR5					1	-0.522
VRFOR						1

Correlation matrix 2000

	CR1	CR5	CRFOR	VR1	VR5	VRFOR
CR1	1	0.844	-0.423	0.734	0.632	-0.334
CR5		1	-0.457	0.634	0.754	-0.307
CRFOR			1	-0.340	-0.369	0.858
VR1				1	0.818	-0.414
VR5					1	-0.437
VRFOR						1

Correlation matrix 2001

	CR1	CR5	CRFOR	VR1	VR5	VRFOR
CR1	1	0.826	-0.346	0.739	0.615	-0.275
CR5		1	-0.373	0.647	0.781	-0.280
CRFOR			1	-0.325	-0.322	0.906
VR1				1	0.807	-0.423
VR5					1	-0.408
VRFOR						1

Correlation matrix 2002

	CR1	CR5	CRFOR	VR1	VR5	VRFOR
CR1	1	0.803	-0.298	0.737	0.610	-0.236
CR5		1	-0321	0.600	0.772	-0.222
CRFOR			1	-0.266	-0.294	0.915
VR1				1	0.784	-0.383
VR5					1	-0.380
VRFOR						1

Appendix 2

Descriptive statistics 1998

	Mean	Std. Dev.	Minimum	Maximum	No. observ.
CR1	24.8	16.1	3.8	71.3	95
CR5	47.9	18.4	10.0	91.0	95
CRFOR	18.1	16.2	0	67.6	95
VR1	38.7	22.8	4.4	95.1	95
VR5	61.6	22.1	10.8	97.6	95
VRFOR	13.2	14.6	0	63.2	95

Descriptive statistics 1999

	Mean	Std. Dev.	Minimum	Maximum	No. observ.
CR1	25.1	16.0	4.0	70.6	95
CR5	49.3	18.0	8.9	91.8	95
CRFOR	18.2	16.7	0	62.0	95
VR1	38.9	22.4	4.6	93.7	95
VR5	62.0	21.7	9.6	98.3	95
VRFOR	14.4	16.3	0	62.0	95

Descriptive statistics 2000

	Mean	Std. Dev.	Minimum	Maximum	No. observ.
CR1	25.8	16.2	3.7	73.7	95
CR5	49.4	18.5	13.4	91.9	95
CRFOR	17.6	15.8	0.3	59.5	95
VR1	39.2	21.5	5.6	89.5	95
VR5	62.4	20.4	16.1	97.9	95
VRFOR	14.6	16.3	0.1	63.1	95

Descriptive statistics 2001

	Mean	Std. Dev.	Minimum	Maximum	No. observ.
CR1	25.3	15.5	4.8	74.5	95
CR5	47.5	18.9	12.8	91.7	95
CRFOR	20.1	18.2	0.3	90.2	95
VR1	37.9	21.1	5.0	90.6	95
VR5	59.7	21.8	14.7	97.1	95
VRFOR	16.7	18.3	0.1	90.2	95

Descriptive statistics 2002

	Mean	Std. Dev.	Minimum	Maximum	No. observ.
CR1	24.6	15.3	4.7	72.8	95
CR5	48.6	19.1	12.7	92.4	95
CRFOR	19.5	17.2	0.5	88.2	95
VR1	36.6	20.8	5.0	90.6	95
VR5	60.4	21.2	15.9	96.6	95
VRFOR	15.8	17.2	0.2	88.2	95

CHAPTER 4
Corporate Governance and Investment in Scandinavia

Ownership Concentration and Dual-Class Share Structure

Johan E. Eklund

Abstract. In Scandinavia, there are a number of legal practices, with common political roots, that impinge on the distribution of corporate control, which may affect firm performance. This paper examines the returns on investment and the effects of ownership concentration in a large sample of listed Scandinavian firms. The marginal q developed by Mueller and Reardon (1993) is used to measure performance. Marginal q measures the marginal return on capital relative to the cost of capital. The question of how ownership concentration affects managerial investment decisions is examined. A Scandinavian corporate governance feature is the widespread use of vote-differentiation. The paper analyses how such deviations from the one share-one vote principle affects this ownership-performance relationship. The main finding is that ownership concentration improves performance, whereas dual-class shares reduce the incentive effect and enhance the managerial entrenchment effect. On average, firms with dual-class shares over-invest.

JEL Codes: G 30, C 23, K22, L25

Keywords: Investment, Marginal q, corporate governance, ownership concentration, managerial entrenchment, one share-one vote, dual-class shares.

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1 Introduction

The way in which corporations are governed has received popular attention in recent years due to a series of corporate scandals, such as, for example, the so-called "Skandia scandal" in Sweden, Parmalat in Italy or Enron in the US. These are cases where the management has misused corporate resources and failed to serve the interests of the owners. However, the importance of sound corporate governance institutions and practices is more fundamental, and goes deeper than merely preventing flagrant fraud and managerial deceitfulness. A large body of literature shows that corporate governance has a much more profound effect on the efficiency of resource allocation[55].

In essence, the corporate governance system in a country is the institutional framework that supports the suppliers of finance to corporations and enables firms to raise substantial amounts of capital (Shleifer and Vishny, 1997). By protecting suppliers of capital and safeguarding property, sound governance systems facilitate mobilization and allocation of capital to useful investments. Corporate governance systems are of outmost importance for the allocation of capital to its highest value use. It can be argued that the corporate governance system in a country determines the speed of structural change and economic development by affecting allocation and reallocation of capital. Therefore, the crucial question is whether the corporate governance system induces managers of corporations to make good value enhancing investment decisions, or not. In particular, the ownership concentration and composition appear to matter for firm performance as shown by Morck et al. (1988)[56]. This paper looks at corporate governance and the rates of return on corporate investment in Scandinavia. The structure of ownership and its effects on performance is examined.

Taking an outsider's view of Scandinavia, the corporate governance systems in the Scandinavian countries, Sweden, Finland, Norway and Denmark, arguably display more similarities than differences. The countries share a number of important features that make them unison in comparison to other countries. It has, for example, been hypothesized that the common origin of the legal systems in Scandinavia is still reflected in the quality of corporate governance (La Porta et al., 1997). Furthermore, Scandinavian firms are typically controlled by a dominant owner and only a small minority of firms is characterized by dispersed ownership structure. Finally, the Scandinavian

[55] For a review of the corporate governance literature see, for example, Shleifer and Vishny (1997), Morck et al. (2005), Mueller, (2003) and Denis and McConnell (2003).

[56] There is a large literature on ownership and firm performance/value emanating from the work of Morck et al. (1988). See e.g. McConnell and Servaes (1990). For critique see Demsetz and Lehn (1985).

countries can also be said to have a common political orientation, with strong social democratic traditions (e.g. Högfeldt, 2004), which, according to Roe (2003), matters for corporate governance.

Such apparent homogeneity of the Scandinavian countries in combination with the importance of well functioning corporate governance systems motivates a comparison of corporate returns and ownership structure in Scandinavia. The purposes of this paper are therefore: First, to asses the returns on investment made by the largest firms in Scandinavia. Second, is to examine the effect of ownership structure on investment decisions. As variations in ownership structure potentially can explain variations in performance and in returns on investment. Finally, and perhaps most importantly, the paper analyses how deviations from the one share-one vote principle affect this ownership-performance relationship. Outright expropriation of corporate assets and investor funds by managers is likely to be small in developed economies, such as the Scandinavian ones. Over-investment in pursuit of ends other than profit maximization and misallocation of assets is more likely to be a problem.

The paper is organized in six sections. Relevant literature on investment, corporate governance and ownership is reviewed in section two. In section three, the method is derived and the data is described. In section four, the returns on corporate investment in Scandinavia are assessed. The fifth section examines how ownership and the extensive use of dual-class shares affect investment decisions. Section six provides the conclusions.

2 Corporate control and investment

Neoclassical investment theory suggests that investment is expanded up to the point where the expected marginal rate of return equals the opportunity cost of capital. This condition would be satisfied in a friction-free world without any informational asymmetries, agency problems or transaction costs. Capital would flow automatically to the most efficient use and thereby guarantee that welfare is maximized. However, the rise of the modern corporation, with its separation of owners and financiers from the management, has created a set of agency problems that can cause investment decisions to deviate from what is predicted in neoclassical models (see chapter 1).

The limited-liability corporation emerged in the early 18th century as a tool for financing ventures that were too large for any single investor to be able or willing to supply all the necessary capital, but it also meant that the investors handed over most of the decision making to managers. Thus, a classical principal-agent dilemma arose as a direct corollary of this partition of the decision-making process and the supply of capital. This was observed already at the very dawn of the modern corporation by Adam Smith, who noted that:

"The directors of such companies, however, being the managers rather of other people's money than of their own, cannot well be expected, that they should watch over it with the same anxious vigilance with which the partners of a private copartnery frequently watch over their own."

(Adam Smith, 1776).

Berle and Means (1932) were the first to call attention to the potential agency costs[57]. They argued that corporate ownership in large listed firms would become dispersed up to a point where professional managers would become unaccountable to the shareholders. Later, Jensen and Meckling (1976) provide a more theoretical underpinning to the linkages between agency costs and ownership structure. Jensen and Meckling analyse how the interests of utility maximizing owner-managers and minority shareholders diverge as ownership structure becomes more dispersed. Their basic argument is that the owner-manager will not bear the full cost of on-the-job-consumption[58]. Potential minority investors will realize this and, subsequently, the share price will reflect the divergence of interest between owner-managers and minority shareholders. Arguably the conflict of interests becomes more severe as the equity stake of owner-managers decreases. Jensen and Meckling (1976) argue that investors with high stakes will also have incentives to maximize firm value. This is referred to as the incentive effect. Hypothesis one is therefore:

Hypothesis 1: Ownership concentration will improve investment performance.

In this view, agency costs increase as ownership is diluted and becomes dispersed. However, not all have seen the separation of ownership and control as a potential problem, where the counter hypothesis is that control and ownership separation may improve allocation. Thorstein Veblen (1921), for example, argues that this separation would lead to the control being turned over from "monopoly" seeking owners/businessmen to growth and efficiency seeking management. Veblen claims for example that if:

"(…) industry were completely organized as a systemic whole, and were then managed by competent technicians with an eye single to maximum production of goods and services; instead of, as now, being manhandled by ignorant business men with an eye single to maximum profits; the resulting output of goods and services would doubtless exceed the current output by several hundred per cent." (Veblen, 1921)

[57] Agency costs are costs that arise from the principal-agent problem, i.e. divergence of managerial objectives from the objectives of shareholders.

[58] Jensen and Meckling (1976) also point out that the most serious problem of not having equity claims is probably that the incentive to seek new profitable investment opportunities and engage in innovative efforts will fall.

Recognizing that owner-managers are also guided by utility maximization and not pure profit maximization, Demsetz (1983) argues that it is not clear that diffusion of ownership automatically will have a detrimental effect. In fact, it has been argued that as the stake of owner-managers increase, so does their ability to misallocate resources, Stulz (1988). This effect is referred to as the entrenchment effect (see Morck et al., 1988, and Stulz, 1988). Morck et al. (1988) find a non-monotonic relationship between ownership and Tobin's *Q*. They find that performance initially increases with ownership concentration, then declines and finally increases again, which is consistent with an entrenchment effect. McConnell and Servaes (1990) find similar results[59]. Expecting a managerial entrenchment effects leads to the second hypothesis:

> **Hypothesis 2:** Ownership concentration will be with a non-linear effect on performance.

The generality of the Berle and Means' (1932) observation is, however, empirically challenged. Looking at ownership structure around the world, most corporations have concentrated ownership and are controlled by families (Morck et al., 2005, and La Porta et al., 1999). Faccio and Lang (2002) study the ownership in Europe and find that corporations are predominantly controlled by families in continental Europe. This control is achieved without corresponding capital by means of primarily three different control enhancing mechanisms (CEM): vote-differentiation of shares, pyramid ownership and cross-holdings. This means that the division of what Berle and Means (1932) call "*nominal ownership*" and the corporate control is further enhanced by separating the capital stake and voting power, making it possible for a small group of investors, often the founding family, to maintain the control of the firm.

Burkhart and Lee (2008) review the theoretical literature on one share-one vote arguing that there are both positive and negative effects associated with dual-class shares. Adams and Ferreira (2008) review the empirical literature and find the empirical evidence inconclusive[60]. Bebchuk et al. (1999), on the other hand, argue that these control mechanisms distort the incentives of the controlling owners and therefore potentially may cause a sharp increase in agency costs. When the incentives are distorted, this may potentially have a negative impact on the optimal choice of investment, scope of the firm and

[59] Cho (1998) criticizes these findings and shows that market value affects ownership concentration. See also Loderer and Martin (1997).

[60] In an external study commissioned by the European Commission the proportionality between ownership and control of listed firm in EU is studied. Among other things, this study reports the results from a survey sent to institutional investors with € 4.9 trillion of assets under management. A clear majority of the investors expect a discount of 10% to 30% of the share price of firms using CEM. See for further details ECGI (2007).

transferral of control. Separation of control rights and cash flow right not only alters the control structure of the corporation but also changes the incentives of owner-managers. An effect one can expect from the separation of cash flow and control rights is that the positive incentive effect will be weakened, whereas the entrenchment effect will be enhanced. From this, hypothesis three follows:

> **Hypothesis 3:** Control-mechanisms, such as dual-class equity structure will weaken the incentive and enhance the entrenchment effect.

Using market-to-book measure of Tobin's *q*, Claessens et al. (2002) find evidence that is consistent with this hypothesis. They examine a large number of firms in East Asia and find that cash flow rights are positively correlated with performance. However, control rights in excess of cash flow rights have a negative effect on firm value. A large number of studies also establish a link between ownership structure and concentration, on the one hand, and performance, on the other. Countries with weaker investor protection tend to have a more concentrated ownership structure (see for example La Porta et al., 1997). In fact, the two most common ways of dealing with the agency aspects of corporate governance are, according to Shleifer and Vishny (1997), first legal and regulatory protection of investor and minority rights, and second, large and concentrated owners.

2.1 Corporate governance in Scandinavia

The corporate governance systems in Scandinavia have some unique features that change the prediction of the Jensen and Meckling model. Like most firms in continental Europe, the Scandinavian firms very often have controlling owners that have maintained their control even as their capital stake has declined and the firms have grown. Most European countries allow at least one of the three principal instruments for enhancing ownership control: cross-holdings, pyramid ownership and vote-differentiation (Söderström et al., 2003).

In particular, the extensive use of vote-differentiated shares has a substantial impact on the way in which the ownership structure has evolved in Scandinavia. In Norway, about 14 percent of listed firms use dual-class shares, in Denmark and Finland, more than 30 percent, and in Sweden, it is as high as 55 percent (Bøhren and Ødegaard, 2005, and Söderström et al., 2003). Many countries in Europe do not allow for dual-class share systems, so this is one of the prominent distinguishing features of the corporate governance systems in Scandinavia. The frequent use of dual-class shares with strong separation of voting rights and equity claims have produced very strong and stable ownership structures in Scandinavia, (see e.g. Högfeldt, 2004, and Henrekson and Jakobsson, 2006). By using vote-differentiation, the founding families may retain control of firms even with a very small equity share. Most firms in Scandinavia have one single controlling owner and very few firms are

characterized by dispersed ownership. Bennedsen and Nielsen (2005) report significant differences in the frequency of control mechanisms for a sample of 4096 European firms (see Table 1).

Table 1 Corporate control mechanisms Europe

	Dual-class shares	Pyramid	Cross-holding
Sweden	**0.62**	**0.27**	**0.01**
Switzerland	0.52	0.06	0.00
Finland	**0.44**	**0.07**	**0.00**
Italy	0.43	0.25	0.00
Denmark	**0.29**	**0.17**	**0.00**
UK	0.25	0.22	0.00
Ireland	0.25	0.18	0.00
Austria	0.23	0.26	0.01
Germany	0.19	0.24	0.03
Norway	**0.11**	**0.33**	**0.02**
France	0.03	0.15	0.00
Belgium	0.00	0.27	0.00
Portugal	0.00	0.13	0.00
Spain	0.00	0.16	0.00
European average	0.24	0.20	0.01
Scandinavian average	0.37	0.21	0.01

Source: Bennedsen and Nielsen (2005). The figures represent the percentage of firms that use Dual-class shares, Pyramid structures and cross-holdings, respectively.

Cronqvist and Nilsson (2003) examine a large sample of Swedish listed firms and find that controlling owners have a negative effect on Tobin's average *Q*. These controlling owners are also more likely to use control mechanisms. Maury and Pajuste (2004) examine a sample of Finnish firms and show that a more uniform distribution of votes among large block holders is positive for firm valuation. They also find that divergence between cash flow rights and control rights have a negative effect on firm value. An additional consequence of the strong separation of ownership claims and control is that the so-called market for corporate control (Manne, 1965) virtually does not exist in Scandinavia. Successful hostile bids are therefore very rare.

Supposed advantages of strong and stable owners provide the underpinning argument for the Scandinavian legislation that allows for vote-differentiation of share and pyramid ownership. In this paper, ownership concentration is measured as the share of capital and votes controlled by the largest owner (*CR1* and *VR1*) and the five largest owners (*CR5* and *VR5*). About 40 percent of the firms in the aggregate Scandinavian sample separate control and cash flow rights, see Table 2. The ownership data has been collected from the annual reports for each firm. For ownership data at country level, see Appendix 2.

Table 2 Ownership concentration in Scandinavia (2004)

All firms						
	Mean	Std. dev.	Min	Max	No. firms	Skewness
Capital share one owner, CR 1	23.5	15.5	0.4	82.4	214	0.90
Capital share five owners, CR 5	44.8	19.6	1.5	95.1	214	0.33
Voting rights one owner, VR 1	29.4	19.7	0.4	89.3	211	0.89
Voting rights five owners, VR 5	52.0	22.6	1.5	96.5	211	0.08
Vote-differentiated firms						
	Mean	Std. dev.	Min	Max	No. firms	Skewness
Capital share one owner, CR 1	23.5	13.7	2.9	60.4	90	0.70
Capital share five owners, CR 5	47.4	19.0	9.4	93.8	90	0.43
Voting rights one owner, VR 1	35.8	20.3	4.6	89.3	88	0.73
Voting rights five owners, VR 5	64.8	19.8	18.6	96.5	87	-0.33
Firms with one share-one vote						
	Mean	Std. dev.	Min	Max	No. firms	Skewness
Capital share one owner, CR 1	23.2	16.7	0.4	82.4	124	1.01
Capital share five owners, CR 5	42.9	19.9	1.5	95.1	124	0.32
Voting rights one owner, VR 1	23.2	16.7	0.4	82.4	124	1.01
Voting rights five owners, VR 5	42.9	19.9	1.5	95.1	124	0.32

Ownership concentration is very high in Scandinavian listed firms, especially compared to the Anglo-Saxon countries. Demsetz and Lehn (1985) examine the ownership structure in 511 large US firms. They report that, on average, the five largest owners together hold 24.8 percent and the top 20 shareholders 37.7 percent. Frequently, 20 percent is assumed to be more than enough to control a firm (i.e. Morck et al., 2005).

