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Working Paper

Financial and Real Investment, Ownership Structure and Manager Compensation: Summary of Empirical Evidence

Sander van der Hoog
Department of Business Administration and Economics, Bielefeld University

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Financial and Real Investment, Ownership Structure and Manager Compensation: Summary of Empirical Evidence ⋆

Sander van der Hoog[a]

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Abstract

This is a brief overview of the literature on corporate governance, ownership and firm performance. We cover different strands related to financialization, corporate ownership structure, stakeholders and shareholders, manager remuneration schemes, and share repurchases. Although this text should not be construed as a full literature review, we discuss how to use the empirical evidence to steer our model design and our choice of model assumptions.

1 On Financialization

Orhangazi (2008) provides empirical evidence on the real effects of financialization at the firm level.

There are two main effects of financialization on the investment behavior of non-financial companies (NFC's). First, NFC's increase their financial investments relative to real investments and hence derive an increasing part of their income from financial sources. This implies a shift from real productive activities towards more financial activities. Second, NFC's are under increasing pressure from their shareholders and financial market participants to increase the returns on investment. As a result, NFC's tend to transfer an increasing proportion of their earnings to financial markets and in the form of shareholder remunerations such as dividend payouts or share repurchases. This implies fewer funds are available for making real investments, or to remunerate other stakeholders in the firm such as employees or pension funds. If firm management would like to increase both shareholder remunerations and that of other stakeholders, this would imply a higher firm indebtedness.

Following this broad outline, two hypotheses regarding the effects of financialization on real investments can be formulated: (i) increased financial investments crowd out real capital accumulation (less funds available), and (ii) increased financial profits change the incentives of firm management regarding investment decisions (shorter planing horizons, focus is on short-term profits).

The two hypotheses are not mutually exclusive. When the first hypothesis turns out to be false for some firms, then it could be the case that the financial profits from financial asset investments might in fact finance the real investments. Ideally, the two hypotheses should be tested for small and large firms, and for family-owned versus non-family-owned businesses. Another cross-cutting category is whether the firm's shares are publicly listed or not, yielding a total of 8 subclasses of firms, in principle. And for each category of firms, the relationship between the firm's ownership structure, its manager remuneration scheme, and the management's attitude towards real versus financial investment decisions should be investigated.

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[a]Department of Business Administration and Economics, Bielefeld University, E-mail: svdhoog@wiwi.uni-bielefeld.de.

2 Corporate ownership structure

What is the link between corporate ownership structure and innovation performance? Corporate owners can be families, government, or institutional investors. For family-owned businesses, a distinction can be made between listed and non-listed firms (Gedajlovic et al., 2005). For non-family-owned businesses, a distinction is made between closely-held firms with a few large investors and diffusely-held firms with many shareholders. The Berle-Means Thesis (Berle and Means, 1934) holds that in dispersedly-held, large corporations the executives of the board basically have effective control of the firm, despite having little or no ownership stake in it. Francis and Smith (1995) find that diffusely-held firms tend to be less innovative than closely-held firms. Diffusely-held firms with many shareholders have less patent activity and grow more by acquisitions rather than by innovations. On the other hand, concentrated equity ownerships are more favorable to investments. A possible explanation is that large single shareholders can enter into a long-term relationship with the other stakeholders in the firm and support long-term investments.

Despite the distinction between family-owned and non-family-owned businesses, the literature on ownership structure has mostly focused on the effect of institutional corporate ownership on the firm's innovativeness. Sherman and Joshi (1998) show that the effect of ownership structure on the intensity of the firms innovation depends on the type of institutional investor. Whereas pension funds are patient investors that appear to have a positive effect on the R&D expenditures of firms in which they hold ownership stakes, the ownership by investment funds has a negative effect on the firm's internal innovation effort. Ownership by insurance companies or by banks does not appear to influence the firm's R&D expenditures.

