

Louvain School of Management

**THE RELATION BETWEEN SHARE REPURCHASES
AND RESEARCH AND DEVELOPMENT INVESTMENTS
IN LIGHT OF A SOCIO-POLITICAL APPROACH**

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ABSTRACT

Through this master thesis, we contribute to the existing literature on the relation between share repurchases and research and development in Europe and we extend the literature on the socio-political approach from Zajac and Westphal. Our data sample is composed by 345 companies from the S&P 350 Europe Index from 1999 to 2019. Firstly, we confirm the negative impact of share repurchases on research and development investments. Secondly, we find that, in setting of high performance, an increase of performance indicators leads to a stronger negative impact, suggesting a decline in the CEOs' power over the allocation of financial resource. Thirdly, we find that a high analyst coverage leads to a stronger negative impact, suggesting that external pressure from analysts also reduces the power of the CEOs. Finally, we suggest that institutional ownership reinforces the power of CEOs, or at least that they share the same interest to invest in long-term value of the company rather than in a short-term satisfaction of investors. Based on these results, we have identified three implications: (1) CEOs who achieve high financial performance should pay attention not to cut research and development investments to satisfy short-term expectations; (2) Investors looking for short-term satisfaction should favour companies with a strong analyst coverage; (3) CEOs who are concerned about institutional pressure should not be worried about any loss of power over the allocation of financial resources to research and development.

KEYWORDS: • Share repurchases • Research and development
 • Socio-political approach • Performance • Governance • Crisis

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I. INTRODUCTION

As you may have recently read through articles from the financial press, the last two decades have seen a surge in share repurchases in Europe. In addition to showing the evolution of share repurchases since 2000, a recent article called “[European Companies, Flush With Cash, Turn to Stock Buybacks](#)” from the Wall Street Journal expects a significant increase in share repurchases expenditures in Europe for the coming years as companies were forced to cut dividends and share repurchases last year due to the worldwide pandemic. We are entitled to question the impact of this future spending to meet short-term expectations on the long-term competitiveness of European companies. Shareholders and analysts tend to have a myopic vision ([Bushee, 1998](#)) privileging short-term satisfaction rather than long-term value creation, such as through research and development investments which are crucial for the prosperity and competitiveness of a company.

We therefore decided to focus on the relation between share repurchases and research and development in Europe. This is a very relevant subject as share repurchases, which are expected to experience a sharply growth, are already a predominant way to satisfy the financial markets by distributing a lot of companies’ earnings ([Allen and Michaely, 2003](#); [Floyd, Li and Skinner, 2015](#)). Since these earnings are also used to finance research and development, it is essential to allocate a sufficient amount to them in order to maintain the future competitiveness ([Aboody and Lev, 2000](#); [Bogliacino and Pianta, 2013](#)). We found interesting to study this relation in light of the socio-political approach from Westphal and Zajac who suggest that the CEOs desire to sustain their power through the control of large financial resources ([Westphal and Zajac: 1998](#); [2001](#); [2004](#); [2013](#)). Moreover, there is very limited knowledge about the relation between share repurchases and research and development, as well as the determinants that may impact this relationship. The goal of this master thesis is to fill this void in the existing literature.

Our database contains financial and governance data from 1999 to 2019 for 345 from the 350 companies that constitute the S&P Europe 350 Index (ranking 2020). Our sample covers 17 countries and 11 sectors of activity.

The main results show that, in setting of high performance, when the performance of companies increases, companies tend to prefer to invest in share repurchases rather than in research and development. We suggest that the power of CEOs over the allocation of financial resources seems to decline when the company increases its performance in setting of high performance mainly due to an increase in external pressure from investors and analysts. Our results also suggest that analyst coverage and institutional ownership have a significant impact on the relation between share repurchases and research and development investments. On the one hand, a company with a high analyst coverage will more likely be exposed to higher external pressure for distributing cash to shareholders suggesting that CEOs lose power over the allocation of financial resources. On the other hand, institutional ownership seems to reinforce the power of CEOs or at least display a same interest to invest in long-term value of the company rather than in a short-term satisfaction of investors. We identified 3 implications based on our results for the managers, investors and analyst: (1) CEOs who achieve high financial performance should pay attention not to cut research and development investments to satisfy short-term expectations; (2) Investors looking for short-term satisfaction should favour companies with a strong analyst coverage; (3) CEOs who are concerned about institutional pressure should not be worried about any loss of power over the allocation of financial resources to research and development.

The next section ([section II](#)) develops the literature review as well as the development of our hypotheses. The [section III](#) presents our methodology while [section IV](#) reports our results. Finally, the last section ([section V](#)) discusses the results and outlines advice for practitioners, literature and personal contributions as well as the limitations of this thesis.

II. LITERATURE REVIEW AND HYPOTHESIS

LITERATURE REVIEW

The conflict between long- and short-term expectations:

According to [Jensen and Meckling \(1976\)](#), firms through their CEOs are responsible for the long-term wealth maximization of shareholders. One way of maximizing shareholders wealth is through investments in projects such as research and development (R&D). [Kumar and LI \(2016\)](#) show that R&D investments are positively related to cumulative stock returns which contribute to the increase of shareholder wealth. However, such strategies implemented by companies can take a certain time to deliver its benefits ([Dierickx & Cool, 1989](#)).