La Porta et al. (1997) have hypothesized that the legal origin of a country determines the efficiency of the country's financial system. In this respect, Scandinavia can be regarded as being relatively homogeneous. Scandinavia has a long tradition of cooperation in drafting new legislation (Carsten, 1993). Interestingly, there are still important differences with respect to deviations from the one share-one vote principle. Denmark, Finland and Sweden all allow dual-class shares. In Norway deviations from the proportionality principle needs government approval (Faccio and Lang, 2002).

3 Methodology

This paper applies a method developed by Mueller and Reardon (1993) to assess the rates of return on investment. The measure produced is a marginal version of Tobin's *Q*. Tobin's *Q* is defined as the market value of a firm over the replacement cost of its assets, which translates to the averages return on total assets. The marginal version of Tobin's *Q*, on the other hand, measures the returns on investment, or the marginal return on capital relative to the cost of capital (Mueller, 2003). This is, in effect, a measure of what Tobin (1982) calls the "functional form" of stock market efficiency[61]. Marginal *q* is also a more appropriate measure of performance since average *Q* contains infra-marginal returns[62].

Marginal *q* can be derived from the simple insight that any investment should ex ante be evaluated against the discounted present value of future cash flows that the investment generates. Obviously, only projects that have a positive net present value should be carried out. Consider an investment, I_t, made by a firm in period *t*. This investment generates cash flows, CF_{t+j} in *j* periods. The present value, PV_t, of this cash flow is as follows:

$$PV_t = \sum_{j=1}^{n} CF_{t+j} / (1 + r_t)^j \quad (1)$$

where r_t is the discount rate. Note that the present value is the discounted *expected* value of future cash flows. This equation can be expressed in the following way, where i_t can be regarded as a quasi-permanent rate of return:

$$PV_t = I_t i_t / r_t \quad (2)$$

For investments to be efficient from a shareholder perspective the investment being considered must generate future cash flows that, discounted to the present value, equals or exceeds the investment cost.
The ratio *i/r* is essentially a marginal version of Tobin's *Q* (Mueller, 2003) which measures the return on a marginal investment, and will therefore,

[61] *Functional Stock Market Efficiency* is related but different from the standard term *Market Efficiency*. Functional efficiency refers to the way in which capital markets are allocating resources to the most efficient usage (Tobin, 1982). Morck et al. (2005) survey a literature that shows how the functional efficiency of capital markets depends on the structure and composition of corporate control.
[62] When firms are price takers and perfectly competitive, marginal *q* and average *Q* will be equal. Firms with market power will have a higher average *Q*. For a derivation of the relationship between average *Q* and marginal *q*, see Hayashi (1982).

henceforth, be referred to as q_m (see Figure 2 in Appendix 1). Equation (2) can be rearranged and expressed as follows:

$$\frac{PV_t}{I_t} = i_t / r_t = q_{m,t} \tag{3}$$

For investment to be meaningful, we must have that $PV_t \geq I_t$. This implies that $q_m \geq 1$. If firms are investing at $q_m = 1$, investments are efficient. This implies that there are no further profitable investment opportunities (see Figure 1 in Appendix 1). Whereas if $q_m < 1$, firms are receiving a return on their investments that is less than the cost of capital, which can only be interpreted as over-investment and an managerial failure of some sort.

At the end of period *t* the market value of a firm may be decomposed into the market value in period *t*-1 (M_{t-1}), the present value of investment made in period *t* (PV_t), the change in market value of the old capital stock (δ_t), and an error term for the errors the market may make in its evaluation of the firm (μ_t)[63].

$$M_t \equiv M_{t-1} + PV_t - \delta_t M_{t-1} + \mu_t \tag{4}$$

By replacing M_{t-1} in equation (4) in each subsequent period, the following expression is obtained:

$$M_{t+n} = M_{t-1} + \sum_{i=0}^{n} PV_{t+i} - \sum_{1=0}^{n} \delta_{t+i} M_{t+i} + \sum_{i=0}^{n} \mu_{t+i} \tag{5}$$

In a single period, the error in the market's evaluation of the firm can be substantial, however, assuming efficient markets: $E(\mu_t) = 0$ and $E(\mu_t, \mu_{t-1}) = 0$, which implies $E(\sum_{i=0}^{n} \mu_{t+i}) = 0$. Thus, as *n* grows the last term will approach zero. From equation (3) we get the following expression:

[63] If the market makes errors in their valuation of the firm, the error component, μ, may contain a revaluation factor in the following period.

$$q_m = \frac{\sum_{i=0}^{n} q_{m,t+i} I_{t+i}}{\sum_{i=0}^{n} I_{t+i}} = \frac{\sum_{i=0}^{n} PV_{t+i}}{\sum_{i=0}^{n} I_{t+i}} \tag{6}$$

Using equation (5) this expression can be formulated in the following way:

$$q_m = \frac{(M_{t+n} - M_{t-1})}{\sum_{i=0}^{n} I_{t+i}} + \frac{\sum_{i=0}^{n} \delta_{t+i} M_{t+i-1}}{\sum_{i=0}^{n} I_{t+i}} - \frac{\sum_{i=0}^{n} \mu_{t+i}}{\sum_{i=0}^{n} I_{t+i}} \tag{7}$$

This can be used to calculate a weighted average q_m for each firm[64].

Assuming that q_m and δ both are constant over time and across firms, we can use equation (4) to estimate q_m and δ directly. Taking equation (4) and subtracting M_{t-1} from both sides we get:

$$M_t - M_{t-1} = -\delta M_{t-1} + q_m I_t + \mu_t \tag{8}$$

Dividing by M_{t-1} we normalize the equation and get the following relationship that can be empirically estimated:

$$\frac{M_t - M_{t-1}}{M_{t-1}} = -\delta + q_m \frac{I_t}{M_{t-1}} + \frac{\mu_t}{M_{t-1}} \tag{9}$$

Mueller and Reardon's (1993) methodology can be applied to test the agency hypothesizes. In contrast to the average Tobin's *Q*, this method measures the marginal return on investment, which makes it more appropriate when testing the agency hypothesizes.

To study the effects of ownership structure or various institutional factors on investment decisions, measures of ownership may be added as interaction terms with I_t / M_{t-1} in equation (9). If interaction terms are added, the functional form will be: $Y = \alpha + \beta_1 X + \beta_2 XZ$, and q_m is the economic

[64] See Mueller and Reardon (1993) for a description of the methodology and account of the properties of q_m.

interpretation of the marginal effect, $\partial Y / \partial X = \beta_1 + \beta_2 Z$. This method has been applied by Gugler and Yurtoglu (2003) and by Bjuggren et al. (2007). The equations estimated have the following functional form:

$$\frac{M_t - M_{t-1}}{M_{t-1}} = -\delta + \beta_1 \frac{I_t}{M_{t-1}} + \beta_2 Z_1 \frac{I_t}{M_{t-1}} + \ldots + \beta_{i+1} Z_i \frac{I_t}{M_{t-1}} + \varepsilon_i \qquad (10)$$

where the Z's denote the explanatory variables. Thus, the marginal effect, q_m, of equation (10) is:

$$q_m = \beta_1 + \beta_2 Z_1 + \ldots + \beta_{i+1} Z_i \qquad (11)$$

The total market value of a firm is defined as the total number of outstanding shares times the share price at the end of year *t*, plus total debt. Investment is approximated as:

I = After tax profit – Dividends + Depreciation + ΔEquity + ΔDebt+ R&D + Advertising & Marketing

The market and accounting data have been collected from Compustat Global database[65]. The firms included were listed at one of the four Stock exchanges in Scandinavia (Copenhagen Stock exchange in Denmark, Helsinki Stock exchange in Finland, Oslo Stock Exchange in Norway and Stockholm Stock Exchange in Sweden) between 1998 or 1999 until 2005, in total 292 firms (2004 observations). All figures have been adjusted by harmonized consumer price indexes to 2005 constant prices. The indexes used have been compiled by Eurostat. Naturally, the standard caveats apply to the data.

To use equation (7) to calculate q_m, it is also necessary to determine the size of the depreciation rate δ, that is, the rate at which the value of the firm's assets is declining over time. According to Mueller and Reardon (1993), most estimates are around 10 percent. Naturally, the actual depreciation rate varies across firms and industries, depending on the durability of employed assets. Even within firms, we have reason to believe that the depreciation rate differs across the capital stock.

[65] Accounting data and market prices have been collected from Standard & Poor's Compustat Global Database, 2006 version. Following variables have been collected from Compustat (mnemonics in brackets): after tax profit (IB), depreciation (DP) dividends (DVT), total debt (DT), research and development (XRD), market price (MKVAL), Advertising and marketing expenditures (XSGA), Δequity (SSTK minus PRSTKC).

Equation (9) has the advantage that no assumption regarding the size of δ is necessary. In empirical estimation of equation (9) the intercept (δ) will capture the depreciation rate plus any systematic changes in market valuations of the stock of old capital. The estimated δ has no bearing on the interpretation of q_m.

4 Corporate returns in Scandinavia

This study covers 292 large Scandinavian firms that are listed at one of the four stock exchanges. This accounts for about 40 percent of all listed firms. In 2004, the top 100 of these 292 firms (25 largest in each country) accounted for approximately 42 percent of the total stock market capitalization (33 percent of GDP)[66]. The firms approximately follow a rank-size distribution, where the second largest firm is about half the size of the largest[67].

As a first step, equation (7) is used to calculate a q_m for each individual firm. For Scandinavia, the estimated average marginal q, excluding the upper 95 percentile and the lower 5 percentile, is 1.19. This means that during the period 1999 until 2005, the Scandinavian firms had an average returns on investment that was 19 percent above the cost of capital. However the median q_m is 1.03, which implies a return that is 3 percent above cost of capital. Neither the average q_m nor the median q_m give any reason to believe that Scandinavian firms are under-performing. This is based on the assumption that the depreciation rate was 10 percent per annum. Equation (7) is sensitive to the choice of depreciation rate. Consequently, a more rapid depreciation will translate into a higher q_m, all else equal.

Investment as defined in this paper can be negative. This will be the case if a firm is making losses that are larger in absolute terms than new equity and debt. It is not meaningful to ask what the return on investment is if the "investment" is negative. Neither does equation (7) make any sense when investment is negative or equal to zero. Accordingly, firms have been excluded from Table 3.

As can be seen from Table 3, returns on investment are approximately normally distributed around a mean of one in all of the four Scandinavian countries, except Norway. As the estimated q_m's are cumulated over 1999 to 2005 the distribution seems to become more centered around one.

[66] These 292 firms represent all non-financial firms for which sufficient ownership information was available. In 2004, there were a total of 796 listed firms in Scandinavia (194 in Denmark, 143 in Finland, 177 in Norway and 282 in Sweden).

[67] The formula $M^i = M^1 / i$, where M^1 is the largest firm and i the firm rank, approximates the size distribution of the firms in the sample.

Table 3 Cumulative distribution of marginal *q*

Denmark Range of q_m	1999	2000	2001	2002	2003	2004	2005
$q_m \geq 2.00$	10	9	6	2	4	5	5
$1.50 \leq q_m < 2.00$	3	2	3	4	3	4	8
$1.00 \leq q_m < 1.50$	3	3	3	5	3	6	6
$0.50 \leq q_m < 1.00$	10	14	12	9	11	13	13
$0.00 \leq q_m < 0.50$	11	19	23	26	25	23	22
$-0.50 \leq q_m < -0.00$	9	5	5	8	8	5	3
$-1.00 \leq q_m < -0.50$	4	4	1	0	2	1	0
$q_m < -1.00$	4	4	6	6	4	4	2
Number of firms	54	60	59	60	60	61	59
Number of $q_m \geq 1$	16	14	12	11	10	15	19
Number of $q_m < 1$	38	46	47	49	50	46	40
Finland Range of q_m	1999	2000	2001	2002	2003	2004	2005
$q_m \geq 2.00$	20	17	9	11	13	12	15
$1.50 \leq q_m < 2.00$	5	1	9	5	5	4	4
$1.00 \leq q_m < 1.50$	9	6	2	9	10	16	22
$0.50 \leq q_m < 1.00$	8	11	17	16	15	11	9
$0.00 \leq q_m < 0.50$	3	13	10	8	8	9	3
$-0.50 \leq q_m < -0.00$	3	3	4	1	1	1	1
$-1.00 \leq q_m < -0.50$	0	3	2	3	1	2	2
$q_m < -1.00$	3	4	5	5	6	4	3
Number of firms	51	58	58	58	59	59	59
Number of $q_m \geq 1$	34	24	20	25	28	32	41
Number of $q_m < 1$	17	34	38	33	31	27	18
Norway Range of q_m	1999	2000	2001	2002	2003	2004	2005
$q_m \geq 2.00$	23	19	13	8	12	17	23
$1.50 \leq q_m < 2.00$	5	6	3	4	6	5	7
$1.00 \leq q_m < 1.50$	7	10	15	10	13	15	9
$0.50 \leq q_m < 1.00$	5	3	7	15	7	3	2
$0.00 \leq q_m < 0.50$	0	4	2	3	4	4	2
$-0.50 \leq q_m < -0.00$	1	3	1	2	0	0	0
$-1.00 \leq q_m < -0.50$	1	0	3	0	0	0	1
$q_m < -1.00$	2	2	3	6	4	1	1
Number of firms	44	47	47	48	46	45	45
Number of $q_m \geq 1$	35	35	31	22	31	37	39
Number of $q_m < 1$	9	12	16	26	15	8	6
Sweden Range of q_m	1999	2000	2001	2002	2003	2004	2005
$q_m \geq 2.00$	36	26	14	5	12	15	18
$1.50 \leq q_m < 2.00$	4	3	7	2	5	5	12
$1.00 \leq q_m < 1.50$	12	16	9	11	12	15	14
$0.50 \leq q_m < 1.00$	4	20	25	27	26	28	28
$0.00 \leq q_m < 0.50$	23	26	31	36	32	30	29
$-0.50 \leq q_m < -0.00$	6	4	9	6	9	7	3
$-1.00 \leq q_m < -0.50$	0	4	3	6	3	3	1
$q_m < -1.00$	3	8	10	13	10	6	2
Number of firms	88	107	108	106	109	109	107
Number of $q_m \geq 1$	52	45	30	18	29	35	44
Number of $q_m < 1$	36	62	78	88	80	74	63

Assuming δ= 10 percent.

There are a few extreme values that have a large impact on the average q_m across firms. These are typically smaller firms that, for some reason, either have a very high return on invested capital, or a massive loss in market value. There are several plausible explanations for these extreme values. Firms may, for example, introduce radical innovations that do not require any substantial investment, but nevertheless substantially increase firm value. Average q_m is, for this reason, also calculated excluding 5 percent in both ends of the distribution.

Dropping 5 percent in both ends of the distribution, the average q_m for Denmark is 0.76, 1.27 for Finland, 1.83 for Norway and 1.11 for Sweden. The median q_m for Denmark is 0.57, 1.18 for Finland, 1.86 for Norway and 0.85 for Sweden. If the assumption that δ = 10 percent is approximately correct, this means that all four of the Scandinavian countries, with the exception of Denmark, have average returns equal to or above the cost of capital.

Bjuggren and Wiberg (2008) find that q_m is sensitive to stock market swings and that depending on period selection the q_m may either be over- or under-estimated. The choice of a 5-6 year period approximately coincides with the average length of a business cycle reduce this problem.

Table 4 reports the value of marginal q for the 10 largest firms in each Scandinavian country. The first two columns report the total market values in 2005 and 1998 adjusted to 2005 constant prices (columns 1 and 2). Total investments made during this period are reported in column three. Since equation (7) is sensitive to choice of depreciation, q_m has been calculated assuming 5, 10 and 15 percent depreciation of old capital (columns 4, 5 and 6). Furthermore, the implicit δ can be calculated from equation (7) by assuming that q_m = 1. This implicit depreciation rate is reported in column 7.

Table 4 10 largest companies in the Scandinavian countries in 2005

	1	2	3	4	5	6	7
Company	M_{2005}[a]	M_{1998}[a]	$\sum INV$ [a]	q_m δ=5%[b]	q_m δ=10%[b]	q_m δ=15%[b]	δ[c]
Denmark							
A.P. MÖLLER – MAERSK	47702.9	7211.4	27433.4	1.668	1.860	2.052	- 0.124
TDC	13932.1	15676.0	12303.0	0.244	0.630	1.016	0.148
NOVO NORDISK	13124.1	8752.7	17150.9	0.481	0.706	0.932	0.048
CARLSBERG	6842.0	4706.6	19592.3	0.199	0.289	0.378	0.113
H. LUNDBECK	3904.8	2607.8[d]	5400.0	0.515	0.790	1.065	0.138
DANISCO	5105.6	3728.0	6866.8	0.395	0.590	0.784	0.205
WILLIAM DEMANT	3165.8	962.1	2303.6	1.288	1.620	1.951	0.007
COLOPLAST	2486.8	1326.3	1998.2	0.869	1.157	1.444	0.073
COPENHAGEN AIRPORTS	2479.6	1441.4	811.0	1.870	2.460	3.049	- 0.024
DE SAMMEN-SLUTTENDE	2411.3	292.3	1215.6	1.972	2.201	2.430	- 0.162
Finland							
NOKIA	64861.2	68445.3	14966.5	0.619	1.293	1.966	0.078
STORA ENSO	15108.7	13268.3	3364.9	0.690	1.214	1.739	0.080
UPM-KYMMENE	13964.4	11361.0	1818.2	0.650	1.073	1.495	0.091
METSO	4061.7	1415.5	16770.9	0.429	0.537	0.644	0.315
SANOMA-WSOY	4050.2	789.6	658.2	2.072	2.517	2.963	- 0.070
M-REAL	3914.6	2933.6	16027.0	0.476	0.752	1.029	0.014
RAUTARUUKKI	3304.8	1953.9	1406.0	1.806	2.396	2.986	- 0.018
WARTSILA	2752.5	1662.5	1287.0	1.770	2.381	2.993	- 0.013
TIETOENATOR	2739.7	2298.9	2135.4	0.968	1.615	2.263	0.052
YIT CORP	2589.4	409.8	662.4	3.530	3.902	4.275	- 0.289
Norway							
NORSK HYDRO	24942.5	12014.9	19283.6	0.986	1.302	1.617	0.052
ORKLA	9539.4	5729.7	3582.9	1.698	2.332	2.967	- 0.005
NORSKE SKOGINDUSTRIER	5043.3	2355.1	1477.6	1.573	1.599	1.624	- 1.050
HAFSLUND	3135.1	1156.5	1823.6	1.448	1.811	2.174	- 0.012
FRED. OLSEN ENERGY	2152.9	641.2	610.7	3.019	3.563	4.107	- 0.136
SCHIBSTED	1900.9	1121.6	495.6	2.462	3.352	4.241	- 0.032
DNO	1867.4	46.8	474.2	3.971	4.104	4.236	- 1.071
TOMRA SYSTEMS	1056.9	1399.7	336.8	3.677	4.130	4.584	-0.245
FARSTAD SHIPPING	950.9	263.6	791.9	1.111	1.355	1.598	0.027
Sweden							
ERICSSON	49367.6	49661.1	62411.5	0.355	0.714	1.073	0.140
VOLVO	24244.6	18240.9	32494.6	0.376	0.568	0.760	0.213
H & M	21244.0	15067.1	14736.6	0.825	1.232	1.638	0.071
ATLAS COPCO	12599.3	5329.9	11514.7	0.850	1.069	1.287	0.084
SCA	11652.2	7553.9	8847.4	0.860	1.257	1.654	0.068
SANDVIK	11038.2	5502.1	12743.4	0.648	0.862	1.076	0.132
SCANIA	9262.2	6128.1	11352.3	0.528	0.780	1.032	0.144
ELECTROLUX	7426.0	9994.2	22765.3	0.019	0.150	0.281	0.424
SECURITAS	6787.2	5421.3	7191.6	0.525	0.860	1.195	0.121
SKF	5940.4	2348.3	7975.8	0.591	0.731	0.872	0.196

[a] Million Euros, 2005 constant prices, [b] q_m calculated assuming that δ is 5, 10 and 15 percent, respectively, [c] Depreciation rate calculated given q_m = 1, [d] market value 1999.