Due to its effects on R&D expenditures, the ownership structure thus appears to have important effects for the economic performance of the firm. A list of relevant issues for economic performance are (De Massis et al., 2012): (a) tax incentives for investments; (b) measures of firm performance, i.e. profitability, capacity utilization, retained earnings; (c) R& D investments and investment lumpiness; (d) human capital investments; (e) long-termism versus short-termism; (f) equity stakes of particular categories of investors; (g) corporate governance structures; (h) investment sensitivity to financial variables and financial constraints; (i) increasing ownership concentration (decreasing the number of firm owners); (j) risk-taking behavior.

3 Stakeholders and shareholders

What form of corporate ownership is most conducive to innovation production? Principal-agent theory maintains that shareholders' control over manager behavior enhances firm performance. Since innovation requires the accumulation of knowledge, skills and financial resources from various stakeholders, principal-agent theory has difficulty to explain how innovation can take place in the first place. If shareholders are the only risk-takers that can lay a claim on the firm's residual profits – while other stakeholders do not have such residual claimant rights – then how can a firm ever induce the other stakeholders to part with their resources and organize all the necessary resources to innovate?

An alternative to principal-agent theory is the stakeholder approach in which the firm is defined as a wide constituency of stakeholders who all face incentives or disincentives to contribute their specific assets to the innovation production process. The view that shareholders are the sole stakeholders who can lay claim to the residual profits of the firm is challenged by Lazonick (2007), who holds that other stakeholders such as employees, suppliers or outside financiers could also make such residual claims.

According to Organizational Control Theory (Lazonick and O'Sullivan, 1996; Carpenter et al., 2003), the corporation should be seen as a separate legal entity with full control over the assets it uses in

the productive process (Blair and Stout, 1999, 2006). In accordance with this view, the theory of the innovative enterprise sees the corporation as the social entity that is value creating, rather than the markets (Lazonick, 2003). The firm creates the incentives for individuals to allocate their resources, encompassing financial, as well as physical and human capital to the process of innovation.

A problem with many empirical studies on the relationship between corporate ownership structure and firm performance is that they are based on samples of US firms. Such studies implicitly rely on agency theory by assuming that all shareholders have the same, single common goal to maximize the return on their equity investments. This monolithic view on shareholders does not allow for different types of shareholders with different investment motivations and objectives, which may lead to wrong conclusions. The corporate governance structure in the US and the UK may not be appropriate for studying the corporate governance structure of European firms, relating to differences in the institutional setting and the cultural background.

The system in the US and the UK can be characterized as an 'at-arms length' governance system where shareholders' only stake in a firm is their equity investment. It therefore makes sense to think of these shareholders as only being interested in the return on equity, and not caring too much about the firm's performance as other stakeholders such as the firm's employees or its consumers might do. In Japan and Germany, however, the governance structure is a relational governance system in which different shareholder constituent groups have various motivations for holding shares in a company. In Italy, families and the government may hold large stakes in a company. It therefore seems important to consider the effects of such different types of shareholders on the strategic management behavior and the investment behavior of the firm.

To investigate the relationship between firm ownership structure and firm performance in European firms, Kirchmaier and Grant (2005) study data from the top 110 public firms in Germany, UK, France, Italy and Spain.[1] Firm performance is measured by the growth in share prices, after detrending the time series using an HP filter. Firm ownership structure is measured by the proportion of votes in the annual shareholder meeting, held by the largest shareholder, or by a coalition of shareholders who control the board. The objective is to measure the extend to which concentrated groups of shareholders can exert a large degree of control. They define three categories of firm ownership structure: Legal Control firms (a shareholder group owns more than 50 percent of the votes), De-Facto Control firms (a significant proportion of votes, usually around 30 percent, tightly-held by a single group), and Widely Held firms (with no single group of shareholders holding a predominant share of the votes).

In France, the most common ownership structure is legal control, but the de-facto controlled firms show higher performance. In Germany legal control is also the most common form, but firms with widely held share ownership perform better, in terms of the growth rate of their share price. The same holds for firms in Spain. In Italy, most firms are legal control firms and these also show the best performance. In the UK, however, most firms are widely-held.

These results show a clear distinction between European countries in terms if their legal systems. While France has a system of civil law, the legal system in the UK is one of common law. Since a common law system provides stronger investor protections this leads to more widely held corporations, in which voting rights are more widely dispersed among smaller groups of shareholders.