In parallel of this long-term view, as [Sander and Carpenter \(2003\)](#) demonstrate, CEOs are facing external pressure for nearer-term results. Shareholders and securities analysts want to be satisfied on a relative short-term basis. Securities analysts are people who assess the firms' performance and periodically publish reports including firms' stock price forecast and recommendations about whether to buy, hold or sell the stock ([Benner and Ranganathan, 2012](#)). At the same time, CEOs cannot neglect this external pressure for short-term results otherwise this will lead to significant hazards such as hostile takeovers, board interference, involuntary executive replacement, etc ([Sanders and Carpenter, 2003](#)). Consistent with that, [Bascle and Jung \(2019\)](#) demonstrate that external pressures faced by CEOs to reach short-term objectives can lead them to take decisions jeopardizing their long terms strategies.

In other words, CEOs, which job is to maximize the long-term shareholder wealth, are facing opposite goals between assuring the long-term shareholders value maximization and the near-term shareholders satisfaction.

R&D and asymmetry of information:

[Aboody and Lev \(2000\)](#) explain that investments in R&D is a major productive input in many firms. [Bogliacino and Pianta \(2013\)](#) demonstrate that the R&D, which is a main input for innovation, leads to lagged profits for the company and that the reinvestment of profits into R&D has a key role in the overall success of European industries. In the same way, [Kumar and LI \(2016\)](#) also show that R&D lead to stock return for shareholders.

However, R&D investments are also linked to source of information asymmetry. Asymmetry of information occurs when one party in an exchange has information that the other party does not have ([Sanders and Carpenter, 2003](#)). [Aboody & Lev \(2000\)](#) demonstrate that R&D investments are associated with information asymmetry. They propose three reasons to explain this relation: (1) R&D is unique to the firm, (2) there are no organized markets for R&D investments, and (3) the lack of details about R&D in corporate reports.

[Sanders and Carpenter \(2003\)](#) suggest that asymmetry of information possibly increases the conflict between long-term and near-term view. As mentioned above, R&D naturally creates asymmetry of information. Companies that invest in R&D are not likely to communicate about their projects in details. As a result, the uncertainty and risk associated to R&D may lead investors and securities analysts to discount the value of companies which invest in R&D. [Sanders and Carpenter \(2003\)](#) suggest therefore that companies tend to use share repurchases to reduce asymmetry of information and appease shareholder in the near-term. According to them, share repurchases help to solve the asymmetry issue by conveying information about the management confidence regarding R&D projects without divulging any technical information.

Hong, Lim, and Stein (2000) show that the more analysts there are, the more firm-specific information there is, and the faster this information is passed on. In other words, the higher the analyst coverage of a firm, the less information asymmetry there is.

Definition and type of share repurchases:

Share repurchases are one of the methods to distribute cash to shareholders. [Zajac and Westphal \(2004\)](#) define share repurchases (or “buybacks”) as a formal policy approved by the board of directors to buy a part of the firm’s outstanding shares back from investors and retire them. In any case, before starting a repurchase program, companies must announce it to the market. After being repurchased, the shares lose their voting and cash flows’ rights by being retired or counted as part of treasury shares ([Allen and Michaely, 2003](#)). [Bagwell and Shoven \(1989\)](#) argue that this decrease in outstanding shares implies a higher share price of the remaining shares than if the same amount of cash had been distributed as dividends. This share price increase results in capital gains that can be converted into cash by selling shares.

[Comment and Jarrel \(1991\)](#), [Stephens and Weisbach \(1998\)](#), [Allen and Michaely \(2003\)](#) agree that open-market share repurchases method is by far the most widely used practice (more than 90%) among the three main vehicles for firms to buy back: Open-market repurchase, Fixed price tender offer and Dutch auction.

While open-market repurchase programs allow firms to buy back at market prices with flexibility regarding duration and quantity, fixed price tender offers and Dutch auctions concern a specific number of shares with a specific expiration date at prices that include premiums. Those features imply that these last two methods are more likely to involve large amount, typically around 15% of outstanding shares, in a short period of time, usually about one month ([Allen and Michaely, 2003](#)). This is opposed to the open-market repurchases that rather involve a smaller number of shares with only 6% of the shares in a much longer duration, about three years ([Allen and Michaely, 2003](#)). The difference

between a fixed price tender offer and a Dutch auction is that the fixed price tender offer specifies a single price whereas the Dutch auction specifies a range of prices at which shareholders can tender.

Share repurchase plan adoption tends to result in positive and persistent market reactions ([Ikenberry, Lakonishok, and Vermaelen, 1995](#)). As demonstrated by [Allen and Michaely \(2003\)](#), positive market reaction due to repurchase program announcement imply a positive price effect. They even go further and determine that, due to their specific features, the magnitude of this positive reaction depends on the type of the repurchase: open-market showed only 3% as average announcement price effect against 8% and 12% respectively for Dutch auction and fixed price tender. The literature often explains the positive effect related to share repurchases by two reasons: The Agency Theory and The Signalling Effect that will be discussed later.