A few firms in Table 4 have implicit depreciation rates that are negative, which indicates that these firms all had returns in excess of their cost of capital.

The dominant firm in Finland, *Nokia*, for example, has performed well over a long period and consequently has a q_m around or slightly above one. This can be compared to the Swedish telecom firm *Ericsson*, one of *Nokia's* main competitors. *Ericsson* seems to have a lower q_m given any depreciation rate, but remains approximately equal to one. It is plausible to assume that the differences in returns can be attributed to differences in performance, since *Nokia* and *Ericson* can be assumed to have approximately the same depreciation rate. The dominant firm in Denmark, *Moller-Maersk* with its high marginal q appears to be under-investing. Finally, the dominating Norwegian firm *Norsk Hydro* seems to have a marginal q approximately equal to one.

Assuming that the marginal rate of return (q_m) and the depreciation rate (δ) are the same across companies and over time, these can be estimated by equation (9). Since the data consists of a cross-sectional time series, a fixed effect model is used (industry and time fixed effects model). The stock market may fail to make a correct valuation in a single period, but assuming efficient markets, this error will approach zero as time span increases. To allow for possible market errors, time dummies were used in the estimations. Both industry and time dummies are restricted to sum to zero, so that the effects measures the deviation from the average depreciation rate. The results are reported in Table 5.

In order to remove outliers, some of the observations have been removed from the data set. The absolute deviation between the dependent variable and the explanatory variable, $|(M_t - M_{t-1})/M_{t-1} - I_t/M_{t-1}|$[68], has been used to identify outliers. Observations that had an absolute deviation above two (41 observations) were removed. This captures, for example, firms that have large swings in market value without corresponding changes in investment. The excluded firms are predominantly found among relatively small hi-tech firms within the biotechnology and ICT sector. Bjuggren and Wiberg (2008) have shown that the marginal q measure is sensitive to swings in valuation of new high-tech firms.

[68] In practice, this excludes variables that have missing observations or contain accounting errors. Observations that were excluded were only among the small firms in the sample. Using a robust estimation technique yields consistent results.

Table 5 Average q_m's in Scandinavia 1999-2004

Dependent variable: $(M_t - M_{t-1})/M_{t-1}$		
Constant, (= δ)	- 0.034**	- 0.039**
	(-2.25)	(-2.52)
I_t / M_{t-1}	0.868***	0.794***
	(27.79)	(34.06)
Denmark* I_t / M_{t-1}	- 0.205***	
	(-5.32)	
Norway* I_t / M_{t-1}	0.244***	
	(4.87)	
Finland* I_t / M_{t-1}	0.057	
	(0.88)	
Sweden* I_t / M_{t-1}	- 0.097***	
	(-2.85)	
No. obs.	1963	1963
No. firms	292	292
R^2	0.48	0.47
R^2-adjusted	0.46	0.45
F-value	32.45	32.78

*** indicates significance at 1 percent, ** at 5 percent and * at 10 percent level. t-values in brackets.

The regressions in Table 4 were estimated with different intercepts, δ, for the different countries; these were, however, insignificant and were therefore dropped out of the regression. In order to test for country effects, country dummy variables were interacted with I_t/M_{t-1}. These too were estimated under the restriction to sum to zero so that the country effects measures the deviation from the average Scandinavian marginal q. The Scandinavian average reported in Table 5 is significantly below one. Marginal q for Denmark is 0.66, 1.07 for Norway, 0.93 for Finland and 0.77 for Sweden. These findings seem to corroborate previous estimates of marginal q for the Scandinavian countries.

In a large cross-country study, Gugler et al. (2002) find similar estimates for Scandinavia. Between 1985 and 2000, they estimate 0.65 for Denmark, 0.96 for Finland, 1.04 for Norway and 0.65 for Sweden. Bjuggren et al. (2007) have also estimated an average q_m to 0.65 for Sweden. The findings reported in Table 4 are, in other words, consistent with previous estimates for Finland and Norway. Gugler et al. (2002) have estimated the Scandinavian average at 0.78. Their findings support the legal origin hypothesis. Anglo-Saxon countries perform best with q_m = 1.02. Average q_m for Germanic and French origin is 0.74 and 0.59, respectively.

However, there is considerable variation in the returns in all four Scandinavian countries, where a large number of firms deviate from the average marginal return on investment. This can have several causes; it might, for example, be plausible to believe there are industry differences. This is supported by the variation of the implicit depreciation rates in Table 4.

In the following section the relationship between ownership concentration, separation of cash flow rights and control rights, and performance are examined.

5 Corporate return and ownership structure

In this section, equation (10) is used to test the effects of ownership concentration and separation of control from cash flow rights on performance. As measures of ownership concentration, the share of **capital** (cash flow rights) held by the largest owner (*CR1*) and the five largest (*CR5*) are used. Control rights are measured by the share of **votes** (control rights) held by the largest (*VR1*) and five largest owners (*VR5*). Dummies are used to control for dual-class shares. In the sample, 49 percent of the firms use a dual-class share structure. Matching accounting and market data with the ownership data leaves 142 firms out of 292. Correlations are reported in Table 6.

Table 6 Correlation matrix

	Sales	I_t/M_{t-1}	M_t-M_{t-1} $/M_{t-1}$	CR1	CR5	VR1	VR5
Sales	1						
I_t/M_{t-1}	0.012	1					
M_t-M_{t-1}/M_{t-1}	- 0.043	0.422*	1				
CR1	- 0.088*	0.069	0.033	1			
CR5	- 0.224*	0.068	0.022	0.847*	1		
VR1	- 0.031	0.118*	0.019	0.812*	0.710*	1	
VR5	- 0.119*	0.102*	0.014	0.678*	0.835*	0.817*	1
Vote-differentiation	0.082*	0.071*	- 0.049	- 0.053	0.033	0.310*	0.422*

* indicates significance at 5 percent.

Naturally, all ownership variables display high and significant correlations. Sales are negatively correlated with all ownership variables, but weaker for *VR1* and *VR5* than for *CR1* and *CR5*. In other words, ownership concentration measured by cash flow rights is inversely related to firm size. This means that controlling owners remain in large firms by resorting to dual-class equity structure. It is also interesting to note that investments are significantly correlated with control rights and vote-differentiation, but not with cash flow rights.

In order to control for unobserved, time-invariant heterogeneity across firms, a fixed effect model with firm and time effects is applied. The fixed time

effect is motivated by the efficient markets hypothesis; a firm may, in any single period, be under- or over-valued but over time this error is expected to be zero. The firm fixed effects controls for differences in depreciation rates across firms and industries.

To identify non-linear effects on performance, the ownership variables are also estimated in quadratic and cubic form. In Table 7 A and B, merely 3 out of 24 estimated ownership parameters are significant. However, a deviation from one share-one vote creates large negative effects.

Table 7 A Concentration of cash flow rights and performance

Dependent variable: $(M_t-M_{t-1})/M_{t-1}$

	Equation A	Equation B	Equation C	Equation D	Equation E	Equation F	Equation G
Constant, (= δ)	-0.088*** (-3.82)	-0.088*** (-3.84)	-0.087*** (-3.78)	-0.087*** (-3.78)	-0.087*** (-3.80)	-.088*** (-3.82)	-0.087*** (-3.79)
I_t/M_{t-1}	0.929*** (14.95)	0.982*** (9.41)	0.711*** (4.61)	0.734*** (3.27)	0.853*** (6.68)	0.948*** (4.14)	0.583 (1.58)
Dual-class Shares	-0.312*** (-3.67)	-0.327*** (-3.71)	-0.340*** (-3.86)	-0.335*** (-3.55)	-0.307*** (-3.60)	-.304*** (-3.56)	-0.344*** (-3.78)
CR1		-0.002 (-0.63)	0.026** (2.16)	0.022 (0.69)			
$CR1^2$			-0.001** (-2.38)	-0.000 (-0.27)			
$CR1^3$				-0.000 (-0.14)			
CR5					0.002 (0.68)	-0.003 (-0.33)	0.031 (1.07)
$CR5^2$						0.000 (0.50)	-0.001 (-1.17)
$CR5^3$							0.000 (1.27)
No. obs.	794	794	794	794	794	794	794
No. firms	142	142	142	142	142	142	142
F-value	12.69	12.39	12.32	12.03	12.40	12.11	11.88
R^2	0.42	0.42	0.42	0.42	0.42	0.42	0.42
Average q_m	0.785	0.790	0.894	0.890	0.796	0.769	0.702
Dual-class q_m	0.617	0.614	0.711	0.710	0.630	0.605	0.516
Single-class q_m	0.929	0.941	1.051	1.044	0.937	0.909	0.860

*, ** and *** indicates significance at 10, 5 and 1 percent, respectively. t-values in brackets.

Firms with only a single class of equity do not significantly under perform, i.e. q_m is not different from one, whereas firms that rely on dual-class equity shares on average have a return on dual-class shares that is 30 percent below the opportunity cost of capital.

Table 7 B Concentration of control/voting rights and performance

Dependent variable: $(M_t-M_{t-1})/M_{t-1}$

	Equation B	Equation C	Equation D	Equation E	Equation F	Equation G
Constant, (= δ)	-0.088*** (-3.80)	-0.085*** (-3.69)	-0.084*** (-3.63)	-0.085*** (-3.72)	-0.089*** (-3.86)	-0.090*** (-3.90)
I_t/M_{t-1}	0.911*** (9.56)	0.818*** (6.02)	0.709*** (3.60)	0.702*** (5.51)	0.966*** (4.29)	0.649* (1.82)
Dual-class Shares	-0.317*** (-3.62)	-0.317*** (-3.61)	-0.331*** (-3.69)	-0.390*** (-4.19)	-0.396*** (-4.26)	-0.404*** (-4.33)
VR1	0.001 (0.24)	0.007 (0.99)	0.022 (1.07)			
$VR1^2$		-0.001 (-0.96)	-0.001 (-0.92)			
$VR1^3$			0.000 (0.76)			
VR5				0.005** (2.03)	-0.007 (-0.82)	0.021 (0.80)
$VR5^2$					0.000 (1.42)	-0.001 (-0.92)
$VR5^3$						0.000 (1.15)
No. obs.	794	794	794	794	794	794
No. firms	142	142	142	142	142	142
F-value	12.38	12.12	11.86	12.54	12.32	12.08
R^2	0.42	0.42	0.42	0.42	0.42	0.42
Average q_m	0.812	0.836	0.836	0.774	0.728	0.730
Dual-class q_m	0.612	0.657	0.665	0.564	0.514	0.512
Single-class q_m	0.929	0.988	0.982	0.954	0.910	0.916

*, ** and *** indicates significance at 10, 5 and 1 percent, respectively. t-values in brackets.

The fact that vote-differentiation has a significant negative effect on firm performance, indicates that the ownership-performance relationship may differ between firms with one class of shares and those having separated cash flow rights and control rights. This negative effect increases in equations *A* through *G*, when the ownership variables are added. One possible interpretation is that the ownership variables are picking up a positive incentive effect. This, in turn, suggests that the ownership effects differ between the two categories of firms.

In Table 8 A and B, ownership variables are interacted with the dummy variable for dual-class share structure (one for vote-differentiation and zero for single class share structure). Different specifications of the functional form have been estimated. The results are relatively robust with respect to choice between fixed effect, random effect or simply pooled OLS model. A previous study has also found estimates of q_m to be stable to model specification (Bjuggren et al., 2007).

Table 8 A Dual-class shares, ownership and performance

Dependent variable: $(M_t-M_{t-1})/M_{t-1}$			
	Equation H		Equation I
Constant, (= δ)	-0.087***	Constant, (= δ)	-0.084***
	(-3.80)		(-3.67)
I_t/M_{t-1}	0.521***	I_t/M_{t-1}	0.404***
	(3.61)		(2.60)
CR1	0.053***	VR1	0.063***
	(3.79)		(4.34)
$CR1^2$	-0.001***	$VR1^2$	-0.001***
	(-3.93)		(-4.43)
CR1*Vote differentiation	-0.045***	VR1*Vote differentiation	-0.053***
	(-4.43)		(-5.07)
$CR1^2$*Vote differentiation	0.001***	$VR1^2$*Vote differentiation	0.001***
	(3.79)		(4.67)
No. obs.	794	No. obs.	794
No. firms	142	No. firms	142
F-value	12.27	F-value	12.35
R^2	0.42	R^2	0.43
Average q_m	0.933	Average q_m	0.993
Dual-class q_m	0.652	Dual-class q_m	0.721
Single-class q_m	1.199	Single-class q_m	1.226

*, ** and *** indicates significance at 10, 5 and 1 percent, respectively.
t-values in brackets.

Table 8 B Dual-class shares, ownership and performance

Dependent variable: $(M_t-M_{t-1})/M_{t-1}$			
	Equation H		Equation I
Constant, (= δ)	-0.091*** (-3.93)	Constant, (= δ)	-0.092*** (-3.99)
I_t/M_{t-1}	0.336 (0.89)	I_t/M_{t-1}	0.050 (0.12)
CR5	0.067** (2.06)	VR5	0.089*** (2.64)
$CR5^2$	-0.002** (-2.31)	$VR5^2$	-0.002*** (-2.84)
$CR5^3$	0.000*** (2.45)	$VR5^3$	0.000*** (2.94)
CR5*Vote differentiation	-0.060*** (-3.24)	VR5*Vote differentiation	- 0.094*** (-3.89)
$CR5^2$*Vote differentiation	0.002*** (2.82)	$VR5^2$*Vote differentiation	0.003*** (3.55)
$CR5^3$*Vote differentiation	-0.000*** (-2.65)	$VR5^3$*Vote differentiation	-0.000*** (-3.37)
No. obs.	794	No. obs.	794
No. firms	142	No. firms	142
F-value	11.58	F-value	11.91
R^2	0.42	R^2	0.43
Average q_m	0.808	Average q_m	0.889
Dual-class q_m	0.656	Dual-class q_m	0.784
Single-class q_m	0.952	Single-class q_m	0.978

*, ** and *** indicates significance at 10, 5 and 1 percent, respectively.
t-values in brackets.

The results are robust with respect to the choice between simple pooled OLS with year dummies, fixed effect model with year and firm effects and random effects model. The estimates are robust with respect to model specification. Since the number of firms with available ownership data is limited to 143, the firm effects capture possible industry effects. Consequently, all equations have been estimated with two-digit industry SIC codes.

The stock market may be under- or over-estimated in any single period, but for a longer period of time, the expected error in stock market evaluations is zero, $E(\mu_t) = 0$. To control for this possibility, annual dummy variables are included and estimated under the restriction that they summarize to zero. Annual deviations in stock market evaluations are therefore measured as deviations from the average. To control for the possibility that the Scandinavian countries have systematic differences in returns, country dummies are also included. These are also estimated under the restriction that they summarize to

zero, so that any deviation is measured as the deviation from the Scandinavian average. Time, industry and country effect are not reported.

Hypothesis 1 and 2 (*H1* and *H2*) cannot be rejected. For all measures of ownership concentration (*CR1*, *CR5*, *VR1* and *VR5*) a positive non-linear relationship is found. In firms with one share-one vote, increasing ownership has a positive, but marginally diminishing effect on performance. For the two concentration measure of the single largest owner, *CR1* and *VR1*, a quadratic form gives the best fit, whereas for the concentration of the five largest owners, *CR5* and *VR5*, a cubic form provides the best fit.

The average q_m for single class equity firms lie between 0.95 and 1.23[69]. In firms with vote-differentiated shares, the effects are similar but much weaker. By comparing the parameters in equations *H* and *I* in Table 8 A and B, one can see that in vote-differentiated firms the positive effect of ownership concentration is significantly lower compared to other firms. Average q_m's estimate for firms with dual-share class structure lies between 0.65 and 0.78 (equations *H* and *I,* respectively). As in equation *A*, firms with dual-class shares seem to be investing at approximately 30 percent below their cost of capital. From equation *H* and *I* in Table 8 A and B, it is clear that the separation cash flow and control rights reduces the positive effect of ownership and enhances the entrenchment effect. Examining listed firms in Sweden, Bjuggren et al. (2007) find similar negative effects of vote-differentiation and positive effects of ownership concentration on investment performance of firms.

Controlling for ownership characteristics and dual-class equity weakens the country effects (not reported here), but remains significantly negative for Sweden and positive for Norway. However the effects of ownership and deviations from one share-one vote cut across national boundaries.

The intercept will as, discussed in section 2, capture both the depreciation rate and any systematic changes in market evaluations. In equation *A* to *I*, the intercept is estimated to approximately 9 percent. This is a reasonable estimate and is in line with previous estimates of depreciation rates. Furthermore, the intercept does not affect the marginal effect, and is thus not of any importance for the interpretation of the results.

[69] The marginal effects have been calculated based on the average ownership concentration in the data set. (*CR1* = 22.24, *CR5* = 44.52, *VR1* = 28.58 and *VR5* = 52.85).

6 Conclusions

This paper examines the linkage between returns corporate investment and ownership structure in the Scandinavian countries. Marginal q is used as performance measure. Marginal q measures the marginal return on capital relative to its cost of capital. This return to cost of capital ratio ($i/r = q_m$) is a measure of what Tobin (1982) labeled the functional efficiency of capital markets. When studying firm performance, this method has some clear advantages over the conventional market to book measures of Tobin's average Q.

Few Scandinavian firms can be characterized as having dispersed ownership as described by Berle and Means (1932). Vote-differentiation is a common tool for creating and maintaining strong and concentrated ownership structures. Scandinavian firms make more frequent use of control mechanisms than firms in comparable countries. On average, the largest owner holds more than 20 percent of the capital (*CR1*) and close to 30 percent of the voting rights (*VR1*).

The hypothesis that ownership concentration improves resource allocation is supported in this paper. The effect of ownership on investment performance is, however, found to be non-linear; cubic or quadratic form. This is consistent with the entrenchment hypothesis. Strong support of the hypothesis that control mechanisms are detrimental to firm performance is also found.