Apart from the formal type of firm ownership in terms of voting rights and legal control of the board, also the type of investor and their investment horizon seems to matter. Gedajlovic et al. (2005) classify shareholders in Japanese firms in three groups: stable investors, market investors, and inside investors. Stable investors are business-oriented investors whose interest is to build and maintain stable business relationships with business partners of the firm, and therefore have an interest in the firm existing over

[1] After removing some firms according to selection criteria, the data set consists of on average 95 firms per country.

the longer term. Examples of stable investors are banks, other firms (suppliers, or customer firms), or insurance companies. In Japan it is also not uncommon to observe cross-equity stakes between firms that make equity investments in each other's businesses to solidify their mutual business interests. This could be seen as a form of tacit collusion, but is normal practice in many countries. Market investors are capital-oriented investors who's main purpose of investing in the firm is capital gains. Finally, inside investors are stakeholders in the firm that have a special relationship to it, such as managers, founders, or family of the founders. These also have an interest in maintaining the firm for the longer duration.

To take the various purposes of these shareholder constituents into account means to go beyond the standard agency theory approach that describes the separation of ownership and control in terms of different incentives of the shareholders and the managers of the firm. In other words, to state that shareholders sole interest is in maximizing the return on their equity investments and that managers' interest is to maximize the firm's performance. The shareholder constituency approach takes into account that there may exist multiple groups of shareholders whose objectives may not always be perfectly aligned.

4 Share buybacks

To structure the discussion, consider the following four hypotheses, due to Bens et al. (2002):

- H1 (EPS dilution hypothesis): The issuing of new shares leads to a dilution of the Earnings-Per-Share (EPS), due to the increase in the number of outstanding shares, without having a structural effect on the firm's earnings. A manager's motivation to manage the EPS dilution then leads to a share repurchase decision.

- H2 (Substitution or crowding-out effect hypothesis): Share repurchases lead to a reduction in real investments, due to a reduction in the firm's internally available funds.

- H3 (Perfect capital markets hypothesis): The net cash outflow due to share repurchases of the won shares should not affect the real investments since all positive NPV projects should still be able to be funded using externally obtained funds.

- H4 (Negative-impact hypothesis): Due to capital market imperfections, share buybacks result in a forfeiture of positive NPV projects, and therefore have a negative impact on the firm's future performance.

Bens et al. (2002) study the effects of Employee Stock Option (ESO) exercises on managers' real investment decisions. They find evidence in favour of the EPS dilution hypothesis (H1) by finding that ESO exercises are positively associated to share repurchases. They also find evidence in favour of the substitution or crowding-out hypothesis (H2) in the sense that share repurchases are negatively associated to real investments. Combining H1 and H2, this leads to the conclusion that ESO exercises are negatively associated to real investments.

In order to finance risky investment decisions the pecking order theory due to Myers and Majluf, 1984 hypothesizes that firms tend to prefer internally available funding sources over external resources due to the costs associated with external funding. This supports the substitution hypothesis if the internal funds represent a scarce resource and managers use this resource to repurchase their own shares, thereby crowding out real investment opportunities. Critics therefore speak of opportunity costs associated to share repurchases consisting of the forfeiture of future firm performance due to foregone expenditures on R&D or capital expenditures. It may even occur that managers reduce R&D and capital expenditures during ESO exercises in order to repurchase their own stock.

A very critical reply to the study by Bens et al. (2002) (referred to as BNW below) is given by Guay (2002), who criticizes each of their four hypotheses, both on theoretical and empirical grounds. Several points of critique are related to the pure mechanics involved in the process of granting and exercising of the stock options that are given to employees in ESO plans.

First, when granting stock options these are always granted at-the-money, i.e. X=P, where X is the exercise price and P is the current market price for one share of the stock. When a stock option is exercised, the firm simply increases its treasury stock and issues a newly created share that it will now sell to the employee, thus making the option exercise not neutral in the total number of shares outstanding, which would have been the case if the employee would have to exercise the option on the open market.