Share repurchases VS dividends

[Allen and Michaely \(2003\)](#) observe several elements regarding share repurchases and dividends. First, both share repurchases and dividends are means to distribute excess cashflows to shareholders. However, the nature of the distribution is different. Dividends are cash that is directly distributed to shareholders while share repurchases result in a capital gain for them (meaning they need to sell the share to receive cash). Moreover, [Bagwell and Shoven \(1989\)](#) highlight that share repurchases may systematically alter the distribution of the ownership while dividends let the ownership unchanged.

Furthermore, [Floyd et al. \(2015\)](#) point out that one of the main advantages of repurchases is the lack of commitment which is consistent with [Brav et al. \(2005\)](#) demonstrating that share repurchases are not sticky like dividends. Dividends usually gradually increased over years and are rarely cut. [Allen and Michaely \(2003\)](#) also show that since a decrease in dividends is normally welcomed negatively by the market, companies are very reluctant to cut them, which is not the case for share repurchases.

These latter are considered to be more volatile than dividends because they vary much more from year to year. Moreover, they are seen by managers as a more flexible payout than dividends ([Brav et al., 2005](#))

[Wang, Yin and Yu \(2021\)](#) explain that before legalization of open-market share repurchases, dividends were the most popular way of distributing cash-flow to shareholders. However, the stickiness of dividends resulted in a low distributions and high investments for companies. After this legalization, share repurchases have gradually become the most popular way of distributing cash as this allows firms to distribute cash with more flexibility. The findings of those authors show a much higher total payout (+47%) without significant dividend cuts.

Considering the total payout, [Allen and Michaely \(2003\)](#) demonstrate that US Corporations pay out over 80% of their earnings to shareholders. This finding is consistent with [Floyd, Li and Skinner \(2015\)](#) that present the total payout evolution from 1980 to 2012 with the distinction between industrial firms and commercial banks that distribute cash through both dividends and repurchases or only through one of these methods. From those data, we learn that industrials total payouts for company that pay both dividends and repurchases are generally higher than 70% from 1998 and around 60% for commercial banks also distributing cash by the two methods. Moreover, in 2007, industrial firms total payout reached a peak of 92.9% compared to 82.3% for commercial banks.

Although dividends and share repurchases are two methods to distribute cash to shareholders, some argue that there is a substitution effect from one to the other, while others support the complementarity hypothesis of share buybacks as an additional payout to dividends. [Ikenberry, Lakonishok and Vermaelen \(1995\)](#), [Grullon and Michaely \(2002\)](#), [Allen and Michaely \(2003\)](#), [Andriosopoulos and Lasfer \(2015\)](#) support the hypothesis of share repurchases substituting for dividends while [Dittmar \(2000\)](#), [Fama](#)

[and French \(2001\)](#), [von Eije and Megginson \(2008\)](#), [Floyd, Li and Skinner \(2015\)](#), [Wang, Yin and Yu \(2021\)](#) support the complementarity between those means of payouts.

Why do firms share repurchases?

The use of share repurchases rather than other ways of distributing can be explained by several reasons such as the aim to reach optimal leverage ratio, to avoid takeovers and to offset the dilution of stock options ([Dittmar, 2000](#)). However, we will focus on the major theories that are discussed by the literature explaining reasons why firms repurchase their own shares.

The first reason lies in the Agency Theory and the free-cash flow hypothesis ([Jensen, 1986](#)) that will be deeply explained later. Share repurchases will reduce the free-cash flow at the disposal of the firm's top managers. As result, it will mitigate eventual misinvestments by managers.

The second explanation is related to the positive signal that share repurchases send to the market. In this case, the use of share repurchases is motivated by asymmetric information between the marketplace and firm's managers ([Ikenberry, Lakonishok, and Vermaelen, 1995](#)). The repurchase of shares is a way to signal less-informed marketplace that the company is expecting future earnings or is undervalued ([Vermaelen, 1981](#)). [Comment and Jarrel \(1991\)](#) studied the three forms of share repurchases with the signalling-based hypothesis and find evidence supporting the signalling theory for all the three methods. However, [Grullon and Michaely \(2004\)](#) find that the signalling hypothesis cannot explain why firms repurchase their shares since they did not find any evidence of better operational performance following the adoption of share repurchases.

In addition to that, [Lazonick \(2014\)](#) has a very critical view on the reasons for doing open-market share repurchases programs. According to him, undervaluation is not a reason why companies buyback their own shares since it happens most of the time when shares prices are high. He also argues that the stock option dilution argument has no

rational economic logic as stock options are a way to motivate employees, implying they should wait until their efforts pay off instead of immediately boosting earnings per share. Moreover, concerning mature companies that argue it is necessary to redistribute unneeded cash to shareholders because they run out of profitable investment opportunities, he demonstrates that executives who are doing so, shirk their responsibilities to deeply and broadly invest in innovation. His conclusion is that executives use open-market repurchases to serve their own interests through stock-based remuneration.

As we have discussed above, The Agency Theory and Signalling hypothesis are the two most widely accepted explanations of why companies buy back their own shares where, as demonstrated by [Grullon and Michaely \(2004\)](#), [Farre-Mensa, Michaely and Schmalz \(2014\)](#), the Agency explanation often prevailed.