Ownership concentration is found to have a non-linear effect on firm performance. This is consistent with previous studies that find both positive incentive effects and negative entrenchment effect of ownership concentration. For firms with one share-one vote ownership has a positive impact but marginally diminishing, whereas for firms controlled by dual-class shares this effect is weaker. These firms have a systematically worse performance than other firms. Dual-class shares drive a wedge between cash flow rights and control rights. Not only does this change the control structure, but it also changes the incentive structure. Firms with only one equity class are, on average, investing efficiently, whereas firm with dual-class equity structure are over-investing. The separation of cash flow rights and control rights reduces the positive incentive effect and enhances the negative entrenchment effect. By impairing capital reallocation, corporate control mechanisms are, in the long run, harmful for industry dynamics and economic renewal.

Vote-differentiation creates massive entrenchment effects and destroys large values. In the long-run, they are likely to harm the functional efficiency of the Scandinavian capital markets. On average, "entrenched" firms have returns on investments that are approximately 30 percent below their cost of capital.

Differences in investment performance across firms can largely be explained by differences in ownership structure and, in particular, to what extent corporate control is upheld by dual-class equity structure. Separation of cash

flow rights from control appears to distort the incentives of the controlling owner by significantly reducing the incentive effect.

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Appendix 1

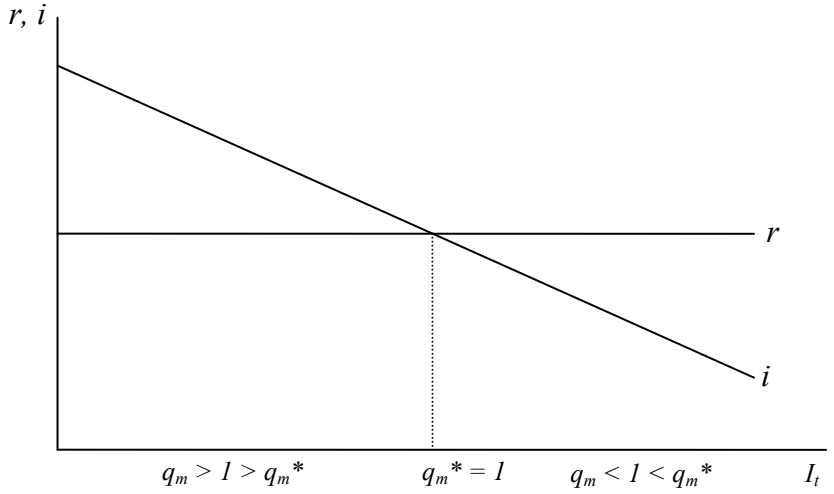

Figure 1 **Marginal rate of return on capital, *i*, cost of capital, *r*, and marginal *q***

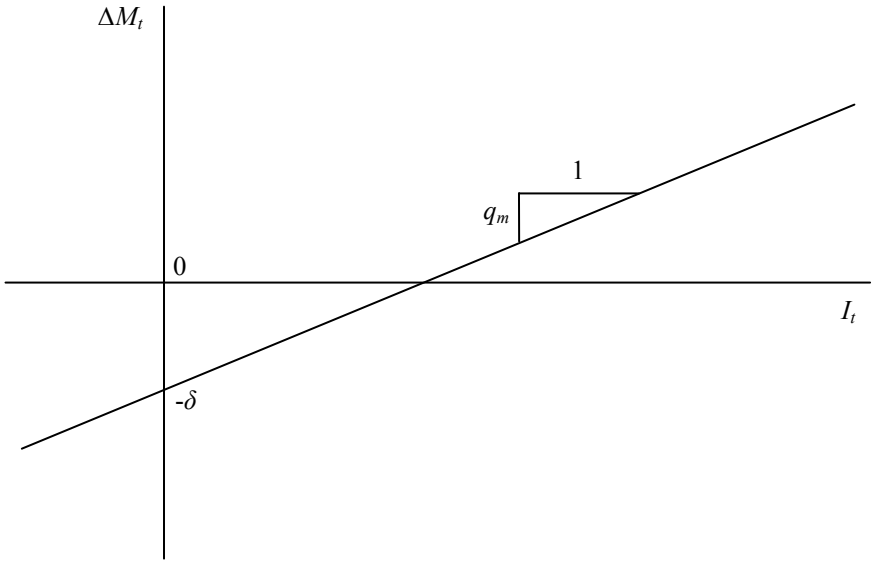

Figure 2 **Marginal *q***

Appendix 2

Ownership structure Denmark

All firms					
	Mean	Std. div.	Min	Max	No. firms
CR 1	23.9	14.4	1.0	51.7	10
CR 3	35.4	16.6	3.0	52.1	10
CR 5	37.4	17.6	5	60.0	10
VR 1	n.a.	n.a.	n.a.	n.a.	10
VR 3	n.a.	n.a.	n.a.	n.a.	10
VR 5	n.a.	n.a.	n.a.	n.a.	10
Vote-differentiated firms					
	Mean	Std. div.	Min	Max	No. firms
CR 1	n.a.	n.a.	n.a.	n.a.	2
CR 3	n.a.	n.a.	n.a.	n.a.	2
CR 5	n.a.	n.a.	n.a.	n.a.	2
VR 1	n.a.	n.a.	n.a.	n.a.	2
VR 3	n.a.	n.a.	n.a.	n.a.	2
VR 5	n.a.	n.a.	n.a.	n.a.	2
Firms with one share-one vote					
	Mean	Std. div.	Min	Max	No. firms
CR 1	n.a.	n.a.	n.a.	n.a.	8
CR 3	n.a.	n.a.	n.a.	n.a.	8
CR 5	n.a.	n.a.	n.a.	n.a.	8
VR 1	n.a.	n.a.	n.a.	n.a.	8
VR 3	n.a.	n.a.	n.a.	n.a.	8
VR 5	n.a.	n.a.	n.a.	n.a.	8

Ownership structure Finland

All firms					
	Mean	Std. div.	Min	Max	No. firms
CR 1	20.3	15.6	0.4	62.2	55
CR 3	31.7	17.6	1.1	72.5	55
CR 5	37.1	18.1	1.5	79.1	55
VR 1	23.8	19.3	0.4	84.1	55
VR 3	37.1	22.5	1.1	87.9	55
VR 5	43.0	22.9	1.5	89.8	55
Vote-differentiated firms					
	Mean	Std. div.	Min	Max	No. firms
CR 1	20.4	12.1	2.93	38.6	14
CR 3	33.4	14.3	6.4	53.9	14
CR 5	39.3	14.5	9.4	57.5	14
VR 1	34.2	22.9	4.6	84.1	14
VR 3	54.6	24.1	12.1	87.9	14
VR 5	62.2	22.4	18.6	89.8	14
Firms with one share-one vote					
	Mean	Std. div.	Min	Max	No. firms
CR 1	20.3	16.7	0.4	62.2	41
CR 3	31.1	18.7	1.1	72.5	41
CR 5	36.4	19.3	1.5	79.1	41
VR 1	20.3	16.7	0.4	62.2	41
VR 3	31.1	18.7	1.1	72.5	41
VR 5	36.4	19.3	1.5	79.1	41

Ownership structure Norway

All firms

	Mean	Std. div.	Min	Max	No. firms
CR 1	28.6	16.6	7.2	68.9	40
CR 3	48.3	22.0	17.4	93.8	40
CR 5	56.0	21.4	22.7	95.1	40
VR 1	29.0	16.7	7.2	68.9	40
VR 3	48.9	22.5	17.4	93.8	40
VR 5	56.5	21.8	22.7	96.5	40

Vote-differentiated firms

	Mean	Std. div.	Min	Max	No. firms
CR 1	30.4	10.7	15.3	40.0	4
CR 3	66.0	24.0	34.1	87.8	4
CR 5	74.7	22.6	44.8	93.8	4
VR 1	34.1	10.9	18.5	43.1	4
VR 3	72.0	22.4	42.2	91.3	4
VR 5	80.0	20.9	52.3	96.5	4

Firms with one share-one vote

	Mean	Std. div.	Min	Max	No. firms
CR 1	28.4	17.3	7.2	68.9	36
CR 3	46.3	21.2	17.4	93.8	36
CR 5	53.9	20.5	22.7	95.1	36
VR 1	28.4	17.3	7.2	68.9	36
VR 3	46.3	21.2	17.4	93.8	36
VR 5	53.9	20.5	22.7	95.1	36

Ownership structure Sweden

All firms

	Mean	Std. div.	Min	Max	No. firms
CR 1	22.9	14.9	4.2	82.4	110
CR 3	37.7	17.9	9.8	90.0	110
CR 5	44.9	18.2	13.4	93.8	110
VR 1	32.5	20.7	4.2	89.3	109
VR 3	49.2	22.3	10.2	93.7	109
VR 5	55.8	21.6	14.0	95.3	109

Vote-differentiated firms

	Mean	Std. div.	Min	Max	No. firms
CR 1	24.1	14.3	5.2	60.4	70
CR 3	40.0	18.4	9.8	80.3	70
CR 5	47.4	18.6	13.4	86.6	70
VR 1	39.2	20.4	9.5	89.3	68
VR 3	58.3	20.3	18.4	93.7	68
VR 5	64.5	19.3	20.7	95.3	68

Firms with one share-one vote

	Mean	Std. div.	Min	Max	No. firms
CR 1	20.7	16.0	4.2	82.4	40
CR 3	33.6	16.5	10.2	90.0	40
CR 5	40.7	17.0	14.0	93.8	40
VR 1	20.7	16.0	4.2	82.4	40
VR 3	33.6	16.5	10.2	90.0	40
VR 5	40.7	17.0	14.0	93.8	40

CHAPTER 5
Q-theory of Investment and Earnings Retentions

Evidence from Scandinavian Firms

Johan E. Eklund

Abstract: In a frictionless milieu retentions should have no impact on investment behavior. However, empirical studies typically find that retentions are an important determinant of investment. Managerial discretion and financial constraints are two alternative explanations that have been suggested. This paper uses a panel of listed Scandinavian firms to examine the importance of retentions as a determinant of investment. Scandinavian firms are, on average, found to depend on retentions to a very high degree, more so than in other developed economies. This high dependence on retentions suggests that the Scandinavian capital markets are suffering from allocational inefficiencies. These market frictions appear too large to be caused *per se* by information asymmetries or managerial discretion phenomena. Possible institutional explanations for this are suggested.

JEL classifications: G0, G30

Keywords: Investment, Liquidity, Retained Earnings, Free Cash Flow, Tobin's *Q*, marginal *q*.

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1 Introduction

Conventional investment theory holds that investment expanded up to the point where expected marginal return on capital equates with the opportunity cost of capital. In line with this the Modigliani and Miller (1958, 1961) theorems hold that the value of a firm and investment decisions should be autonomous from its financial structure. This in turn implies that the cost of capital and return on investments should be the same independently if the investment is funded by equity, debt or retained earnings. In the absence of market frictions, internally generated funds are perfectly substitutable with external capital.

However, starting with Kuh and Meyer (1957), a large number of empirical studies show that the source of financial funding is not irrelevant for the investment decision. These studies typically find that liquidity and retentions are important determinant of investment, thus frictions matter. For reviews of the investment literature, see Chirinko (1993), Hubbard (1998) and Jorgenson (1971). A positive relationship between investment and liquidity is inconsistent with neoclassical predictions, such as the Modigliani and Miller theorems.[70] There are, in principle, two possible explanations for a positive relationship between investment and liquidity: financial constraints/hierarchy caused by *asymmetric information* or managerial discretion caused by *agency problems*. Asymmetric information between management and investors may make firms financially constrained by making external funds costlier than internally generated funds. This creates a hierarchy of finance which, in turn, may lead to under-investment (Myers and Majluf, 1984, and Stiglitz and Weiss, 1981). From a managerial perspective, on the other hand, internally generated "free cash flow" has the advantage if monitoring by external providers of capital can be avoided or external capital is not readily available (Jensen, 1986). Agency conflicts between management and investors may lead to over-investment if managers prefer empire building at the expense of shareholder value maximization (Grabowski and Mueller, 1972).

A problem with empirical studies of investment behavior is how to differentiate between managerial discretion (principal-agent problems) and asymmetric information explanations. To be able to do so it is necessary to control for investment opportunities, i.e. differentiate between firms that are investing at returns above or below their cost of capital. Mueller and Reardon

[70] Modigliani and Miller (1958, 1961) show that under certain assumptions firm value is independent from capital structure and by the same token investments should be independent from dividend policy or access to external capital. However, introducing market frictions these propositions do not hold. Costs associated with bankruptcies and tax policies are example of factors that violate these assumptions.

(1993) have developed a method to measure marginal q, q_m, which precisely measure the return on investment, i, relative to the cost of capital, r ($q_m = i/r$). This method to estimate marginal q is used in this paper to discriminate between firms that over- and under-invest, respectively. If marginal $q > 1$ firms are under-investing and conversely if marginal $q < 1$ firms are over-investing. This approach has previously been applied by Kathuria and Mueller (1995) and Gugler et al. (2004) to differentiate between managerial discretion and asymmetric information explanations for the investment-liquidity relationship.

This paper adds to the literature primarily by applying the Gugler et al. (2004) methodology to a panel of 292 Scandinavian firms for the period 1998-2005. The main finding is that the investments of Scandinavian firms, as compared to other countries, are much more sensitive to liquidity. Investments are found to be nearly strictly proportional to retentions. The results imply that Scandinavian countries have institutionally induced market frictions that are more severe than elsewhere. These frictions seem too large, compared to other countries, to be attributed *per se* to asymmetric information and managerial discretion. Instead, further research is necessary in order to detect the institutional determinants of these frictions, i.e. institutionally induced transaction costs.

Apart from *marginal q*, conventional measures of *Tobin's Q* and *sales accelerators* are also used in the investment equations in order to control for investment opportunities. When it comes to liquidity the literature contains a number of different measures and definitions.

In principle, liquidity can be defined in two ways; a *pre-dividend definition* and a *post-dividend definition*. The first alternative is to define liquidity as *after tax profits plus depreciation*. In the second alternative, definition dividends are also subtracted. There are also a number of terms used to denote liquidity. Both definitions are sometimes referred to as cash flow, which is misleading (considering that both changes in debt and equity affect the cash flow). *Free cash flow* is a more appropriate term for the pre-dividend definition of liquidity, and *retained earnings* (*RE*) is a more appropriate term for the post-dividend definition of liquidity. From an empirical point of view, the choice between the two definitions of liquidity is of minor importance due to very high correlation. In this paper *retained earnings* is used.

This paper is organized in five sections. In the following section relevant theories and empirical research on the relationship between investments, agency problems and asymmetric information are reviewed. The marginal q methodology and data are presented in section three. Section four contains empirical findings and analysis. Policy implications and conclusions are discussed in section five.

2 Investments, agency problems and asymmetric information

Neoclassical investment theory predicts that investments are made up to a point where the expected marginal rate of return on capital, mrr_k, equates with the cost of capital, r (see Figure 1 in Appendix 1, and Jorgenson, 1963). Investments that fulfill this criterion are said to be efficient. In empirical studies of investments the crucial problem is how to control for unobserved expectations of future investment opportunities. A solution to this problem was developed by Brainard and Tobin (1968) and Tobin (1969): *Q*-theory of investment. The *Q*-theory of investment has the advantage of providing information about future market conditions of importance for investments, without detailed knowledge or assumptions of future demand and supply conditions.

In the neoclassical *Q*-theory of investment[71] the investment expenditure of a firm is determined by its Tobin's *Q*. Tobin's *Q* is defined as the market value of the firm divided by the replacement cost of capital ($Q_{a,t} = M_t / K_t$). This quotient gives the average return on capital relative its opportunity cost of capital. Assuming that Tobin's *Q* controls for investment opportunities of a firm, Hubbard (1998), for example, derives the following empirical relationship between investment and Tobin's *Q*:

$$\frac{I_t}{K_{t-1}} = a + bQ_{a,t} + \varepsilon_t \qquad (1)$$

where I_t and K_{t-1} are investment and capital in period t and $t-1$, respectively, and a is the replacement investment coefficient. This basic specification is found in a large number of empirical studies.

However, if we are concerned about the adjustment of the capital stock, K_t, the marginal return on capital is more relevant. The marginal return on capital gives the increase in market value given one additional unit of capital (note that $\Delta K_t \equiv I_t$) relative the opportunity cost. This is the so-called marginal *q*. Marginal *q* measures the return on investment, *i*, relative to the cost of capital, *r*, ($q_m = i/r$). For investment to be efficient, I^*, q_m should be equal to one. If $q_m < 1$ firms are over-investing, and conversely if $q_m > 1$ firms are under-investing.

In the neoclassical *Q*-theory of investment marginal *q* and Tobin's average *Q* will equate. In equilibrium $q_m = Q_a = 1$. Hayashi (1982) has shown that this is only the case if firms are price takers (perfect competition) and that their

[71] The *Q*-theory is sometimes referred to as the modified neoclassical theory. This refers to the fact that neoclassical theory is, as compared to the Q-theory, not forward looking.

production and installation functions are homogeneous. These are clearly strong assumptions. Since this is typically not the case, marginal *q* should be used instead of Tobin's *Q*. However, due to the difficulties in measuring marginal *q*, most studies use market-to-book measures of Tobin's *Q* as a proxy for investment opportunities. In addition to the conventional market-to-book measure of Tobin's *Q,* this paper also uses a measure of marginal *q* developed by Mueller and Reardon (1993), (see next section).

As mentioned, in a frictionless milieu investment should only depend on Tobin's *Q*. However, in the presence of capital market imperfections we no longer expect investments to be independent from liquidity (retentions). The following specification has been used by Fazzari, et al. (1988) and many subsequent studies:

$$\frac{I_t}{K_{t-1}} = a + bQ_t + c\frac{RE_t}{K_{t-1}} + \varepsilon_t \qquad (2)$$

where RE_t is retentions in period *t*. A positive *c* in equation (2) rejects the frictionless model and implies either financial constraints or managerial discretion in the form of over-investment. Deviations from marginally efficient investments are caused by two principle factors: *agency problems* (managerial discretion) and *asymmetric information* (financial hierarchy). Agency problems may cause over-investment, whereas asymmetric information may result in under-investment.

2.1 Asymmetric information

From Akerlof (1970) we know that if outsiders are unable to distinguish between "good" and "bad" ('lemons') products the average price will drop. In the context of financial markets information asymmetries will affect investment by raising the cost of external capital[72]. As firms are investing more the retained earnings are gradually depleted, and at some point it becomes necessary to resort to external funding of some sort in order to invest further. Asymmetric information, however, gives rise to a "financial hierarchy" where the cost of external funds is higher than internal funds. Myers and Majluf (1984) and Stiglitz and Weiss (1981) argue that information asymmetries between managers and investors/capital markets make external capital more expensive than internal finance. Informational asymmetries may, through increasing the cost of debt and equity, lead to suboptimal investment ($I < I^*$). At this point $q_m > 1$ (see Figure 2 in Appendix 1). Baumol et al. (1970) and Mueller and Reardon (1993) have, for example, found that investments are sensitive to the

[72] In the absence of information asymmetries, transaction costs may still make external funds more costly than internally generated funds. See Duesenberry (1958).

source of finance, and that there is a financial hierarchy, where internally generated cash flow is invested at a lower return than other external sources of finance. For this reason under-investing firms are expected to have a positive relationship between investments and retentions.