Second, when the option is exercised, the firm sells the share to the employee in return for the exercise price. That is, the share is sold for exercise price X, the employee receives a share with value P-X (since the value of the share on the market is P), and the firm receives the proceeds from the option exercise which is X. Note that upon the exercise of the option, the firm receives a tax deduction on its compensation expenses. To 'neutralize' the option exercise, the firm may decide to immediately repurchase the same number of shares as issued, using the proceeds obtained from the option exercise. Note that if the firm does so, then no "EPS dilution" occurs since the total number of shares outstanding remains invariant. Such an immediate neutralization costs the firm the difference P-X in cash, which is the exact same amount it could have paid the employee in cash compensation. In fact, if the firm would repurchase shares from the same employee who just exercised the share option the transaction would result in the same positions for the firm and the employee. However, the difference between the cash compensation and the equity compensation cum repurchase is that in the latter case the firm could gain a tax advantage, provided it has a sufficiently low marginal tax rate on earnings.[2]

A second criticism targets the motivations for firm managers to repurchase stock rather than to pay out dividends. First, shares purchased through stock option exercises do not pay dividends. Therefore holders of these shares may prefer the firm to reward its shareholders through stock repurchases rather than through dividend payments. Second, taxes raised on dividend payouts may be higher than taxes on capital gains on the investor's side. On the firm's side there may also be tax benefits to stock repurchases rather than dividend payouts, since the compensation expenses for employee stock option plans may be tax deductible from the firm's pre-tax earnings as a deferred compensation expense.

A more fundamental criticism on hypothesis H1 questions the EPS dilution effect of stock options, apart from the possibility of the firm using the exercise proceeds to repurchase the newly issued shares in an attempt to neutralize the option exercise. Since stock options as such do not count towards the total number of outstanding shares (since they have not yet been exercised), but merely provide the opportunity to buy the stock at the indicated exercise price, it is unclear why BNW claim this would have any dilution effect on the EPS. EPS dilution only occurs if the employee directly buys a newly created share from the firm, but not if they buys it from the firm's treasury stock.

When the employee decides to exercise the option on the market, instead of buying it directly from the firm's treasury through a direct purchase plan, there is a buyer and a seller to the transaction leaving the total number of outstanding shares invariant. By repurchasing its own shares, the firm is therefore not counteracting any possible EPS-dilution, but rather is actively trying to increase the EPS by decreasing its outstanding shares. This is unrelated to the issuing of share options.

A second criticism deals with hypothesis H2. The claim by BNW that "Repurchases decrease the number of shares outstanding and have no direct mechanical effect on cur- rent earnings, thus increasing current EPS." (Bens et al., 2002, p.363) is also criticized. Since the cash used for a share repurchase could have otherwise been used to repay debt or to generate interest income, these opportunity costs

[2]It could very well be the case that for the share repurchase the employee who exercised the option is exempt from offering shares immediately in the announced repurchase.

should be taken into account in the calculation of the effect on earnings (Guay, 2002, p.13). Doing so properly would result in earnings actually declining during the first years after a stock repurchase. In fact, this results in a dilution effect of the EPS due to a nominator effect (decreasing total earnings), not to an increase of EPS due to a denominator effect (decrease in the number of shares).

5 Shareholder investment horizons and firm payout decisions

There appears to be some evidence in the literature that short-term investors prefer share repurchases, while long-term investors prefer dividend payouts. Gaspar et al. (2017) study the impact of shareholder investment horizons and find that firm ownership by short-term oriented institutional investors decreases the likelihood that the firm makes dividend payments, and increases the probability of a share repurchase. This was also found by earlier studies (Brennan and Thakor, 1990).