[Bascle \(2016\)](#) put the Agency Theory in a socio-political approach and explains that institutional logics are *“broad cultural beliefs and norms that structure cognition and fundamentally shape decision making and action in a field”*, where a field constitutes the arena of three participant types in which a set of norms prevails. These are the *“actors”* who cope with conformity expectations, and the *“second”* and *“third”* participant types who enforce norms and sanctions. Concretely, we are here in the shareholder-value maximization’s logic where the field is the financial markets with firms as *“actors”*, investors as *“second”* and security analysts as *“third”*. The Agency Theory has had such an impact that share repurchases became a norm in this field and therefore that companies are expected to repurchase their own shares. But firms are able to be opportunistic and push their own interests in the way of following the norms such as by decoupling share repurchase programs meaning announcing share repurchase programs without implementing them.

Furthermore, according to the literature, share repurchases can be used as tool to appease shareholders without taking too much risk. [Sanders and Carpenter \(2003\)](#) suggest that CEOs used share repurchase announcements in order to mollify shareholders in the short-term and let the company continue to invest in future oriented projects. [Benner and Ranganathan \(2012\)](#) found a similar mechanism where in period of strong pressure for technological change, management uses announcement of share repurchases as a substitute to conforming to the pressure from analysts to change their strategy and reduce their investments. In top of that, [Zajac and Westphal \(2004\)](#) demonstrate that companies which announce the implementation of share repurchase programs, without doing it, were not sanctioned by the market. On the contrary, announcement of share repurchases were still welcomed by positive market reactions.

Additionally, [Benner and Ranganathan \(2012\)](#) find evidence that the more a firm is covered by analysts, the more the firm will announce share repurchases programs. This suggests that analysts do influence the firm's decision of repurchasing shares regardless of the content of their recommendations.

Share repurchases in Europe:

In 2008, studying 15 nations which are members of the European Union between 1989 and 2005, [von Eije and Megginson \(2008\)](#) find that share repurchases policies of EU companies (as well as dividend policies) are similar in many ways to those of American firms. However, they show that large-scale share buybacks started much earlier with a slower growth in the US than in Europe. [Andriosopoulos and Lasfer \(2015\)](#) demonstrate, like in the US, that European companies can also use share repurchases to manipulate the financial markets by not really implementing them.

In addition to that, [Andriosopoulos and Lasfer \(2015\)](#) show that legislation regarding share repurchases has relatively standardized across European countries. Also, [Ginglinger and Hamon \(2006\)](#) explain that open market share repurchases in Europe are recent

practices and are only framed by national regulations of each country until the implementation of a European Directive in 2004 which aim to harmonize regulations. As a reminder, “a directive shall be binding, as to the result to be achieved, upon each Member State to which it is addressed, but shall leave to the national authorities the choice of form and methods” ([Official Journal of the European Union](#)).

From [Article 4](#) of this directive¹, four conditions to make share repurchase programs are given. Firstly, it must comply with [Article 19 of Directive 77/91/EEC](#) which informs that share repurchase programs shall be authorized by the general meeting which determines terms and conditions such as the duration and the maximum quantity to be repurchased. For any authorized share repurchase, administrative members and management bodies are required to ensure that some conditions are met. The second condition from Commission Regulation declares that all details from approved programs have to be disclosed to the public before the start as well as subsequent changes to those programs. The third condition obliges companies which repurchase their own shares to put in place mechanisms ensuring that each related transaction is reported to the competent authority. The last condition states that all transactions details must be publicly disclosed within a maximum seven market days from transactions dates.

The Jensen’s Agency Theory

The Agency theory is a major theory in the literature that has been extensively discussed, [Jensen and Meckling \(1976\)](#) define the Agency relationship as “a contract under which one or more persons (the principal(s)) engage another person (the agent) to perform some service on their behalf which involves delegating some decision-making authority to the agent”. The Agency Theory resides in the divergence between manager’s decisions (the agent) and the decisions which would maximize the welfare of shareholders (the

¹ Commission Regulation (EC) No 2273/2003 of 22 December 2003 implementing Directive 2003/6/EC of the European Parliament and of the Council

principal). In order to reduce the size of the divergence, shareholders will have to act in order to make sure that managers align their interest with theirs. This situation will result in Agency costs which are the sum of the costs (the monitoring expenditures by the principal, the bonding expenditures by the agent, and the residual loss) that are incurred in order to align the agent's interest with those from the principal.

The Agency Theory ([Jensen, 1986](#)) lies in the fact that managers have incentive to grow their firm beyond optimal size. With growth, the power and the resources under the control of managers increase as well as their compensation. The bigger the company, the bigger the compensation of the manager. In order to offset this, Jensen suggests that shareholders push managers to distribute free-cash flow (with mechanisms such as share repurchases and dividends) in order to put managers under pressure and mitigate misinvestments. By doing so, it reduces the power of managers and therefore their compensation. Jensen defines the free cash flow as the remaining excess cash flow after having financed all projects with a positive net present value when discounted at the relevant cost of capital. This definition implies that we should understand misinvestments as wasted money in unprofitable investments (below the cost of capital) or in organization inefficiencies.