In addition to this, firms with relatively good investment opportunities should also find it simpler to indicate this to investors and thus also find it easier to raise money. All else equal, one should therefore expect firms that have a high Tobin's *Q* to find it less difficult to access external capital and thus depend less on retentions. To test this hypothesis an interaction term between Tobin's *Q* and retentions is added. The expected sign of this term is negative, (Gugler et al., 2004).

Since q_m is a measure of investment efficiency we should expect q_m to vary positively with under-investment.

2.2 Managerial discretion

The separation of ownership from control in corporations creates a principal-agent problem between the owners/investors on the one hand, and managers on the other. In modern corporations the owners and managers are often different and it can therefore also be assumed that they frequently have conflicting interests. Berle and Means (1932) argued that ownership was becoming increasingly dispersed and that this would lead to more and more control being handed over to managers. Jensen and Meckling (1976) analyze how the interests of managers and owners diverge as ownership is separated from control and ownership becomes dispersed. With dispersion of ownership and divergence of interest there is a risk that managers cater to other objectives than shareholder value maximization[73].

Gugler et al. (2004) argue that, even though the managerial discretion hypothesis suggests that over-investing firms rely on retentions to a high extent, this does not rule out the possibility that external funds also are used. By this logic, Gugler et al. argue that the probability of managers resorting to external sources should positively vary with Tobin's *Q*. To test this hypothesis an interaction term between retentions and Tobin's *Q* is included. The predicted sign is positive.

[73] A number of hypotheses have been suggested as to what managers are maximizing if not profits. Marris (1963) argue that managers are deriving utility from managing large firms and therefore tend to maximize growth rather than shareholder value. Baumol (1959) suggest that managers are instead maximizing sales. Assuming that managers (owner-managers) are pursuing growth instead of profit or shareholder maximization we can expect over-investment. Grabowski and Mueller (1972) suggest that the sensitivity of investments to retentions/free cash flow may be due to this type of managerial discretion.

Among over-investing firms some managers will be less resource wasting. All else equal, this will be reflected by a relatively higher marginal *q*. This hypothesis is tested by including marginal *q*. The predicted sign is negative.

2.3 Previous research and alternative explanations

The bulk of studies on investment behavior, going back to Kuh and Meyer (1957), find that investments are correlated with internal funds (both free cash flow and retentions). For reviews of the investment literature, see Chirinko (1993), Hubbard (1998), Jorgenson (1971).

Fazzari, et al. (1988) show in their seminal study that investments in firms with high dividend ratios, and therefore less likely to suffer from financial constraints, are less sensitive to cash flow. These results have been corroborated by a number of studies. See for example Schaller (1993) on Canada and Hoshi et al. (1991) on Japan.

Moreover, institutional differences appear to be important in determining cross country differences in the sensitivity of investment to liquidity. In particular, there may be differences in tax policies that explain, at least partially, cross-country variations in investment sensitivities. Previous studies of the investment-liquidity relationship have found that the institutional context is of importance. Hoshi et al. (1991), for example, find that the corporate structure matters for how sensitive investments in Japanese firms are to cash flow. Independent Japanese firms are more sensitive to liquidity than firms that are part of a group. In Scandinavia, one can also expect the tax system to influence investment behavior. Dividend taxes may, for example, alter investment so that internal funds are less costly than external capital (Sinn, 1991). Some authors claim that the Swedish tax system has systematically disfavored dividends over investment, which has caused managers to use large sums of internal funds for investment without the scrutiny of external investors or capital markets, (see Henrekson and Jakobsson (2001), Henrekson and Sanandaji (2004), Högfeldt (2004), and Magnusson and Jakobsson (2006) for more details on the institutional and political factors that have influenced the Swedish corporate governance system). Presumably, this is also the case in the other Scandinavian countries[74].

[74] The industry and tax policies in Sweden were strongly influenced by the "socialistic" visions in the first half of the 20th century that predicted that firms would become bigger and bigger (large scale) and eventually capitalism would be replaced by socialism. Schumpeter (1942) predicted in Capitalism, Socialism and Democracy, that socialism, due to the superior performance of capitalism, would replace capitalism in western democracies. Similar ideas are found in Galbraith's (1967) The New Industrial State. For an analysis of how the Swedish industrial and tax polices were influenced by these ideas, see Henrekson and Jakobsson (2001) and Högfeldt (2004).

A problem in these types of studies is the possibility that Tobin's *Q* fails to perfectly control for investment opportunities, e.g. due to measurement errors. For example, if there is a positive serial correlation of profits, profits will reflect reinvestment opportunities and retentions in period *t* will be correlated with profits in period *t-1* (Tirole, 2006). If this is the case, profit retentions may be proxies of future investment opportunities, which then can explain why investments are sensitive to retentions. One way of controlling for this possibility is to also include growth in sales. From accelerator theories of investments we know that growth in sales (proxies for changes in the desired output) is strongly correlated with changes in the desired level of capital (ΔK_t^*) (see Jorgenson, 1971).

In neoclassical *Q*-theory of investment growth in sales is expected to have an impact since under neoclassical assumptions Tobin's *Q* incorporates the accelerator model (see Ciccolo and Fromm, 1979, Jorgenson and Sibert, 1968, and Mueller, 2003).

Growth in sales is also predicted to have a positive effect in both the under- and the over-investing group. Financially constrained firms are likely to find it less difficult to raise external funds if their sales are increasing. Firms that are over-investing should by the same logic find it easier to raise external capital if they have rapid sales growth.

Table 1 summarizes the hypotheses that are tested. Since both the agency hypothesis and the financial friction hypothesis predict a positive relationship between investments and liquidity it is difficult to differentiate between them. As mentioned, the solution is to identify firms that are under- or over-investing. Managerial discretion (which implies excessive spending) is inconsistent with under-investments. Similarly, financial constraint explanation is inconsistent with over-investment. The hypotheses in Table 1 follow Gugler et al. (2004), with the exception that growth in sales has been added and the prediction of q_m differs. Gugler et al. do not include q_m in the first column, and they make no predictions for the over-investing firms.

To test the robustness of the results, Tobin's average *Q* and dividend ratios are used, *mutatis mutandis,* to differentiate between the two categories of firms.

Table 1 Summary of hypotheses and predicted signs

Investment theory	Neoclassical *Q*-theory of investment	Marginal *q* theory of investment	
		Under-investment (asymmetric information)	Over-investment (Managerial discretion)
	All firms	Firms with $\overline{q}_m > 1$	Firms with $\overline{q}_m < 1$
Dependent variable	I_t/K_{t-1}	I_t/K_{t-1}	I_t/K_{t-1}
Explanatory variables:			
Intercept	+	+	+
Retained Earnings, RE_t	0	+	+
Tobin's average *Q*, $Q_{a,t-1}$	+	+	+
Marginal *q*, $q_{m,t-1}$	0	+	-
Growth in Sales$_t$	0	+	+
$Q_{a,t-1} * RE_t$	0	-	+

3 Methodology and data

Mueller and Reardon's (1993) method to estimate q_m links investment, I_t, to changes in market value, M_t. The intuition behind their method is that \$1 worth of investment should be reflected by at least \$1 increase in market value. This is the case if q_m is equal to one, implying that the return on investment, *i*, is equal to the cost of capital, *r*, ($q_m = i/r$). If $q_m > 1$ this means that the return is above the cost of capital. This in turn means that further investment is profitable. Conversely if $q_m < 1$ firms are over-investing at returns below their cost of capital (see Appendix 2).

Mueller and Reardon's method can be used to calculate three different, but closely related, measures of marginal *q*. The first alternative is to calculate a firm and time specific q_m:

$$q_{m,t} = \frac{M_t - (1-\delta)M_{t-1}}{I_t} \tag{3}$$

where δ is the depreciation rate. The second alternative is to calculate a firm specific multi-period weighted average of q_m:

$$\overline{q}_m = \frac{M_{t+n} - M_{t-1}}{\sum_{j=0}^{n} I_{t+j}} + \frac{\sum_{j=0}^{n} \delta_{it+j} M_{t+j-1}}{\sum_{j=0}^{n} I_{t+j}} - \frac{\sum_{j=0}^{n} \mu_{t+j}}{\sum_{j=0}^{n} I_{t+j}} \quad (4)$$

Equation (3) is used to calculate the $q_{m,t}$ that enters the investment equation as explanatory variable. μ_t is the error in market valuation of the firm in period *t*. The last term in (4) approaches zero as *n* grows. Equation (4) is, on the other hand, used to calculate a weighted average of q_m for each firm ($\overline{q}_m$). $\overline{q}_m$ is used to split the sample into over- and under-investing firms. To estimate q_m, according to both equation (3) and (4), it is necessary to assume a depreciation rate (δ). For this purpose, the third alternative can be used as no assumptions regarding the depreciation rate are necessary. This method yields simultaneous estimates of the average q_m and δ for all firms:

$$\frac{M_t - M_{t-1}}{M_{t-1}} = -\delta_i + q_m \frac{I_t}{M_{t-1}} + \frac{\mu_t}{M_{t-1}} \quad (5)$$

This is an equation that can be empirically estimated. From the efficient market hypothesis we expect $\mu_{t+j} = 0$ for all *j*. This means that when the number of observations grows, the last term in (5) will become smaller and approach 0. It should be noted that it is not necessary to calculate the cost of capital with this method. If the market fails to assign a correct market value in period *t*, equation (3) will give an incorrect estimate of q_m. However, assuming that the errors in market valuation are not persistent and that possible errors are corrected by the market in subsequent periods equations (4) and (5) will still be accurate measures of q_m, (see Gugler et al., 2004, and also Mueller and Reardon, 1993, for further details on q_m). Since depreciation rates can be assumed to differ across industries, industry specific depreciation rates, δ_i are estimated. Industries are also subjected to random shocks that affect the value. For this reason equation (5) is also estimated with time effects. First, equation (5) is estimated. Then the estimated δ_i's, including time effects, are plugged into equations (3) and (4).

Tobin's *Q* is measured as the quotient between market value and capital ($Q_{a,t} = M_t/K_t$). See Appendix 2 for a derivation of these three measures and how they are linked to Tobin's *Q*.

3.1 Variables and data

The accounting and market price data have been obtained from Standard and Poor's database Compustat Global (mnemonic items in brackets). Market value, M_t, is defined as the number of common shares times the market price per share (*Mkval*), plus total debt (*Dt*). Since the M_t is comprehensive, it is necessary to use an equally comprehensive definition of investment. Investment, I_t, is therefore measured as:

$$I = \textit{After tax profits} - \textit{Dividends} + \textit{Depreciation} + \Delta E + \Delta D + \textit{Advertising costs} + \textit{R\&D}$$

where after tax profit is income before extraordinary items (*Ib*), dividends (*DVT*), depreciation (*DVC*), ΔE is new equity (*SSTK – PRSTKC*), ΔD is change in debt (*DT*), R&D is research and development expenditures (*XRD*) and Adv. is marketing and advertising expenditures (approximated with *XSGA*)[75]. Retained Earnings, RE_t, is defined as the sum of the first three variables in the investment function (after tax profit, dividends and depreciation). Capital, K_t, is defined as total assets (*AT*). As sales variable (*SALE*) is used.

Marginal q, $q_{m,t}$, and weighted average of marginal $q, \bar{q}_m$, are calculated from equation (6) and (7), respectively. Tobin's Q, $Q_{a,t}$, is calculated as the quotient between M_t and K_t. All variables are adjusted to 2005 constant prices (Eurostat HCPI, 2005 = 100). In total, data for 292 listed Scandinavian firms have been collected (2004 observations). The data rages from 1998 or 1999 to 2005 and is unbalanced.

[75] This definition allows for investments to be negative if losses of a firm are large enough. The reason that investment can be negative is that the accounting depreciation data fails to capture actual economic depreciation of capital. Negative investments make no sense in equations 3 and 4 and have therefore been excluded. The results in the remainder of the paper are robust if negative "investments" are excluded or not. Only few investment observations are negative.

4 Results and analysis

The basic investment equation that is estimated is an extended version of equation (2) and is of the following form:

$$\frac{I_t}{K_{t-1}} = \alpha + \beta_1 Q_{a,t-1} + \beta_2 \frac{RE_t}{K_{t-1}} + \beta_3 q_{m,t-1} + \beta_4 \frac{RE_t \times Q_{a,t-1}}{K_{t-1}} + \beta_5 \frac{\Delta Sales_t}{Sales_{t-1}} + \mu_t$$

(6)

In addition to retained earnings, RE_t, and Tobin's average Q, Q_a, marginal q, q_m, Tobin's Q interacted with retentions, $RE_t \times Q_{a,t-1}$, and growth in sales are added. Both marginal q and Tobin's Q are lagged one period to avoid endogeneity problems. An alternative to RE_t is to use a pre-dividend definition of liquidity, free cash flow. Using free cash flow instead of retained earnings is, however, inconsequential from an empirical point of view, considering that the correlation is close to one (see correlation matrix in Appendix 3). The results in this paper hold also for this definition of liquidity.

Ideally, dividing I_t and RE_t with K_{t-1} should normalize equation (6) and make it empirically testable. However, none of the variables are normally distributed; both skewness and kurtosis are high for all the variables in equation (6). Jarque-Bera and Shapiro-Wilk tests indicate significant non-normality at one percent level for all the variables.

There are several ways of dealing with non-normality; transformation of variables, trimming of the sample, or some sort of robust estimation technique. Which method is more appropriate depends on the cause of non-normality. From histograms of the variables it is clear that extreme values are the problem. Therefore, as a first step to reduce the weight of outliers, all the variables have been caped at the 1st and 99th percentiles. This makes the variables more normally distributed and makes it possible to use standard OLS estimations.

To trim the sample in this way is, however, unsatisfactory. A more appropriate way of dealing with non-normality is to employ some sort of a robust estimation technique. The standard technique is to use quintile median regressions. Median regressions can, however, be more sensitive to outliers than Iteratively Reweighed Least Squares. The Iteratively Reweighed Least Squares use a maximum likelihood estimator where case weights are calculated from scaled residuals. Median absolute deviation is used as scale, see Huber (1981).

As a robustness check all three types of estimation are used and reported (trimmed OLS, Iteratively Reweighed Least Squares and Median Regression). Iteratively Reweighed Least Squares, which is the theoretically most appropriate way of dealing with non-normality, also yield the best results in terms of

explanatory power. Otherwise the results are robust with respect to the choice of estimation method.

Other statistical problems, such as multicollinarity for example, do not seem to plague the data (see correlation matrix). The correlation between $Q_{a,t}$ and growth in sales for example is only 0.17, which must be considered low given that both are indicators of investment opportunities. $Q_{a,t}$ and $q_{m,t}$ is only weakly correlated (0.14). Surprisingly, there is no correlation between $q_{m,t}$ and I_t. The strongest correlation is found between RE_t and I_t (0.38). As $Q_{a,t}$, $q_{m,t}$ and growth in sales all are measures of investment opportunities one might still be concerned about multicollinarity. Therefore, the Variance Inflation Factor (VIF) has also been calculated. No VIF is above two, which indicates that there is no significant problem with multicollinarity.

Since it is a panel data set, all regressions are estimated with industry and time effects (fixed effect). The time effects control for possible cyclicity of investments and the industry effects control for differences in investment behavior across industries. All results are robust with regard to the inclusion or omission of time, industry and country effects. Regressions reported here have been estimated with industry (2-digit SIC) and time effects (not reported). In addition, possible country effects have been tested for. Sweden is found to have a significantly higher investment rate than the other Scandinavian countries, but country effects do not alter the results and as a result they have been excluded.

Retained earnings are clearly the most important variable and the estimated coefficient is not significantly different from one. These coefficients are clearly in the upper end of the distribution of coefficients found in this type of studies.

Independent of investment opportunities, Scandinavian firms relies to a very large extent on retentions to fund their investments. Both firms that are in the financially constrained category and firms that are in the category of over-investing display almost a strict proportionality between retentions and investments. The frictionless hypothesis is clearly rejected.

Using the same methodology and variables definitions, Gugler et al. (2004) find the coefficient for US to be 0.20. For financially constrained firms their estimates are a bit higher, 0.30, and for over-investing ones the coefficient is 0.15. Fazzari et al.'s (1988) study of US firms also finds most coefficients on cash flow to lie in the rage 0.20 to 0.40.

Still, there are clearly significant differences across firms. Looking at the aggregate investments, retentions account for not more than about 50 percent of all investments. The reason is that the majority of firms rely on retentions whereas only few firms raise most of the new equity (ΔE). Only 9 percent of the firms raised new equity at least once during the period, and even among these firms the equity additions were skewed. Ten firms accounted for more than 50 percent of all new equity additions. The majority of firms rely to a very high extent, or solely, on retentions to fund their investments.

Assuming that profits are serially correlated, retentions of profits for investments may simply proxy for future investment opportunities. To control for this possibility growth in sales is also included.[76]

Results for all firms are reported in Table 2. Growth in sales is found to vary positively with investment. Tobin's Q is also positively related to investments, while marginal q has no robust significant impact on investment. One explanation could be that $Q_{a,t}$ controls for investment opportunities and thereby renders $q_{m,t}$ insignificant. However $q_{m,t}$ remains insignificant even after omitting $Q_{a,t}$. An alternative interpretation can therefore be that q_m fails as a forward looking measure of investment opportunities. Both Tobin's Q and growth in sales have a relatively low economic significance.

The constant (replacement investment coefficient) is roughly in the neighborhood of 15 percent, meaning that replacement investment amount to approximately 15 percent of K_{t-1}, which seems plausible.

Table 2 All firms

Dependent variable: I_t/K_{t-1}			
	Fixed Effects [a]	Iteratively Reweighed Least Squares	Quintile Median Regression
Constant	0.123*** (3.08)	0.166*** (5.40)	0.181*** (4.73)
RE_t/K_{t-1}	1.080*** (14.41)	1.008*** (145.95)	1.010*** (490.81)
Tobin's Q, $Q_{a,t-1}$	0.053*** (9.32)	0.004*** (3.69)	0.005*** (4.13)
Marginal q, $q_{m,t-1}$	0.000 (0.01)	-0.000 (- 1.26)	-0.000*** (-2.82)
$\Delta Sales_t/sales_{t-1}$	0.136*** (7.15)	0.038*** (7.55)	0.004*** (9.43)
$Q_{a,t-1} * RE_t$	-0.101*** (- 3.90)	-0.001 (- 0.69)	-0.002*** (-19.47)
No. observations	1836	2002	2003
No. firms	292	292	292
R^2	0.38	0.96	-
Pseudo R^2	-	-	0.32
F-value	19.9	861.3	-

[a] Trimmed sample, *** indicates significance at 1 percent, ** at 5 percent and * at 10 percent level. t-values in brackets.

[76] In empirical applications of the accelerator model of investment, accelerator sales models yield superior predictions as compared to value added and profit accelerators, see Jorgenson (1971).