It is assumed that dividend payments are costly for the shareholders because the tax rate on dividend income exceeds the capital gains tax (this is the state of affairs in the U.S. but this might differ per country in Europe). From the shareholders' point of view a share repurchase is therefore preferable to a dividend payment. However, these costs are only incurred by the short-term shareholders who indeed will sell their shares when there is a share repurchase announced by the firm. If the repurchasing price is set above the current market price, enticing the short-term shareholders to participate and offer their shares, the long-term investors are facing a dilution cost due to the share repurchase. The manager therefore faces a trade-off between the tax costs of a dividend payment that affects only the short-term investors and the potential dilution costs of a share repurchase that affects only the long-term investors. If the short-term investors dominate among the shareholders, for example due to shareholder activism, the manager might be tempted to favour share repurchases over dividends. This would explain why the market response to a repurchase announcement differs between firms that are dominated by short-term investors and firms that are dominated by long-term investors. This also corresponds to a finding by Gaspar et al. (2017) who find that the market reaction decreases with the length of the shareholders' investment horizon.

6 The effect of manager remuneration schemes

This leads to the link between managers' incentives and long-term investment decisions, and the effect of executive compensation schemes on executives' strategic planing horizons. Core et al. (2003) provide a survey of equity compensations and managerial incentives which is purposefully aligned with principal-agent theory. This implies that any manager compensation schemes are interpreted in light of manager incentives as desired by the shareholders, and assumes the only objective of management is to maximize the net present value of the shareholders' portfolio. The management's ownership of equity is therefore in order to re-align the managers' incentives with those of the shareholders.

They identify four main reasons why firms would use managerial remuneration schemes based on stock options or restricted stock.[3] The first reason is due to incentives: if the manager's equity incentives become misaligned with the level of incentives that is desired by shareholders, the equity compensation is to re-align them. This implicitly assumes that managers are only driven by monetary incentives and do not care about any other stakeholders in the firm.

Second, equity compensation can be used as an alternative to cash compensation. This holds in particular for firms that are cash constrained because stock options and restricted stocks are deferred payments that do not require an immediate cash payout. Third, equity compensations can be preferred for

[3]Restricted stock are unregistered shares of ownership.

tax reasons. The performance-based component of managerial compensation constitutes a firm expense that is not included in the $1m limit on tax deductibles, unlike the expense for fixed compensations. This leads to a direct tax savings for the firm, which correlates with the empirical observation that the use of stock options is greater for firms with lower marginal tax rates (Yermack, 1995; Matsunaga, 1995; Dechow et al., 1996; Bryan et al., 2000).

7 The effect of announcing share repurchases on the share price

Andriosopoulos and Lasfer (2015) perform an empirical study of the effects of share repurchase announcements on the share price. They specifically focus on the market's response to an announcement of the intention by a firm to undertake a share repurchase, so not on the market's response to an actual share repurchase programme. Such announcements can therefore be seen as a signaling device that can be used by the firm to decrease the information asymmetry between the firm's management and the market participants about the possible under-evaluation of the firm's equity by the market. The importance of such market signaling is evidenced by the fact that the 3-year buyback completion rate after an announced share repurchase is about 70% of the target buyback amount (Bonaimé, 2012). This shows that as soon as the management has reached its goal of affecting the market share price, there is no more need for the actual share repurchase.

The market's response to the announcement is measured by the short-run excess return of the share price on the announcement day. The response could be seen as a proxy for the average market sentiment, i.e. as the market participant's average optimistic or pessimistic expectations about the effect of an actual share repurchase programme in the near future (within 3 years).

A first result, also reported by other authors, is that when firms announce their intent to repurchase shares the market reacts positively (Pettit, 2001). Table 1 shows that for the EU as a whole the average excess market return on the announcement day is 1.55%. For the UK this is 1.68%, for Germany 2.32%, and for France 0.80%. The result for the UK is lower than that for the US, which is 3.54%, quite a bit higher than the EU. Summarizing, the generic observation is that the market shows a positive sentiment towards share repurchase announcements. However, not every firm that makes a share repurchase announcement follows-up by actually making any share repurchases. Due to this possible non-completion by the firms, those firms that have a high prior completion rate are more credible and are therefore shown to be rewarded more by the market upon making an announcement than firms with less credibility. That is, firms with higher completion credibility show a higher positive excess market return on the announcement day than firms with less credibility, even though these also show positive excess market returns on the announcement day.

A second result is that the effect on the share price is not very long-lasting, and only occurs on the announcement day itself. There are no significant excess returns in the share price on the 20 pre- and post-announcement days, including the 2 days immediately before and after the day itself. This indicates that for the UK, French and German markets only the announcement of the intention to buy back shares matters for the market's response, and not whether the firm actually commits itself to execute the share repurchase programme that it has announced.