Lazonick's critics of the Agency Theory

According to [Lazonick \(2014\)](#), there are two confronting regimes: the value creation and the value extraction. The value creation remains in a "retain-and-reinvest" approach where companies retained earnings in order to reinvest it in increasing their capabilities. It is what he calls "sustainable prosperity", which is opposed to the "downsize-and-distribute" approach referring to cost reduction and cash distribution to shareholders. Contrary to the first one, the extraction value contributes to instability regarding employment, economic growth and income equality. He considers the Agency Theory as an extraction value regime. Indeed, [Lazonick \(2016\)](#) explains that the legitimacy of share

repurchases can be found in the maximizing share value ideology resulting from the Agency Theory. He explains that companies are run to maximize the distribution of income to those participants who matter the least to their operations and performance. Lazonick points out two major flaws in the maximizing share value ideology. The first one is the belief that public shareholders allocate resources to more efficient uses via stock market. However, in practice, they do not. The second flaw is related to the idea that only the shareholders bear the risk. However, Lazonick argues that taxpayers through government investment and subsidies and workers through their investment in the production capabilities bear the risk as well.

The socio-political approach of Zajac and Westphal

The socio-political approach from Zajac and Westphal diverges from the Agency Theory in the fact that managers have more interest in their power rather than in their compensation. From their point of view, managers want to keep cash at their disposal for investments such as R&D and therefore do not want to make share repurchases. By doing so, they increase their power.

In 1998, they conceived the agency problem as a way to reduce social uncertainty regarding managers and shareholders' interests' alignment through symbolic mechanisms that may perpetuate CEO's dominance over the board. Later, in 2001, Westphal and Zajac findings support that symbolic management like decoupling has more probability to occur when actors empowered in the organization have political interest in avoiding institutional pressures since, as [Westphal and Zajac \(1998\)](#) demonstrate, the decoupling can be considered as a viable response to institutional pressure. The term “*symbolic management*” is defined in their paper from 2013 as “*organizational initiatives and communications that enhance the legitimacy of organizational activities by associating those activities with normative values, beliefs, and objectives that transcend the organization itself*”. Leaders with social influence over their board succeed in enhancing

the legitimacy of corporate governance within their company by ceremonially adopting policies while still persevering in governance practices that serve their personal and political interests ([Westphal and Zajac, 2013](#)). [Westphal and Zajac \(2001\)](#) show that the political interest of top managers is to seek to preserve managerial discretion over the allocation of corporate resources.

CEO's power and performance:

In 1994, Ocasio studied the dynamics of the CEO's power circulation, especially during poor performance periods by confronting two main models which are the institutionalization (and perpetuating) of power and the model of circulation of power.

The first one suggests that the power of the CEO is likely to increase during his office term. Moreover, in conditions of economic adversity, CEO's power should be exacerbated especially for powerful CEOs who use their sources of power to maintain their authority. [Ocasio \(1994\)](#) measures the CEO's authority through several variables such as CEO age, CEO tenure, CEO as founder, CEO as chairman, firm size, board size and so on. Therefore, increasing CEO's tenures leads to increasing CEO's legitimacy and resources for maintaining and perpetuating his power.

The second model which is opposed to the first one suggests that the circulation of power depends on two underlying mechanisms that are obsolescence and contestation. According to this model, technical and political obsolescence increases with CEO's tenure and economic adversity particularly provides conditions for political contestation. In this view, deterioration of firm's performance is synonym of decrease in CEO's power.

Its results show that poor economic performance leads to increased rate of CEO succession and so a decrease in the CEO power for average corporations. Another result is that circulation of power is not a continuous process but becomes significant under conditions of economic adversity.

[Daily and Johnson \(1997\)](#) contribute to the literature demonstrating the reciprocal nature of the relationship between CEO's power and firm performance. More than influencing firm performance, CEO's power is affected by prior firm performance. According to their findings, higher levels of firm performance lead to greater power for the CEO through more directorships in the subsequent year, which then lead to higher levels of firm performance two years later.

However, even if they agree that period of bad performance is often subject to increase in external pressure for companies and their CEOs; [Schnatterly, Gangloff and Tuschke \(2018\)](#) also suggest that the higher the company performance, the higher the shareholders' expectations, and therefore the greater pressure on CEO's power.

Share repurchases and R&D in the context of financial crisis:

Before going deeper in the matter of share repurchases in the context of financial crisis, we find it appropriate to define what a financial crisis is and more particularly a banking crisis.

As [Frederic S. Mishkin \(1992\)](#) explains, financial crisis disrupts the economy by altering the allocation of funds to the most productive investment opportunities (i.e., those that have a positive net present value). The purpose of the financial system is to channel funds to the best investment opportunities. However, in period of financial crisis, the economy is driven away from an equilibrium with high output in which financial markets perform well to one in which output declines sharply.

A more specific type of crisis which is highly disruptive and leads to sustained declines in economic activity and ultimately in welfare is systemic banking crisis ([Laeven and Valencia, 2020](#)). They define banking crisis as an event that simultaneously displays: (1) significant signs of financial distress in the banking system (as indicated by significant bank runs, losses in the banking system, and/or bank liquidations); (2) Significant

banking policy intervention measures in response to significant losses in the banking system.