The next step is to split the data into two groups; firms with $\bar{q}_m > 1$ (under-investing) and firms with $\bar{q}_m < 1$ (over-investing). $\bar{q}_m$ are calculated using equation (4). The $\bar{q}_m$'s are estimates of the weighted average return on investments relative to the cost of capital for each firm. Equations (3) ($q_{m,t}$) and (4) ($\bar{q}_m$) are both sensitive to the choice of depreciation rates. To obtain accurate depreciation rates equation (5) was first estimated including both time and industry specific effects, from which time and industry specific depreciation rates were obtained. For more details on the estimation of marginal *q,* see Mueller and Reardon (1993), Gugler et al. (2004) and Eklund (2008). The results for these under-investing firms are reported in Table 3. Over-investing firms are reported in Table 4.

Table 3 Under-investing firms with marginal *q* > 1

Dependent variable: I/K_{t-1}			
	Fixed Effects [a]	Iteratively Reweighed Least Squares	Quintile Median Regression
Constant	-0.009 (-0.15)	0.028 (0.79)	0.013 (0.25)
RE_t/K_{t-1}	1.085*** (10.19)	1.003*** (35.74)	0.925*** (32.50)
Tobin's $Q, Q_{a,t-1}$	0.036*** (5.08)	0.010*** (3.90)	0.004*** (10.78)
Marginal q, $q_{m,t-1}$	0.000 (1.14)	-0.000 (-0.38)	-0.000 (-0.86)
$\Delta Sales_t/sales_{t-1}$	0.141*** (4.75)	0.004*** (10.32)	0.004*** (9.31)
$Q_{a,t-1} * RE_t$	-0.049* (-1.74)	-0.017*** (-7.38)	-0.001*** (-4.23)
No. observations	637	727	729
No. firms	106	106	106
R^2	0.48	0.77	-
Pseudo R^2	-	-	0.24
F-value	12.95	54.2	-

[a] Trimmed sample, *** indicates significance at 1 percent, ** at 5 percent and * at 10 percent level. t-values in brackets.

The effect of RE_t on investments remains close to one in both groups of firms. In most of the regressions marginal q turns out to be insignificant. In economic terms, retentions are clearly the most important variable that explains most of the variation. As predicted, information asymmetries and financial constraints appear to become less problematic for firms with high $Q_{a,t}$'s. This can be seen

from the negative coefficient on $Q_{a,t-1} * RE_t$. The same term is negative, but not robustly so, among over-investing firms. The hypothesis that over-investing firms are resorting to more external finance when $Q_{a,t}$ is high is therefore rejected.

An interesting observation is that over-investing firms appear to be more sensitive to changes in Tobin's Q and growth in sales than financially constrained firms. One straightforward interpretation is that financially constrained firms simply cannot increase their investments in response to hike in investment opportunities.

The results in Table 3 and 4 have been subjected to a number of robustness tests. First, firms having $\bar{q}_m$ s close to one were excluded ($0.8 < \bar{q}_m < 1.2$). By excluding these firms a clearer separation between over- and under-investing forms is achieved. Secondly, the results in Table 3 and 4 were replicated using a different calculation of $q_{m,t}$ and $\bar{q}_m$ assuming a 10 percent depreciation rate across all firms and industries. The results remain robust in both these cases (Not reported).

Table 4 Over-investing firms with marginal $q < 1$

Dependent variable: I_t/K_{t-1}			
	Fixed Effects [a]	Iteratively Reweighed Least Squares	Quintile Median Regression
Constant	0.161***	0.094	0.227***
	(3.19)	(1.24)	(5.83)
RE_t/K_{t-1}	1.341***	1.014***	1.020***
	(12.63)	(110.31)	(115.83)
Tobin's Q, $Q_{a,t-1}$	0.092***	0.060***	0.028***
	(9.76)	(22.31)	(11.00)
Marginal q, $q_{m,t-1}$	- 0.000	- 0.000	- 0.000***
	(- 0.60)	(-0.97)	(- 4.48)
$\Delta Sales_t/sales_{t-1}$	0.137***	0.117***	0.138***
	(5.86)	(9.68)	(12.12)
$Q_{a,t-1} * RE_t$	- 0.325***	- 0.002	- 0.004*
	(- 6.22)	(-0.83)	(- 1.65)
No. observations	1199	1274	1274
No. firms	186	186	186
R^2	0.41	0.97	-
Pseudo R^2	-	-	0.39
F-value	15.3	783.8	-

[a] Trimmed sample, *** indicates significance at 1 percent, ** at 5 percent and * at 10 percent level. t-values in brackets.

As a further robustness check, Tobin's Q, $\overline{Q}_a$ (period average), was used in the same way as marginal q, $\bar{q}_m$, to distinguish between over- and under-investing firms. The results are robust as compared to the grouping based on marginal q. The results are reported in Appendix 4. Finally, the sample was also split into high and low dividend firms. Fazzari et al. (1988), for example, find that low dividend firms tend to be more sensitive to retentions. Dividend ratios were calculated as the dividends over free cash flow. These results are also reported in Appendix 4. Again, the results are robust and the retention coefficients are close to one.

In contrast to Gugler et al. (2004), few of the coefficients on $q_{m,t}$ are significant. Gugler et al. find coefficients in the range of 0.002 and 0.005. Thus, from an economic point of view marginal q, as measured here, has a negligible impact. A possible explanation for this is the fact that the methodology of measuring marginal q does not yield a forward looking measure of future investment opportunities. It is forward looking in the sense that an investment made in period t is reflected in the market value, which is based on market expectations. But marginal q does not necessarily yield a good prediction of future investment opportunities. Mueller and Reardon's (1993) measure of marginal q may, in other words, be an appropriate *ex post* measure of performance but less adequate as an *ex ante* indicator of investment opportunities.

These investment-retention coefficients are very large when compared internationally. There are several alternative explanations that possibly can explain the strong effect retentions have on investments. First, in this sample only listed Scandinavian firms are included, which may cause a selection bias. Assuming that the majority of the firms are mature and have depleted their investment opportunities in the sense that they no longer require large external funding for their investments, this could probably shed some light on the results (see lifecycle theories of the firm, Mueller, 1972).

Second, the age of firms is possibly also a factor that matters for how sensitive investments are to retentions. One hypothesis is that information asymmetries that constrain firms financially are gradually reduced as firms matures and build a reputation. If this is the case internal funds should become less important over the life-cycle of the firm. Examining Canadian firms, Schaller (1993) finds that young firms are more cash flow sensitive. However, this seems unlikely, considering that all firms independent of investments opportunities are sensitive to retentions.

A counter hypothesis is that as a firm matures investment opportunities are depleted. When this happens managers may find it more difficult to access external capital thereby resorting extensively to internally generated funds, see the life-cycle theory of the firm in Grabowski and Mueller (1975).

Finally, there may be strong institutional factors such as tax policy (Sinn, 1991) favoring retentions over other sources of finance. All in all, institutional

factors are likely to be the cause of the high dependence on retentions. Transaction costs of various sorts, as pointed out by Duesenberry (1958), can make investments sensitive to retentions. To what extent tax policies and various market regulations (i.e. labor market rigidities) contribute to these frictions is an area where more research is needed.

Apart from financial frictions in terms of information asymmetries and agency problems the results also have macro economic implications. Financial market imperfections can, for example, lead to *"financial accelerators",* which may magnify initial economic shocks, see Bernanke et al. (1996) and also Fisher (1933). This implies that a large coefficient on retentions/cash flow can augment business cycles. Firms relying solely on internal funds will reduce their investments when their revenues/profits falls which then acts magnifying. Vice versa, when profits are high investments will also be high. Empirical studies by Greenwald et al. (1984), Bernanke and Gertler (1989) and Hoshi et al. (1991) find evidence that these types of capital market frictions contribute to fluctuations in output.

5 Conclusions

Using comprehensive definitions of investment and retained earnings this paper shows that Scandinavian firms are highly dependent on retained earnings to fund their investments. Independent of investment opportunities Scandinavian firms rely to a great deal on retained earnings. Both firms that are financially constrained and firms that are over-investing rely heavily on retentions to fund their investments. Investments are almost strictly proportional to retentions.

A positive relationship between investment and internally generated funds can in principle be explained by either information asymmetries that increase the cost of external capital (Myers and Majluf, 1984) or agency-conflicts in the form of managerial discretion (Grabowski and Mueller, 1972). In order to separate between these two alternative explanations it is necessary to distinguish between firms that are under- and over-investing, respectively. In this paper a method to measure marginal q developed by Mueller and Reardon (1993) is used to differentiate between these two categories of firms. The results are also robust when controlling for high and low dividend firms, and firms with high or low Tobin's Q.

It is hard to accept that the two alternative hypotheses, financial hierarchy and managerial discretion, can explain the results, given the exceptionally strong effect of retentions on investments. Instead, further studies are called upon to further explore the institutional specificities of Scandinavian corporate governance systems. The question that arises is related to the cause of the frictions that make firms so dependent on retentions. The tax system may be one factor obstructing an efficient capital allocation. Another possible explanation for this high dependence on retentions may be found in the roots

of the corporate governance systems, which, for a long time, have favored large growing enterprises at the expense of smaller new firms. This tendency has arguably been particularly strong in Sweden (Högfeldt, 2004), which is also found to have a higher investment rate than the other Scandinavian countries.

How investment behavior is affected by control structures, such as pyramids and dual-class shares, and how these interact with ownership may, for example, be important, particularly the question of the extent that control structures mitigate problems with asymmetric information and agency problems or makes them more severe. Further research on how relations to banks and ownership spheres affect investment behavior is also necessary.

Finally, this paper raises two important policy concerns that need more research. First, the extent tax policies/industry policies can explain these results. If tax policies, for instance, favor retentions over dividends, one needs to understand the implications for business renewal and structural change. Assuming that some Scandinavian firms are suffering from financial constraints, while at the same time, other firms are over-investing, this implies that capital is allocated inefficiently. A policy change that reduces dependence on retentions to fund investments would then improve resource allocation, bringing about a swifter reallocation of resources between different sectors of the economy (removal of institutionally induced transaction costs). Secondly, if the investment-liquidity relationship is robust over time, one needs to investigate the extent to which it contributes to excessive business and output fluctuations. All else equal, high dependence on retentions means that investments will co-move with business cycles to a higher extent. These aspects call for further research.

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Appendix 1

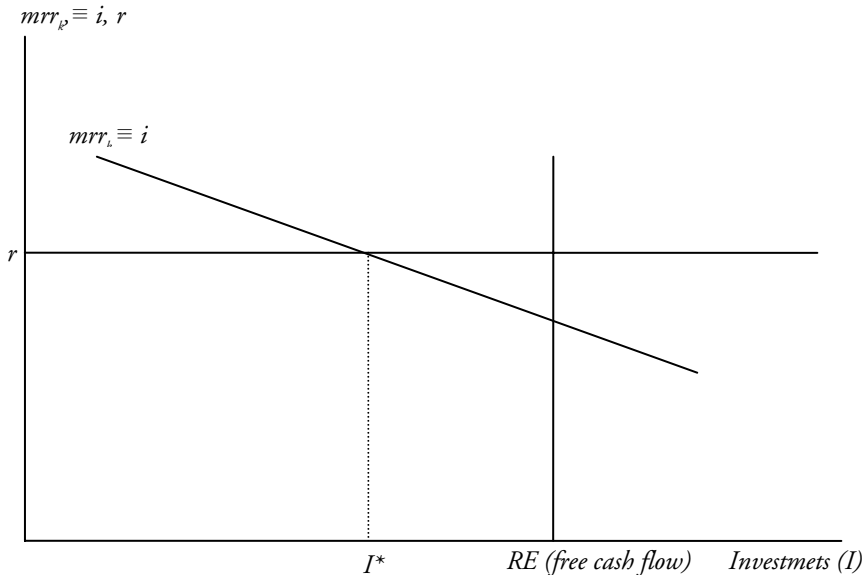

Figure 1 Managerial discretion and over-investment

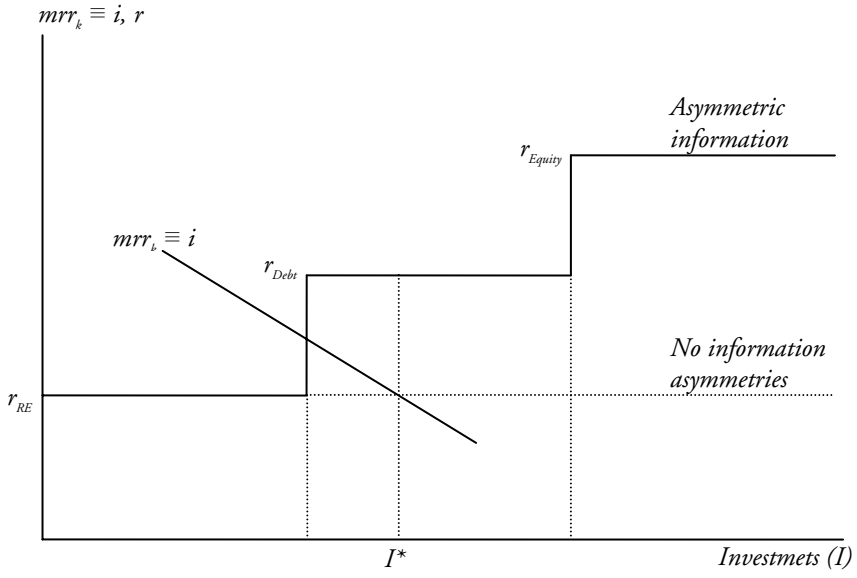

Figure 2 Investments and asymmetric information

Appendix 2

Tobin's average Q and marginal *q*

Mueller and Reardon's (1993) method of measuring marginal q can be derived from Tobin's Q. Tobin's Q is defined as the ratio between the market value and the replacement cost of capital. Tobin's Q measures the average return on capital, K, (hence average Q) whereas marginal q measures the marginal return r, of new capital (I). Both these measures can be derived from the rule of *marginal efficiency of investment.* Note that in a competitive equilibrium where all firms are price takers Tobin's Q and marginal q will both be equal to one (Hayashi, 1982).

At time t, the market value, M_t, of a firm can be defined as the present value of future cash flows. An investment, I_t, made in period t, will generate future cash flows, CF_t, in t plus j periods. The present value of CF_t that I_t generates is the following:

$$PV_t \equiv \sum_{j=0}^{\infty} CF_{t+j} /(1+r)^j \tag{7}$$

where r is the discount rate. For investment to be rational from a shareholder-value maximization perspective, only investments that have a positive net present value should be considered ($PV_t - I_t > 0$).

The market value of a firm at time t can, in other words, be expressed as the sum of all future cash flows that all investments generate:[77]

$$M_t \equiv \sum_{t=0}^{\infty}\sum_{j=0}^{\infty} \frac{CF_{t+j}}{(1+r)^j} \equiv \sum_{t=0}^{\infty} PV_t \tag{8}$$

The stock of capital at time t can be defined as the sum of investments:

[77] Investments are typically thought of as generating a finite number of future cash flows. A firm can, on the other hand, be assumed to generate infinitely many future projects.

$$K_t \equiv \sum_{t=0}^{-\infty} I_t - \sum_{t=0}^{-\infty} \delta K_{t-1} \tag{9}$$

Tobin's average q is the quotient between equations (8) and (9) ($Q_{a,t} = M_t/K_t$).

The marginal return on new capital or marginal q, q_m, can be derived from the net present value rule. q_m is the quotient between i and r, where i is a quasi-permanent rate of return that I_t generates ($q_{m,t} = i/r$).

$$PV_t = \frac{i_t I_t}{r_t} = q_{m,t} I_t \tag{10}$$

The market value at time t can be expressed as the market value in the previous period, plus the present value of investment made in period t, minus the depreciation, δ, of M_{t-1}:

$$M_t = M_{t-1} + PV_t - \delta M_{t-1} + \mu_t \tag{11}$$

μ is the error that the market may make in evaluating the firm in period t. By substituting PV_t in equation (10) with $q_{m,t} I_t$ and rearranging we obtain:

$$q_{m,t} = \frac{M_t - (1-\delta_i) M_{t-1}}{I_t} \tag{3'}$$

Taking equation (11) and replacing the second term with subsequent periods yields a multi-period version of equation (11):

$$M_{t+j} = M_{t-1} + \sum_{j=0}^{n} PV_{t+j} - \sum_{j=0}^{n} \delta_t M_{t+j-1} + \sum_{j=0}^{n} \mu_{t+j} \tag{12}$$

If this is divided by $\sum_{j=0}^{n} I_{t+j}$ we get the following:

$$\frac{M_{t+j}}{\sum_{j=0}^{n} I_{t+j}} = \frac{M_{t-1}}{\sum_{j=0}^{n} I_{t+j}} + \frac{\sum_{j=0}^{n} PV_{t+j}}{\sum_{j=0}^{n} I_{t+j}} - \frac{\sum_{j=0}^{n} \delta_t M_{t+j-1}}{\sum_{j=0}^{n} I_{t+j}} + \frac{\sum_{j=0}^{n} \mu_{t+j}}{\sum_{j=0}^{n} I_{t+j}} \tag{13}$$

The multi-period version of equation (7) is:

$$\frac{\sum_{j=0}^{n} PV_{t+j}}{\sum_{j=0}^{n} I_{t+j}} = \frac{\sum_{j=0}^{n} q_{m,t+j} I_{t+j}}{\sum_{j=0}^{n} I_{t+j}} = \overline{q}_m, \tag{14}$$

Substituting the second part of equation (10') into equation (9') and rearranging we get:

$$\overline{q}_m = \frac{M_{t+n} - M_{t-1}}{\sum_{j=0}^{n} I_{t+j}} + \frac{\sum_{j=0}^{n} \delta_{t+j} M_{t+j-1}}{\sum_{j=0}^{n} I_{t+j}} - \frac{\sum_{j=0}^{n} \mu_{t+j}}{\sum_{j=0}^{n} I_{t+j}} \tag{4'}$$

Thus, equation (4) is the multi-period weighted average of equation (3).

By rearranging equation (3) and dividing with M_{t-1} to remove heteroscedasticity we obtain:

$$\frac{M_t - M_{t-1}}{M_{t-1}} = -\delta_i + q_{m,t} \frac{I_t}{M_{t-1}} + \frac{\mu_t}{M_{t-1}} \tag{5'}$$

Equation (5) can be empirically estimated. Since depreciation rates differ across industries, industry specific depreciation rates, δ_i are estimated. Industries are also subjected to random shocks that affect the value. For this reason equation (9) is also estimated with specific time shocks. First, equation (5) is estimated and then the estimates of δ_i, including time effects, are plugged into equations (3) and (4). From the efficient market hypothesis we expect $\mu_{t+j} = 0$, for all j. This means that when the number of observations grows, the last term in (5) will become smaller and approaches 0.