8 Manager remuneration and share buybacks

Below we summarize some empirical evidence about executive compensation schemes and the changing behaviour of firms with respect to share buybacks. This is followed by a discussion of the main

Table 1: Market response to share repurchase announcements.

Country	US	EU	UK	DE	FR
Market response (%)	3.54	1.55	1.68	2.32	0.80

Notes: The market response is measured as the excess market return of the share price, on the announcement day.
Source: Andriosopoulos and Lasfer (2015).

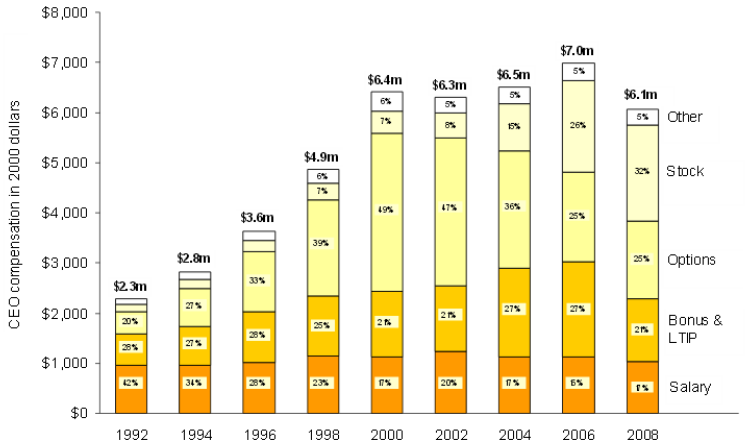

Figure 1: Composition of CEO remuneration schemes Source: Frydman and Jenter, 2010.

assumptions in our model, and how this connects to the features discussed in the literature overview above.

Figure 1 shows that since 1992 there has been a rapid, almost exponential increase in total CEO compensation paid out by companies listed in the S&P500. Most of this increase is explained by an increase in the percentage of the total CEO compensation that is paid out in stock options. This percentage increased from approx. 20 percent in 1992 to 49 percent in the year 2000. After 2000 the total CEO compensation has remained approximately constant, or stagnating from the point of view of the managers. But the composition has changed quite a bit. Rather than granting stock options as part of the CEO remuneration scheme, companies have instead started to grant (restricted) stock shares. The number of companies doing so has also increased over time (see Figure 2 below). The motivation for replacing the options with shares may be either related to income tax benefits for the managers or with favourable accounting rules for the companies themselves. For instance, the firm may benefit from tax deductions for delayed payments of employee compensation. Alternatively, it could also be related to changes in other regulations such as accounting or profit and loss reporting standards.

Over the same period, the firms' repurchasing of their own shares has also increased dramatically, both in the U.S. but also in Europe. This can be seen in Figure 2, which illustrates the total expenditures on buybacks aggregated over all companies in the S&P500 as a percentage of the total market capitalization of the S&P500. Since 2000 this ratio has increased from an historical average of 1 to 1.5 percent to about 5 percent at the height of the 2008 financial crisis. The effect of the crisis is also clearly visible in the graph as a sharp drop after 2008, but it has rebounded afterwards.