The literature suggests that share repurchases tend to decline in periods of crisis whereas R&D investment are sustained. According to [Floyd, Li, and Skinner \(2015\)](#), financial crisis have a significant negative impact on share repurchases. The literature also suggests that in period of crisis, companies tend to sustain their investment in R&D. As a matter of fact, [Benner and Ranganathan \(2012\)](#) demonstrate that firms continue their strategic investments, i.e. R&D investments and capital expenditure, under strong pressure for uncertainty (technology adaptation). In addition to that, [Flammer and Ioannou \(2020\)](#) find that to sustain their competitiveness during financial crisis, companies will seek to maintain their R&D.

Relation between share repurchases and R&D investments:

Throughout the years, the literature has extensively documented the negative relation between share repurchases and R&D investments.

[Allen and Michaely \(2003\)](#), [Grullon and Michaely \(2004\)](#), [Almeida, Fos and Kronlund \(2016\)](#) find that repurchasing firms decrease their investments such as in R&D. In addition to that, [Lazonick's research \(2014\)](#) demonstrate that the use of open market share repurchases were often made at the expense of investments in productive capabilities and therefore at the expense of shareholders long-term value.

One explanation lies in the conflict between short-term and long-term expectations. [Bushee \(1998\)](#) shows that high level of institutional ownership which are focusing on short-term gain increases the probability that managers will boost earnings by cutting R&D. In the same way, [Graham et al. \(2005\)](#) also find that companies sacrifice long-term value which is achieved by investing in R&D in order to reach short-terms earnings expectations.

Another explanation is provided by [Sanders and Carpenter \(2003\)](#) who suggest that limited resource firms that allocate large amount of resource to share repurchases will more likely reduce the allocation on other investments such as R&D.

Finally, a more recent paper from [Wang, Yin and Yu \(2021\)](#) supports the negative relation between share repurchases and R&D investments with results showing that resources for share repurchases primary comes from internal cash. This implies that firms may cut capital expenditures and R&D, and therefore sacrifice long-term investment opportunities to buy back their own shares. They also added that capital expenditures and R&D cuts involve decline in the long run regarding firm value, profitability, sales growth, and innovation outcome.

HYPOTHESIS DEVELOPMENT

Baseline hypothesis:

According to the literature, expenditures on share repurchases negatively affect the amount of cash allocated to R&D ([Bushee, 1998](#); [Sanders and Carpenter, 2003](#); [Allen and Michaely, 2003](#); [Grullon and Michaely, 2004](#); [Graham, Harvey and Rajgopal, 2005](#); [Lazonick, 2014](#); [Almeida Fos and Kronlund, 2016](#); [Wang, Yin and Yu, 2021](#)).

We expect that our results will be in line with the literature. As explained by [Jensen \(1986\)](#), cash flows at the disposal of firms' top managers can be distributed to shareholders through mechanisms such as dividends and share repurchases or be retained and invested on R&D. However, [Allen and Michaely \(2003\)](#), [Floyd, Li and Skinner \(2015\)](#) demonstrate that the total payout, which is the distribution of earnings to shareholders through dividends and share repurchases, are generally high (more than 70%). By earnings, they mean income before extraordinary items from Compustat Item 18 which is also used to compute cash flow by adding depreciation and amortization from Compustat Item 14 ([Vogt, 1994](#)). Therefore, by distributing vast majority of their

earnings, firms will considerably reduce the cash flows at their disposal and consequently free cash flows since they are excess of cash flows ([Jensen, 1986](#)).

Hypothesis 1 (H1): Share repurchases have a negative impact on research and development investments.

Performance hypothesis:

Performance is usually a key indicator of the health of a company. If a company has a good performance, it means that the company is in good health. By extension, if the company is going well, it may imply that the CEO is doing a good job.

In this respect, as [Daily and Johnson \(1997\)](#) demonstrate the reciprocal nature of the relationship between CEO power and firm performance, a CEO which is doing a good job is more likely to have a greater power than if he was performing poorly. [Ocasio \(1994\)](#) demonstrates that in period of bad performance, the rate of CEO succession increased. This finding implies that the CEO may have lost or considerably reduced its power over the others in period of poor performance. In other words, if the company performs well, the power of the CEO is more likely to increase. Alternatively, if the company performs badly, the power of the CEO is more likely to decrease.

From the socio-political approach, power is the key since it allows the CEO to resist better to external pressure and it is achieved through the retention of financial resources and investments in projects. In other words, CEO avoids distributing cash to shareholders with mechanism such as share repurchases in order to invest in projects such as R&D ([Jensen, 1986](#); [Wesphal and Zajac, 2001](#); [Lazonick, 2014](#)).

Regarding external pressure, [Schnatterly, Gangloff and Tuschke \(2018\)](#) suggest that the better companies perform, the higher the shareholders expectations are, and the stronger the pressure on the CEO is to deliver results.

As the external pressure increases, the power of the CEO is expected to decrease since it is more difficult to ignore demands of investors to distribute cash. In order to satisfy

shareholders and securities analysts, companies may use mechanisms such as share repurchases to contempt their short-term expectations ([Sander and Carpenter, 2003](#); [Benner and Ranganathan, 2012](#)) at the expense of R&D investments.