Appendix 3

Table 5 **Correlation matrix** [a]

Variables	$\Delta Sales/sales_{t-1}$	$Tobin's\ Q_{t-1,}\ Q_{a,\ t-1}$	$Marginal\ q,\ q_{m,t-1}$	$Average\ marginal\ q,\ \bar{q}_m$	I_t/K_{t-1}	RE_t/K_{t-1}	$Q_{a,t-1} * RE_t/K_{t-1}$	Dividend ratio
$\Delta Sales/sales_{t-1}$	1							
$Tobin's\ Q,\ Q_{a,\ t-1}$	0.167*	1						
$Marginal\ q,\ q_{m,t-1}$	0.020	0.141*	1					
$Average\ marginal\ q,\ \bar{q}_{m,t-1}$	- 0.001	0.002	- 0.016	1				
I_t/K_{t-1}	0.250*	0.283*	0.010	- 0.084*	1			
RE_t/K_{t-1}	0.175*	0.073*	0.007	- 0.036	0.379*	1		
$Q_{a,t-1} * RE_t/K_{t-1}$	- 0.084*	0.016	0.021	- 0.023	0.102*	0.283*	1	
$Dividend\ ratio$	0.015	0.003	- 0.036	- 0.005	0.016	0.025	- 0.000	1
$\frac{(RE_t + Dividends_t)^b}{K_{t-1}}$	0.015	0.111*	0.052*	- 0.046*	0.390*	0.957*	0.872*	- 0.004

* indicates significance at 5 percent. [a] based on the trimmed sample. [b] Equivalent to Free Cash Flow

Table 6 Descriptive statistics [a]

Variables	Mean	Median	Std. dev.	Skewness	Kurtosis
$\Delta Sales_t/sales_{t-1}$	0.079	0.039	0.32	3.55	26.76
Tobin's Q, $Q_{a,\,t-1}$	1.277	0.891	1.19	3.34	16.67
Marginal q, $q_{m,t-1}$	5.971	4.209	28.08	- 0.72	26.71
Average marginal q, $\bar{q}_{m,t-1}$	1.378	0.744	6.16	11.65	166.26
I_t/K_{t-1}	0.225	0.164	0.28	1.14	5.13
RE_t/K_{t-1}	0.061	0.073	0.12	- 1.60	10.08
$Q_{a,t-1} * RE_t/K_{t-1}$	- 0.957	0.059	41.98	- 44.31	1975.92
Dividend ratio	0.282	0.198	0.40	2.14	12.14

[a] based on the trimmed sample

Appendix 4

Robustness checks

In Tables 7 and 8 the sample has been divided into firms with Tobin's *Q* above and below one. Tobin's *Q* is the period average for each firm.

Table 7 Under-investing firms with Tobin's average Q > 1

Dependent variable: I_t/K_{t-1}			
	Fixed Effects [a]	Iteratively Reweighed Least Squares	Quintile Median Regression
Constant	0.115***	0.078***	0.052
	(2.56)	(2.75)	(1.35)
RE_t/K_{t-1}	0.984***	1.014***	1.010***
	(9.13)	(136.76)	(253.15)
Tobin's Q, $Q_{a,t-1}$	0.040***	0.003***	0.004***
	(5.55)	(2.76)	(5.77)
Marginal q, $q_{m,t-1}$	0.000	-0.000	-0.000***
	(0.66)	(-1.24)	(-3.20)
$\Delta Sales/sales_{t-1}$	0.124***	0.003***	0.004***
	(4.61)	(6.59)	(8.60)
$Q_{a,t-1} * RE_t$	-0.077***	-0.003*	-0.002***
	(-2.42)	(-1.64)	(-30.03)
No. observations	854	958	959
No. firms	140	140	140
R^2	0.41	0.98	-
Pseudo R^2	-	-	0.41
F-value	12.22	951.54	-

[a] Trimmed sample, *** indicates significance at 1 percent, ** at 5 percent and * at 10 percent level. t-values in brackets.

Table 8 Over-investing firms with Tobin's average Q < 1

Dependent variable: I_t/K_{t-1}			
	Fixed Effects [a]	Iteratively Reweighed Least Squares	Quintile Median Regression
Constant	0.103**	0.095***	0.151***
	(2.44)	(2.85)	(4.21)
RE_t/K_{t-1}	1.146***	1.450***	1.106***
	(5.43)	(12.13)	(22.98)
Tobin's Q, $Q_{a,t-1}$	0.061**	0.083***	0.077***
	(2.09)	(4.50)	(3.80)
Marginal q, $q_{m,t-1}$	-0.000	-0.000	0.000
	(-0.40)	(-0.70)	(0.16)
$\Delta Sales/sales_{t-1}$	0.142***	0.136***	0.003***
	(5.41)	(9.57)	(4.25)
$q_{a,t-1} * RE_t$	-0.118	-0.537***	-0.240***
	(-0.48)	(-4.58)	(-2.46)
No. observations	982	1042	1044
No. firms	152	152	152
R^2	0.39	0.50	-
Pseudo R^2	-	-	0.25
F-value	14.24	22.82	-

[a] Trimmed sample, *** indicates significance at 1 percent, ** at 5 percent and * at 10 percent level. t-values in brackets.

In Tables 9 and 10 the sample has been divided into low and high dividend payout ratio firms.

Table 9 Low dividend firms

Dependent variable: I_t/K_{t-1}			
	Fixed Effects [a]	Iteratively Reweighed Least Squares	Quintile Median Regression
Constant	0.116**	0.165***	0.200***
	(2.12)	(3.77)	(5.09)
RE_t/K_{t-1}	1.027***	1.039***	0.970***
	(10.86)	(31.67)	(38.56)
Tobin's q, $q_{a,t-1}$	0.057***	0.011***	0.003***
	(6.97)	(3.05)	(9.84)
Marginal q, $q_{m,t-1}$	0.000	-0.000	-0.000***
	(1.38)	(-1.11)	(-4.70)
$\Delta Sales/sales_{t-1}$	0.120***	0.004***	0.004***
	(4.84)	(6.64)	(12.28)
$q_{a,t-1} * RE_t$	-0.090***	-0.018***	-0.001***
	(- 2.93)	(-5.36)	(-6.36)
No. observations	885	998	1000
No. firms	147	147	147
R^2	0.42	0.68	-
Pseudo R^2	-	-	0.29
F-value	12.6	42.4	-

[a] Trimmed sample, *** indicates significance at 1 percent, ** at 5 percent and * at 10 percent level. t-values in brackets.

Table 10 High dividend firms

Dependent variable: I_t/K_{t-1}			
	Fixed Effects [a]	Iteratively Reweighed Least Squares	Quintile Median Regression
Constant	0.136**	0.179***	0.190***
	(2.34)	(4.35)	(4.21)
RE_t/K_{t-1}	1.121***	1.007***	1.007***
	(7.54)	(136.47)	(200.24)
Tobin's q, $q_{a,t-1}$	0.040***	0.006***	0.007***
	(3.97)	(2.58)	(2.89)
Marginal q, $q_{m,t-1}$	-0.000	-0.000	-0.000
	(-0.63)	(-0.82)	(-1.62)
$\Delta Sales_t/sales_{t-1}$	0.158***	0.069***	0.132***
	(4.83)	(4.78)	(9.21)
$q_{a,t-1} * RE_t$	-0.034	-0.002	-0.002
	(-0.51)	(-0.67)	(-0.88)
No. observations	951	1001	1003
No. firms	145	145	145
R^2	0.42	0.99	-
Pseudo R^2	-	-	0.44
F-value	13.6	1339.3	-

[a] Trimmed sample, *** indicates significance at 1 percent, ** at 5 percent and * at 10 percent level. t-values in brackets.

CHAPTER 6
The Cost of Legal Uncertainty

The Impact of Insecure Property Rights on The Cost of Capital

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Abstract: The rate of return demanded on an investment is influenced by risk. More risky investments have to offer a higher rate of return in order to attract capital. In this paper it is argued that in international investments a special risk premium labeled, "institutional risk," should be included. Different countries represent different institutional risks for investors, which we argue are not diversifiable. The institutional risk considered is the legal protection of property rights. Investors are likely to use a higher discount rate in evaluations of investments in countries where the institutional framework provide weak protection of property. Weak property rights will increase the required rate of return and decrease investment. How to account for the institutional risk has not received much attention in the finance literature, even though the concept "political risk" is sometimes mentioned. This paper shows the existence of such risk premiums and estimates their magnitude. We find that weak protection of property rights has a significant impact on the required rate of return on investments. Furthermore we find that the conventional capital asset pricing model (CAPM) is powerful when trying to understand well developed capital markets, but when looking at countries with weak institutional environment, we find that the CAPM model is inadequate. We argue that the explanatory power of the CAPM is a function of the institutional structure for entitlement allocation and contractual upholding.

JEL classifications: G11, G15, K11, K12

Keywords: Cost of capital, property rights, CAPM, institutional risk.

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1 Introduction

In the required rate of return on investment a special risk premium labeled "institutional," risk should be included. Different countries represent institutional risks for investors. It is various risk factors tied to the institutional framework that gives the rules of the game facing investors. The rules can be of a supportive nature or make long-term investment hazardous due to the lack of secure property rights. Investors should use a higher discount rate in evaluations of investments in countries where property rights are weakly protected.

How to account for the political risk has not received much attention in the finance literature, even though the concept "political risk" is sometimes mentioned. However, a formal treatment is not offered. An exception is Faure and Skogh (2003) who have shown how "political risk" can be incorporated in investment analysis. It is their approach that has inspired this paper.

It is one thing to propose the necessity to add an "institutional risk premium" and quite another to prove the existence of such risk premiums and estimate their magnitude. One reason why few attempts have been made so far is the difficulties to empirically quantify and price institutional risk. The purpose of this paper is to show the existence of property risk premiums and measure their magnitude.

As measures of institutional risk we use two indexes; one on property right protection provided by the Heritage Foundation, and one on investor right protection provided by the Political Risk Group. With these indices we use a CAPM type of model to estimate the effect of property right uncertainty on the cost of capital.

Section 2 starts with a discussion of what is meant by institutional risk. How to calculate capital costs and risk premiums for assets with political risk is the subject matter of section 3. The data used in our empirical analysis is presented in section 4. The empirical findings are analyzed in section 5. The paper ends with conclusions in section 6.

2 Political risk, property rights, contracts and legal uncertainty

Investments are risky. A cost in form of a capital outlay is taken today, while the benefits represented by positive net cash flows lie in the future. It is like a deferred exchange where a payment is made today in return for enhanced future consumption. When the future unfolds it might turn out that the products produced by the new capital (the investment) cannot be sold at profitable prices.

This is a risk that every entrepreneur has to face. In addition there might be an institutional risk caused by insecure property rights and a defective judicial system that makes it difficult to enforce contracts effectively. Secure property rights and contract enforcement were put forward already by David Hume and Adam Smith as two of the most important institutional factors for the prosperity of a nation. According to Kasper and Streit (1999), David Hume and Adam Smith stressed three institutions of fundamental importance for progress and welfare: *"(…) the guarantee of property rights, the free transfer of property by voluntary contractual agreement, and the keeping of promises made"* (p. 20). In other words, secure property rights, freedom of contracts and enforcement of agreements are basic cornerstones in the quest for prosperity.

Secure property rights, freedom of contracts and enforcement of agreements are basic parts of the institutional framework within which an economy is organized. It is the task of the state to develop a well functioning and adequate institutional framework through formal rules. According to North (1990), *"(…) formal rules include political (and judicial) rules, economic rules, and contracts"*. By economic rules North means property rights, which are defined as *"the bundle of rights over the use and the income to be derived from property and the ability to alienate an asset or a resource"* (p. 47). The links to investments is clear, as investments mean the creation of new assets. Furthermore, North ascertains a hierarchical order between rules in the sense that *"the rules descend from polities to property rights to individual contracts"* (p. 52). According to for example North (1990) and Williamsons (2000), these institutions are very stable over time.

Hernando de Soto (2000) has argued powerfully that the varying degree to which countries succeed to support capital formation and accumulation is to be found in the legal structure of the property rights system of the western world. de Soto claims that:

> *"When advanced nations pulled together all the information and rules about their known assets and established property systems that tracked their economic evolution, they gathered into one order the whole institutional process that underpins the creation of capital. If capitalism had a mind, it would be located in the legal property system."*
>
> *(de Soto (2000) p. 65)*

Furthermore, de Soto argues that informal institutions are far less important than formal institutions in this respect.

In other words it is through polity a nation can influence the institutional framework, and thereby stimulate investments and growth. The institutional framework might be of a kind that makes investors certain that no one else will appropriate the fruits of their investments, or the framework might be one that makes investors think that there is a risk that someone else will reap the

benefits. If the property rights are insecure long-term investments will be hampered and come at the cost of lower welfare.

3 Risk, return, portfolio theory and investment

Conventional investment theory holds that investors will evaluate alternative investments based on the net present value (*NPV*). According to the *NPV* rule investments should be evaluated according to the expected cash flows *(CF)* minus the expected investment costs *(I)*. Only projects with expected positive net present values should be initiated *(NPV = PV – I)*. When calculating the present value of cash flows generated by an investment one uses a discount factor;$1/(1 + r)$, where r is the discount rate. The discount rate is also referred to as the required rate of return or as the cost of capital. For risk free projects the required rate of return equals the risk free interest rate, which also serves as a reference when valuing risky assets. The *PV* of future cash flows is calculated as follows[78]:

$$PV = \sum_{t=1}^{T} \frac{CF_t}{(1+r)^t} \tag{1}$$

The discount rate will depend on the riskiness of the future cash flows. If the risk that the actual cash flow will be lower than predicted the discount rate will be accordingly higher than a more certain future cash flow. As the discount rate, r, increases the present value declines, hence the aggregate number of investments also declines.

The crucial question is therefore how to determine the size of the discount rate and the risk associated with various assets. We argue that the discount rate can be broken down into a multitude of components, among which property rights protection is one. Accordingly the present value formula should be:

$$PV = \sum_{t=1}^{T} \frac{CF_t}{(1+r_f + RP_p + RP_o)^t} \tag{2}$$

where, r_f is the risk free interest rate, RP_p the risk premium associated with weak property right protection, and RP_o a "general" risk premium.[79] Note that

[78] The present value of future cash flows from all investments made by a firm is equal to the value of a firm set by the capital markets.
[79] A political risk premium is proposed by Faure and Skogh (2003).

the "general" risk premium can presumably be broken down further into different risk factors[80].

The conventional *Capital Asset Pricing Model* (CAPM) makes a distinction between diversifiable firm specific risk and non-diversifiable systematic risk. Because the specific risk can be diversified away it is only the remaining non-diversifiable risk that matters for the pricing of the asset, i.e. investors are only compensated for the systematic non-diversifiable risk.

As a consequence, the return *r* that investors require depends on the systematic risk of the investment (see next section). On a global capital market firm specific risk can be diversified away. However the institutional risk of insecure property rights and contracts is a risk associated with the institutional framework of rules of a country which cannot be diversified. This institutional framework is made up by both informal rules, like norms, customs, tradition and religion and formal rules like property and contract laws and the enforcement of these rules. It is primarily the formal rules upon which polity can exert an influence. To change informal rules is a much tougher task. According to North (1990) and Williamson (2000), this institutional framework changes very slowly over time. Even changing and enforcing formal rules (like property rights rules) tend to take decades to implement. As an investor you are more or less stuck with the institutional framework for a considerable time. The prospects of balancing changes in the security of property rights by having an international portfolio are small. Hence, insecure property rights represent a truly systematic risk that, according to the theory, will increase the cost of capital. Raising the cost of capital will, as shown in standard investment theory, decrease investment, see chapter 1.

According to CAPM, the expected return on a security can be calculated as:

$$E(r_i) = r_f + \beta_i (E(r_m) - r_f) \tag{3}$$

where, β_i measures the sensitivity of a security to market risk (systemic risk), r_m the return on a market portfolio *m*. The model holds that the expected rate of return should equal the risk free interest rate plus a risk premium that varies with β. The expected rate of return, $E(r_i)$ that is obtained, is simply the discount rate *r* used in equation (1) to calculate the present value of future cash flows. The term $E(r_m) - r_f$ is the market price of risk for efficient portfolios. In this model only the market portfolio matters when calculating the risk premium.

This standard CAPM can be extended into the so-called multi-beta CAPM by including other factors that influence the size of the risk premium. Merton

[80] It can in line with the arbitrage pricing theory be argued that the discount factor RP_0 can be broken down further in to a multitude of components (see e.g. Ross 1976). The problem is however to isolate the different factors that influencing the rate of return.

(1973) is among the first to include a number of uncertainty factors that could influence the price of an asset. Friend et al. (1976) use, besides the market portfolio, inflation uncertainty as an additional factor when determining cost of capital. We follow their approach and add legal uncertainty, in form property rights and protection of investors, as additional risk factors.

In a seminal article Roll (1977) levies critique against the standard CAPM. One of Roll's points is that all assets in the entire world shall be included in the market portfolio *m*. However, in the empirical literature national stock indices like Standard and Poor 500 and New York Stock Exchange index are used as market portfolios. This is clearly an incorrect measure according to Roll's critique. A step towards a more "correct" market portfolio measure is to use an index containing all securities in the entire world. Such an index for traded corporate shares is Morgan Stanley world market index. That is the index that will represent market portfolio in the present study.

Estimation of Beta and the risk premium can be made according to a two-pass procedure.[81]

A number of studies of CAPM using the two pass procedure have been performed. In the firsts pass, time series data is used to estimate beta-values. These beta-values are then used in as second-pass, cross-sectional, regression[82]. Several of these studies indicate that a two factor model (a multi-CAPM) can be used.[83] Consequently, there is some empirical support for using a model where legal uncertainty, as well as a market portfolio, is included as factors in the calculation of cost of capital. In that case, the second-pass regression will contain a second factor representing institutional risk and look like:

$$\bar{r}_i = \alpha_i + RP_m \times \hat{\beta}_i + RP_p \times Institutional\ Risk + \varepsilon_i \qquad (4)$$

where RP_p is the right risk premium due to insufficient safeguarding of property and investor rights.

4 Variables, data and R^2 around the world

To calculate the impact of institutional risk on the risk premium and the required return on investments stock exchange data, data about the quality of property rights and global market portfolio are needed. Table 1 shows the data we have used for these variables.

[81] See e.g. Elton and Gruber (1995)

[82] First-pass: $r_{ti} = \alpha_i + \beta_i \times r_{mt} + \varepsilon_{ti}$, and second-pass: $\bar{r}_i = \alpha_i + RP_m \times \hat{\beta}_i + \varepsilon_i$.

[83] See e.g. Sharpe and Cooper (1972), Douglas (1968) and Black et al. (1972).