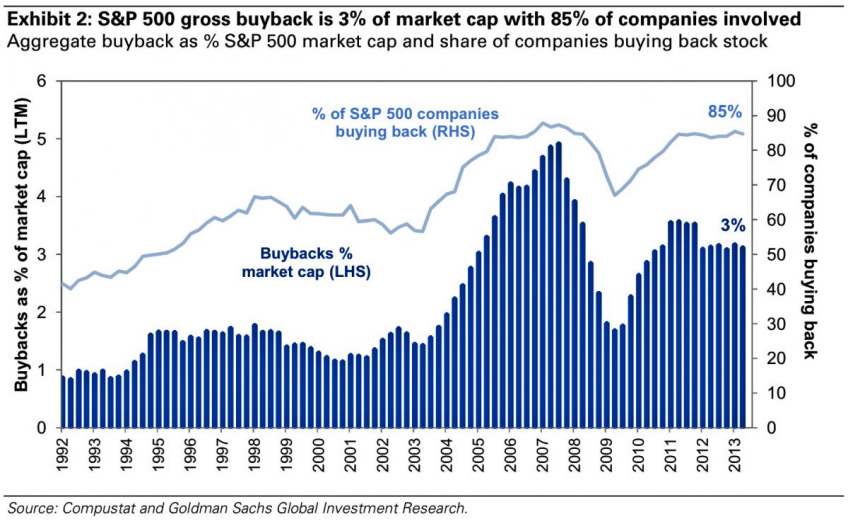

Figure 2: Source: Compustat and Goldman Sachs Global Investment Research, as quoted by Ro (2014); Verhage (2015).

9 Modeling share repurchases and short/long investment horizons

A model that tries to explain the influence of firm ownership structure on economic performance should contain several key features: different management planing horizons, agency costs, resource endowments, and risk-taking behavior. Concerning the managers' behavioral aspects, Chen (2013) reports on the relationship between CEO tenure and R&D investment decisions. Mohamed et al. (2014) provide a link between CEO's ownership and managerial optimism to their investment policy.

Outcomes that such a model should capture are then, first, the effect that an increased financial payout ratio has on real investments since higher expenditures on interest payments, dividends and share buybacks impede real investments by decreasing the amount of internal funds available due to the crowding-out hypothesis (but see Guay (2002) for counter-arguments). These decisions also shorten the planing horizon of the firm's management and increase uncertainty. Second, the model should also show that the increased financial income resulting from financial investments influences the management's attitude towards risk, resulting in more speculative investments.

Orhangazi (2008) provides empirical evidence on the crowding-out effect of financial profits on real investments. Increased financial profit opportunities might crowd out real investments by changing the incentive structure of a firm's management, who might feel tempted to invest in financial assets instead of real, productive investments. On the other hand, however, financial profits from such financial investments may also provide more available funds to make real investments. This holds true for small firms since financial incomes are an important source of funds for these firms. For large firms this is however not true in general. Rather, for large firms financial profits and real investments are negatively correlated, while for small firms there is no significant correlation.

More generally the discussion above suggests to explore the following issues using a dynamic modelling approach (a) investment behavior, i.e. expenditures on R&D or human capital development versus financial asset investments; (b) the allocation of funds to different channels, such as retained earnings

versus shareholder rewards by performing share buybacks or other reward mechanisms; (c) the planing horizon of the managers of the firm; (d) manager objectives, i.e. are managers oriented towards nurturing stable business ties with other stakeholders (suppliers, customers, employees), or are they only oriented towards increasing the firms share price; (e) the firm's activity on the financial market, i.e. whether it is actively trying to manage its share price, or whether it passively responds to the share price.

10 Model assumptions and their empirical foundations

To capture the above empirical stylized facts, and the empirical evidence about the managers' investment behavior described earlier, we propose a partial model of an oligopolistic industry that captures the trade-off between short-term financial gains for managers and long-term effects on a firms competitiveness (a detailed description of the model is provided in deliverable D3.4). In our model, the manager remuneration scheme consists of a mixture of fixed and variable components, namely a fixed salary and a performance oriented bonus that is defined as a percentage of the firm's profits in cash and a fixed number of shares granted. For the share grant we assume that the manager receives restricted stock rather than call options in the firm's equity. Restricted stock is stock that is not fully transferable, for instance it cannot be sold until certain conditions are met such as a target earnings per share or continued employment at the firm. The restricted stock has the same value as the market price of the stock at the time of the grant. Such fair value accounting is advantageous to the manager since she pays income tax on the value of the stock at the time of the grant, rather than on the income generated when the restricted stock is actually sold on the market. If the stock market value has increased between the time of issue and the time of sale, this difference will hence not be taxed. In addition, we assume that the firm does not grant the restricted stock immediately, but with some delay. This corresponds to restricted stock units (RSUs) that are a hybrid form of stock options and restricted stock. RSUs are a promise by an employer to grant the restricted stock at a specified point in time in the future. Such delayed income payments may be advantageous to the firm, due to corporate income tax deductibles of delayed layouts for employee income payments.