We suggest that, in a setting of a high performance, any increase in performance should decrease the power of the CEO by increasing the external pressure on them even though their power is strengthened by the good performance of the company. This implies that the negative impact of expenses in share repurchases on R&D investments should be magnified when the performance indicators increase in a setting of high performance.

The first performance hypothesis is linked to the Price-Earnings Ratio (P/E Ratio). The P/E Ratio is a comparison of information about current and future earnings that is summarized in price (the numerator) and the information in current earnings alone (the denominator) ([Ou and Penman, 1989](#)). As a result, a low P/E Ratio means poor performance while high P/E Ratio means a good performance. Therefore, we expect the next relations:

Hypothesis 2 (H2): The negative impact of share repurchases on research and development investments will be magnified when the Price-Earnings Ratio increases in setting of high performance.

The second performance hypothesis is linked to the Tobin's Q that reflects the present value of future cash flows based on current and future information. Compared to an accounting-based measure, the Tobin's Q has the advantage of not relying on accounting profits that are subject to influence from managers through creative accounting techniques ([Singh, Tabassum, Darwish and Batsakis, 2018](#)). A Tobin's Q inferior to 1 means the company is undervalued, alternatively when the Tobin's Q is superior to 1, it means that the company is overvalued. We therefore suggest that:

Hypothesis 3 (H3): The negative impact of share repurchases on research and development investments will be magnified when the Tobin's Q increases in setting of high performance.

The third performance hypothesis is linked to the Quick Ratio. This latter is a solvency indicator which shows the degree to which a company's current liabilities are covered by the most liquid current assets ([Richards and Laughlin, 1980](#)). By extension, we could say that well performing companies have a higher Quick Ratio than companies that do not. The literature has associated the solvency with share repurchases ([Medury, Bowyer, Srinivasan, 1992](#); [Westphal and Zajac, 2001](#)). Therefore, we expect the next relation.

Hypothesis 4 (H4): The negative impact of share repurchases on research and development investments will be magnified when the Quick Ratio increases in setting of high performance.

The fourth performance hypothesis is linked to the EBIT that is an accounting performance measure defined as earnings before extraordinary items plus interest and tax expenses ([Li, 2016](#)). A low EBIT means bad performance while high EBIT means a good performance. Therefore, we expect the next relation.

Hypothesis 5 (H5): The negative impact of share repurchases on research and development investments will be magnified when the EBIT increases in setting of high performance.

Governance hypothesis:

Through the socio-political approach of Zajac and Westphal, we know that the aim of top managers like CEO is to increase their power, perpetuate their dominance and preserve managerial discretion over the corporate resources' allocation ([Westphal and Zajac: 1998, 2001, 2013](#)).

Shareholders seeking for relative short-term performance will prefer to receive more cash through share repurchases rather than let the company spend it on R&D ([Bushee, 1998](#);

[Sander and Carpenter, 2003](#); [Graham, Harvey and Rajgopal, 2005](#); [Bascle and Jung, 2019](#)) while top managers will prefer to keep financial resources at their disposal for R&D and cut share repurchases ([Westphal and Zajac, 2001](#)).

The power of the CEO allows the CEO to cope more easily with the external pressure of investors. Therefore, the more powerful a CEO is, the more influence he may have, and the less negative the impact of share repurchases on R&D is. We also suggest that the opposite is true, the less powerful a CEO is, the less influence he may have, and the more negative the impact of share repurchases on R&D is.

We expect that some characteristics of CEOs may increase their power: the accumulation of the positions of chairman of the board and chief executive officer ([Westphal and Zajac, 1998](#)), being a founder of the company as well as the CEO ([Daily and Johnson, 1997](#)) or displaying of a high tenure ([Westphal and Zajac, 2001](#)).

The fact that the CEO is also the chairman means he has cumulative roles and therefore board may have less control over CEO's decisions which implies that he can more easily serve their own interests through more influence over the board members. Therefore, we expect the next relation:

Hypothesis 6 (H6): The negative impact of share repurchases on research and development investments will be softened when the chief executive officer is also the chairman.

CEO as founder basically provides more legitimacy of authority which can be taken for granted. Moreover, being the founder means that the CEO has the longest tenure in the company. Therefore, we expect the next relation:

Hypothesis 7 (H7): The negative impact of share repurchases on research and development investments will be softened when the chief executive officer is also the founder.

The more the CEO displays a high tenure, the more authority he has and the less he will face contestation to its authority. Therefore, we expect the next relation:

Hypothesis 8 (H8): The negative impact of share repurchases on research and development investments will be softened when the chief executive officer tenure increases.

We also expect that the board size could affect the power of the CEO. If a board size is composed by numerous individuals, it takes more compromises to reach a consensus and it becomes easier for the CEO to influence and control the board ([Cheng, 2008](#)). We therefore suggest that the power of the CEO increases with the size of the board and expect the next relation to be true:

Hypothesis 9 (H9): The negative impact of share repurchases on research and development investments will be softened when the board size increases.

As [Shnatterly, Gangloff and Tuschke \(2018\)](#), [Benner and Ranganathan \(2012\)](#) suggest that institutional investors and securities analysts are associated with external pressure on CEO. Therefore, the more institutional investors or analysts, the more external pressure on CEO. As a result, we expect that power of the CEO is driven down with the increase of institutional investors or analyst coverage.