Table 1 Description of the variables

Country stock market indexes	Measures the stock price performance including dividends. Expressed in US dollars. *Source: Morgan Stanley*
World market index	Measures the stock price performance including dividends for 49 developed and developing countries. *Source: Morgan Stanley*
Property right protection (PRP_{it})	Assessment of the protection and certainty of property rights. Annual index ranging from 1 to 5, with higher scale meaning weaker protection property rights. *Source: Heritage Foundation index of economic freedom*
Investor right protection (IRP_{it})	Investor profile. Assessment of a number of factors influencing the risk of investments. Monthly index ranging from 1 to 12, with a higher scale meaning stronger protection of investors. The index measures contract viability, risk of expropriation, payment delays and profit repatriation. To facilitate comparisons we invert this index so that higher value means weaker investor protection. *Source: International Country Risk Guide*
Returns	Different forms of return are calculated.
r_{it}	Monthly stock market return on country level. National stock market indexes corrected for dividends and in US dollars are used. *Source: Morgan Stanley*
r_{mt}	World market return calculated with monthly world market index. *Source: Morgan Stanley*

Monthly stock market indices compiled by Morgan Stanley are used to calculate the rate of return on national stock markets and on the world market portfolio.[84] These stock market indexes, covering a ten-year period (1995 to 2005, 129 months more exactly), are expressed in US dollars, and corrected for dividends. This assures that the indices are consistently defined and include all relevant returns. As a proxy for the market portfolio, the world stock market index from Morgan Stanley is used, which includes 49 developed and emerging market country indexes (see Table 2).

The Heritage Foundation index of the insecurity of property rights *(PRP)* and the index of investor rights protection *(IRP)* provided by the International Country Risk Guide (ICRG) are used as measures of institutional risk. The Heritage index ranges from one to five, where one indicates strong protection of property rights. It is an annual index which is available for the period 1995 to 2005. The property right index is an assessment of the quality of contract enforcement, legal protection of property, existence of corruption in the judicial system and the probability of expropriation.

The ICRG index ranges from 1 to 12, where 1 indicates strong protection. The ICRG index is a monthly index that is here used for the period 1995 to

[84] MSCI total return indices with gross dividends

2005. In order to facilitate comparison of the indexes we invert the investor right index, so that 1 indicates strong protection of investors. This index measures factors that have to do with protection of property rights and enforcement of contracts.

Table 2 shows the 49 developed and emerging countries that are included in Morgan Stanley's world market portfolio. The betas and the R^2 from the first pass regression plus three other variables are presented. Among the variables from the first pass regression the R^2-values are of special interest. The R^2-values show how much of the national rate of return that can be explained by variation of the rate of return on a world market portfolio. It is evident that there is a clear difference between developed and emerging countries in this respect. The R^2-values tend to be much higher in developed countries. The summary statistics in Table 3 confirm that this difference is statistically significant. These results can be contrasted with those of Morck et al. (2000), who find considerably lower R^2 for individual firms in developed countries using national indices as market portfolios. By correlating the R^2-values reported by Morck et al. (2000) with our values we get a negative correlation coefficient that is significant at one percent.

Even though at first sight it might seem odd, our results are in line with those of Morck et al. (2000). Our high R^2 –values for developed countries are due to the fact that we use a global perspective with the world as the market portfolio and look at how national portfolios can be explained by co-movement with a world market portfolio. With well functioning stock markets with low barriers for international investor opportunities to risk reduction through international diversification will be taken advantage of. In other words the unique risk of the national market will be diversified away and the systematic risk of a world portfolio will to a large extent determine the rate of return on a national portfolio. In Morck et al. (2000) individual stocks are studied. Their argument is that trade in individual stocks is to a large extent driven by firm specific fundamentals. In well developed economies the information about firm specific information is easily accessible and more reliable. (This argument is further developed in Jin and Myers, 2006). Consequently, firm specific fundamentals will be more important in the pricing of individual stocks and the co-movement with national indices lower (i.e. lower R^2 in developed countries).

The reason why information is accessible and more trustworthy in developed countries is, according to Morck et al. (2000) and Jin and Myers (2006), due to investor protection through secure property rights. We will use this to explain why our R^2-values are so low for the developing countries. We conclude that there is a need for more factors than a market portfolio to explain the rate of return, especially if we look at developing countries. This makes the values for property right protection and investor protection of special interest also in our study. Like the R^2-values the values for property right as well as investor protection appear to be significantly higher in Table 2. That these values really are significantly higher is also confirmed by a z-test (see Table 3).

Table 2 Country data for 1995-2005 (129 months)

Developed Countries	$\hat{\beta}_i$	R^2 – values from 1st- pass regression	Property right protection (*PRP*) (average)	Investor right protection *(IRP)* (average)	Average rate of return
Australia	0.87	0.53	1.00	1.60	0.128
Austria	0.61	0.22	1.00	1.31	0.122
Belgium	0.80	0.40	1.00	1.38	0.127
Canada	1.11	0.68	1.00	1.41	0.160
Denmark	0.84	0.47	1.00	1.46	0.150
Finland	1.62	0.40	1.00	1.37	0.221
France	1.07	0.69	2.00	1.42	0.125
Germany	1.26	0.65	1.00	1.41	0.105
Greece	0.95	0.20	2.36	1.74	0.164
Hong Kong	1.20	0.38	1.00	1.57	0.108
Ireland	0.85	0.48	1.00	1.35	0.107
Italy	0.94	0.39	2.00	1.50	0.131
Japan	0.87	0.37	1.36	1.41	0.011
Netherlands	1.08	0.68	1.00	1.34	0.106
New Zealand	0.81	0.30	1.00	1.42	0.106
Norway	1.07	0.48	1.18	1.46	0.140
Portugal	0.82	0.32	2.00	1.52	0.107
Singapore	1.15	0.37	1.00	1.36	0.045
Spain	1.14	0.59	2.27	1.34	0.178
Sweden	1.42	0.60	1.64	1.48	0.172
Switzerland	0.79	0.45	1.27	1.34	0.124
United Kingdom	0.77	0.69	1.00	1.36	0.103
United States	1.00	0.87	1.00	1.34	0.121
Emerging Economies	$\hat{\beta}_i$	R^2 – values from 1st-pass regression	Property right protection (average)	Investor right protection (average)	Average rate of return
Argentina	1.12	0.16	2.73	2.16	0.165
Brazil	1.85	0.43	3.00	1.98	0.200
Chile	1.02	0.38	1.00	1.80	0.083
China	1.14	0.17	4.00	1.89	0.017
Colombia	0.52	0.05	3.36	1.41	0.179
Czech Republic	0.63	0.09	2.00	1.55	0.205
Egypt	0.46	0.04	3.09	1.90	0.274
Hungary	1.30	0.26	2.00	1.54	0.287
India	0.65	0.10	3.00	1.89	0.108
Indonesia	1.46	0.16	3.45	1.96	0.101
Israel	1.07	0.33	2.00	1.73	0.135
Jordan	0.15	0.01	2.36	1.77	0.158
South Korea	1.59	0.24	1.27	1.53	0.149
Malaysia	0.94	0.14	2.45	1.65	0.044
Mexico	1.44	0.44	2.91	1.55	0.175
Morocco	0.06	0.00	3.09	1.76	0.115
Pakistan	0.41	0.02	3.18	2.43	0.141
Peru	0.69	0.12	3.45	1.96	0.156
Philippines	1.06	0.20	2.73	1.90	-0.061
Poland	1.37	0.27	2.27	1.63	0.166
Russia	2.13	0.23	3.36	2.15	0.413
South Africa	1.11	0.35	2.91	1.59	0.114
Thailand	1.63	0.25	1.36	1.32	0.028
Taiwan	1.10	0.26	2.09	1.71	0.022
Turkey	2.15	0.26	2.36	1.87	0.322
Venezuela	1.01	0.09	3.45	2.27	0.172

With regard to average rate of return there are no similar systematic differences between the two types of countries. One observation is that there is more variation of the rate of return for emerging than for developed countries. The negative rate of return for Philippines is troublesome from a theoretical perspective. According to the CAPM model, this rate of return would indicate a negative risk free interest rate which is not possible. We will therefore exclude the Philippines when the risk premiums are calculated.

Table 3 shows summary of statistics that confirms the picture given. The world market portfolio is significantly a better explaining factor of rate of return in developed than in emerging countries. Property rights protection is significantly higher in developed countries. Also, property rights protection and the rate of return show a much higher variation in emerging countries.

An interesting question is why does the world market portfolio explain more of the national rate of return in developed than in developing countries? We have put forward the hypothesis that variables measuring the degree of investor protection and secure property rights must be included in a CAPM model if differences in national rates of return are to be explained. Another explanation, which must be controlled for, is the possibility that the composition of the world market portfolio generates this result. Most of the world market portfolio consists of national portfolios from developed countries with the USA as most important holding. The national portfolio of the USA corresponds to as much as almost half the value of Morgan Stanley's world market portfolio. This can be compared to the weight of the developing countries which is less than five per cent. The simple fact that world portfolio primarily consists of securities from developed countries could be the explanation for the national differences in R^2-values with higher values for developed than developing countries.

Table 4 shows that the correlation between the variables is especially high between property rights and R^2-values, considerably higher than for Index Weights and R^2-values. This result does also point to an interpretation that in countries with insecure property rights the market portfolio alone does not explain as much of the rate of return as in countries with secure rights. And for obvious reasons the property right and investor right indexes are highly correlated.

Table 3 **Summary statistics for the aggregates of developed and emerging economies 1995-2005 (129 months)**

	R^2 from 1st-pass Regression		Property right protection		Investor right protection		Rate of return	
	Developed economies	Emerging economies	Developed economies	Emerging economies	Developed economies	Emerging economies	Developed economies	Emerging economies
Mean	0.487*	0.194*	1.307*	2.649*	1.43*	1.81*	0.124	0.149
Standard Deviation	0.170	0.128	0.473	0.749	0.103	0.270	0.043	0.101
Minimum	0.2	0	1	1	1.31	1.32	0.011	-0.061
Maximum	0.87	0.44	2.36	4	1.74	2.43	0.221	0.413
Count	23	26	23	26	23	26	23	26

* indicates that z-test shows significantly different means at less than 5 per cent level.

Table 4 Correlation matrix

	R^2	Property rights	Investor rights	Average returns
R^2	1			
Property rights	-0.658*	1		
Investor rights	-0.627*	0.761*	1	
Average returns	-0.071	0.194	0.224	1
Index Weights	0.502*	-0.246	-0.249	-0.094

* indicates significance at 5 percent.

To test if there is a significant link between the R^2-values from the first-pass regression and the institutional framework we first check if property right and investor right can be used as alternative explanatory variables. Then in order to test the robustness of the results, index weights are included as additional explanatory variable in a second round of regressions. In all regressions, R^2 from Table 2 is used as dependent variable. Since R^2 is bound between one and zero we do a logistic transformation of R^2:

$$\vartheta_i = \log\left(\frac{R_i^2}{1-R_i^2}\right)$$

The results in Table 5 A suggest that in countries with weak institutional protection of property the systematic economics factors influencing the world market return have less explanatory power. In Table 5 B it is tested how robust these results are when index weights also are used as explanation of the R^2 values. As can be seen, the results are robust when the index weights for the world market portfolio are included. This suggests that the CAPM provide a less adequate tool for understanding asset pricing in less developed financial markets. Therefore we believe that the R^2-values can be used as proxies for financial development; countries in which the CAPM model displays a lower explanatory power might be interpreted as less developed financially.

To check for multicollinearity between the two indices and the index weights of the world market portfolio we calculate the variance inflation factor (VIF). In both cases VIF is close to one, which means that we can rule out multicollinearity.

Table 5 A **First pass R^2-values and protection of property and investor rights**

	Property right protection (PRP)		Investor right protection (IRP)	
Estimation method	OLS		OLS	
Dependent variable: ϑ_i	Coefficient	t-value	Coefficient	t-value
Property rights $(\overline{PRP}_i)$	-0.425*	-5.72		
Investor rights $(\overline{IRP}_i)$			-1.332*	-4.88
R^2	0.41		0.34	
Adj. R^2	0.40		0.32	
F-value	32.7		23.8	
No. observations	49		49	

* indicates significance at 1 percent.

Table 5 B **First pass R^2-values and protection of property and investor rights, including index weights**

	Property right protection (PRP)		Investor right protection (IRP)	
Estimation method	OLS		OLS	
Dependent variable: ϑ_i	Coefficient	t-value	Coefficient	t-value
Property rights $(\overline{PRP}_i)$	-0.381*	-5.23		
Investor rights $(\overline{IRP}_i)$			-1.171*	-4.36
Index weights	0.024**	2.43	0.025**	2.41
R^2	0.48		0.41	
Adj. R^2	0.45		0.39	
F-value	21.0		16.0	
No. observations	49		49	

* indicates significance at 1 percent and ** significance at 5 percent.

5 Models and results

In the first step monthly data are used to estimate the country beta-values. In the second-pass regression these beta estimates are regressed on to the average return. In addition, the average values for Heritage and International Country Risk Guide indexes of property rights protection are included:

$$\bar{r}_i = \alpha_i + RP_m \times \hat{\beta}_i + RP_{PRP} \times \overline{PRP}_i + \varepsilon_i \quad (5a)$$

$$\bar{r}_i = \alpha_i + RP_m \times \hat{\beta}_i + RP_{IRP} \times \overline{IRP}_i + \varepsilon_i \quad (5b)$$

where $\overline{PRP}_i$ is the average value of the Heritage foundation property right index and $\overline{IRP}_i$ is the International Country Risk Guide index of investor protection. Subscript, *i*, denote country. We identify the Philippines as an outlier as the average return for the time period investigated is negative and consequently exclude it from our regression.

Significant coefficients, $RP_{PRP,}$ for the average value of the Heritage index and RP_{IRP} will indicate that the market portfolio is not the only important explanatory variable in calculations of a risk premium.

The result of the estimation of the second-pass equation is shown in Table 6. The security of property rights turns out to be important. The coefficient for *PRP* is statistically significant at less than ten percent level and the *IRP* is significant at five percent. A higher degree of insecurity is consistent with a higher cost of capital. Furthermore, the signs of the coefficients are positive. As both the indices have a scale where low values indicate secure and high values insecure property rights the estimated coefficients indicate that a higher risk premium has to be offered in countries with insecure property rights

Table 6 Risk premium factors: property rights and investor protection

	Property right protection (PRP)		Investor right protection (IRP)		Conventional CAPM	
Estimation method	OLS		OLS		OLS	
Dependent variable: $\bar{r}_i$	Coefficients	t-values	Coefficients	t-values	Coefficients	t-values
Intercept (α)	0.035	1.02	-0.048	-0.77	0.079*	2.99
Property rights ($\overline{PRP}_i$)	0.021**	2.01				
Investor rights ($\overline{IRP}_i$)			0.079**	2.20		
$\hat{\beta}$	0.062*	2.71	0.059**	2.59	0.060**	2.53
R^2	0.19		0.21		0.12	
Adj. R^2	0.16		0.17		0.10	
F-value	5.4		5.9		6.4	
No. observations	48		48		48	

* indicates significance at 1 percent and ** significance at 5 percent.

With the conventional CAPM model we find that the world risk free interest rate ($\hat{\alpha}$), is on average 8 percent. However, assuming that the countries with the best values on the property right index (PRP = 1) and the investor protection index (IRP = 1.31) have virtually no uncertainty, we find lower risk free interest rates. Using the best values of the two risk factors we estimate the risk free rate to be 5.6 percent for the property right index and 5.5 percent for the investor right index. The influence of security of property rights is significant whichever of the two indices we use. The coefficients on the conventional betas stay approximately the same whatever index is used. This suggests robustness in the result.

Estimated risk premiums for property right protection and investor right protection (plus the estimated risk free interest rate) for all the countries are reported in Table 7. We find on average 3 percentage point difference in interest rates between emerging and developed countries, which can be explained by differences in property rights protection. A z-test shows that these differences are significant at five percent. The general beta does not significantly differ between developed and emerging countries. Hence, the developed countries have a much lower risk premium on investments due to the systematic risk that the institutional framework represents. Improvement in the institutional framework will probably be helpful to more investments and higher welfare.

For the conventional CAPM, Ramsey's regression specification error test (RESET) indicate a problem of omitted variables (F-test 8.23), which supports the inclusion of further explanatory variables. This is consistent with the fact that the R^2 and R^2-adjusted almost double with the inclusion of the two indexes.

Table 7 Risk free rate plus risk premiums

Developed Economies	Property right premium + α	Investor right premium + α
Australia	0.056	0.078
Austria	0.056	0.055
Belgium	0.056	0.061
Canada	0.056	0.063
Denmark	0.056	0.067
Finland	0.056	0.060
France	0.077	0.064
Germany	0.056	0.063
Greece	0.085	0.089
Hong Kong	0.056	0.076
Ireland	0.056	0.059
Italy	0.077	0.071
Japan	0.064	0.063
Netherlands	0.056	0.058
New Zealand	0.056	0.064
Norway	0.060	0.067
Portugal	0.077	0.072
Singapore	0.056	0.059
Spain	0.083	0.058
Sweden	0.069	0.069
Switzerland	0.062	0.058
United Kingdom	0.056	0.059
United States	0.056	0.058
Averages developed economies	**0.062***	**0.065***
Emerging Economies		
Argentina	0.092	0.123
Brazil	0.098	0.108
Chile	0.056	0.094
China	0.119	0.101
Colombia	0.106	0.063
Czech Republic	0.077	0.074
Egypt	0.100	0.102
Hungary	0.077	0.074
India	0.098	0.101
Indonesia	0.107	0.107
Israel	0.077	0.089
Jordan	0.085	0.092
South Korea	0.062	0.073
Malaysia	0.086	0.082
Mexico	0.096	0.074
Morocco	0.100	0.091
Pakistan	0.102	0.144
Peru	0.107	0.107
Poland	0.083	0.081
Russia	0.106	0.122
South Africa	0.096	0.078
Thailand	0.064	0.056
Taiwan	0.079	0.087
Turkey	0.085	0.100
Venezuela	0.107	0.131
Average emerging economies	**0.091***	**0.095***

* indicates that the z-test shows significantly different means at 1 percent

6 Conclusions

The importance of secure property rights for prosperity and growth has already been stressed by David Hume and Adam Smith. How secure property rights lead to lower cost of capital and thereby more investment has not been established formaly. However, portfolio theory in corporate finance theory provides such a link. In portfolio theory as represented by CAPM and APT, systematic risk and surprise changes in fundamentals are determinants of cost of capital.

The rationale is that an investor can get rid of unsystematic risk through portfolio diversification. A time perspective is used where unsystematic risk is avoided by combining assets that show different patterns of changes over time implying a correlation less than one. Insecure property rights have to do with what institutional framework a country has. Institutional framework changes slowly over time. Hence it is difficult to diversify away from the systematic risk that the institutional framework represents.

The specificities of institutional frameworks of countries make it impossible to use traditional APT and CAPM methodologies to estimate the impact of insecure property rights on cost of capital. There is not much of variation over time in the institutional frameworks. The variation is instead to be found between countries. This makes it difficult to apply APT methodology. Instead a multi-factor CAPM approach has been used with a world market portfolio as one systematic factor and indices over secure property rights and contracts as another. The security of property rights and contractual agreements are introduced in a second-pass regression that looks at differences between countries.

If a CAPM type of analysis is used an indication of higher risk premiums in countries with insecure property rights is also found. We find that a significant part of the required rate of return in developing countries can be explained by weak institutional protection of property and contracts. Our two measures of the quality of property rights seem to capture the same effect, and indicate that institutional risk needs to be included in capital asset pricing.

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