For the shareholders we assume they have either optimistic or pessimistic expectations about the effects of a share repurchase on the market value of the share. If the agents with optimistic expectations dominate the market, then there is a positive market sentiment and on average it is expected that the share price will increase following a share repurchase by the firm. Initially, this belief in an upward movement of the share price results in excess market demand for the share in anticipation of the share repurchase and yields an increase in the market value of the share due to an equilibrium pricing mechanism. If however the pessimistic agents dominate then there will not be such an initial excess market demand for the share, and the market share price will fall.

The manager has beliefs about market response to his actions and incorporates the agents' expectations and the resulting changes in share prices in her decision whether or not to perform a share repurchase. Thus, when there is a negative market sentiment, the manager rationally decides not to pursue the share repurchase since she already knows beforehand that this will result in a negative effect on the market price of the share, and that this will adversely affect her own remuneration. Hence, whenever there is on average a positive market sentiment, we expect the manager to rationally anticipate a positive effect of share repurchases and proceed with the share buyback, and whenever there is a negative market sentiment the manager decides against doing so.

We thus have a system with heterogeneous expectations that can be studied either from a population based perspective or at the level of the individual agents. If we assume that agents with different expectations are of a different type, and agents are fixed to this type, then we may call these types beliefs, and agents cannot easily switch beliefs. This is a population based perspective and we can study

the fraction of the population of agents that is of a certain belief type. Initially we may assume that the fraction of shareholders of each belief type is constant so that agents themselves cannot switch.

However, if we assume that optimistic and pessimistic expectations are not fixed but that agents may switch between them, then the agent types are not fixed beliefs but rather expectation rules. This brings us into the realm of "heterogeneous rules switching" models (Brock and Hommes, 1997). The difference between fixed beliefs or switching between expectation rules is important since it may lead to drastically different outcomes due to the endogenous dynamics of the evolving expectations formation process.

In the analysis of the model we will therefore distinguish between taking a population-based "heterogeneous and fixed beliefs" analysis adopting fixed population fractions, or an agent-based approach that relies on "expectation rules switching".

We have included into the manager's remuneration scheme two components that are variable and profit-oriented: the firm's operating profits and the share price. The manager is therefore operating under an incentive scheme that tries to align the interests of the manager to the interests of the firm, as well as to the interests of the shareholders. This is in line with Core et al. (2003), where the argument is made that the purpose of the inclusion of management ownership of equity in the executive compensation scheme is in order to re-align the managers' incentives with those of the shareholders. However, in the model we envision, we do not assume that the manager compensation schemes should be interpreted solely in light of manager incentives as desired by the shareholders, as would be the case in a pure principal-agent theoretical framework. On the contrary, we explicitly include the real profits of the firm into the managers' compensation as well, so we do not assume that the only objective of management is to maximize the net present value of the shareholders' portfolio (shareholder value maximization, Lazonick and O'Sullivan, 2000). By considering the firm's longer-term profits we have implicitly included the interests of other stakeholder constituencies (such as, e.g., the firm's workers, the suppliers, or its creditors) into the manager's objectives, as suggested by Gedajlovic et al. (2005) and Lazonick (2007).

The income of the manager is linked to the evolution of the firm's share price through the restricted stock grant, and is partly based on the firm's operating profits through the manager's cash bonuses. Therefore the manager has two incentives for making investment decisions: (i) the short-term financial gains from making financial investments into share repurchases, and (ii) the more patient, longer-term financial payouts from making real investments into the firm's productive capacity that will likely boost its operating profits in the future.

Regarding the manager's planing horizon, we assume that the manager has some expectation about the length of its tenure at the firm. This affects the manager's planing horizon and her investment decisions. If the manager expects short tenure, and therefore has a short planing horizon, the weight of the short-term financial profits from share repurchases will weigh stronger in her decision. When the expected tenure is longer, also the planing horizon is longer, and the operating profits from making real investments in productive activities will dominate in the manager's decision.

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