Hypothesis 10 (H10): The negative impact of share repurchases on research and development investments will be magnified when the institutional ownership increases.

Hypothesis 11 (H11): The negative impact of share repurchases on research and development investments will be magnified when the analyst coverage increases.

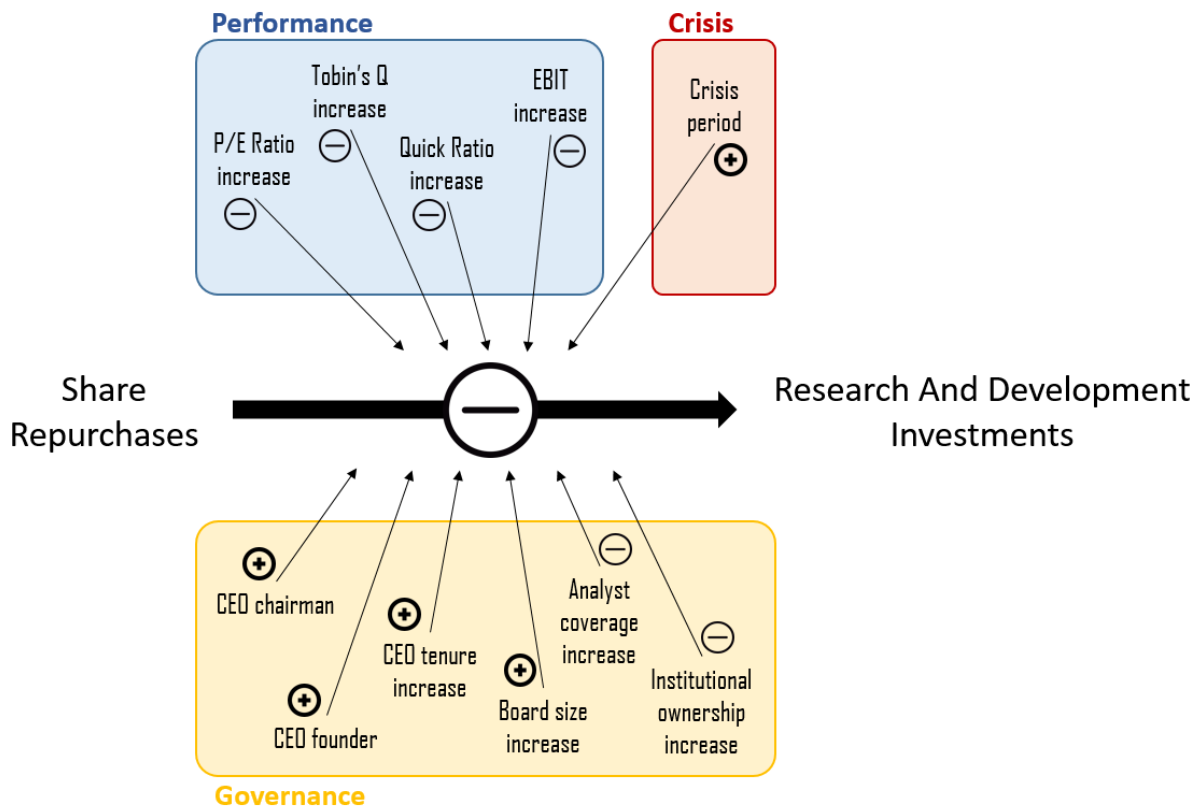
Crisis hypothesis:

Period of crisis is characterised by uncertainties for companies. According to [Floyd, Li, and Skinner \(2015\)](#), financial crisis have a significant negative impact on share repurchases. At the same time, [Benner and Ranganathan \(2012\)](#) demonstrate that firms continue their strategic investments which is composed by R&D and capital expenditure under strong pressure for uncertainty. Finally, [Flammer and Ioannou \(2020\)](#) find that to sustain their competitiveness during financial crisis, companies will seek to maintain their R&D investments.

From this, we suggest that in period of crisis, CEO has more power which allows them to mitigate external pressure and keep more cash flows at their disposal and preserve future company health through R&D investments.

Hypothesis 12 (H12): The negative impact of share repurchases on research and development investments will be softened in period of crisis.

CONCEPTUAL MODEL



III. METHOD

SAMPLE AND DATA COLLECTION

We constituted a database based on S&P Europe 350 Index (ranking 2020) from 1999 to 2020. Concretely, our database is composed of 345 European companies from 17 countries: Britain (84), France (51), Germany (43), Switzerland (35), Sweden (25), the Netherlands (21), Spain (17), Italy (14), Denmark (12), Finland (10), Belgium (9), Ireland (8), Norway (7), Luxemburg (4), Austria (2), Portugal (2) and the Isle of Man (1). Those 345 are spread across 11 sectors of activity: Industrials (70), Financials (61), Consumer Discretionary (44), Materials (34), Consumer Staples (28), Health Care (25), Communication Services (23), Utilities (22), Information Technology (17), Real Estate (11), and Energy (10).

We constituted our database from the Bloomberg Terminal to which we had access thanks to the Université Catholique de Louvain which has several terminals available to their students, teachers and researchers in finance. We exported data directly from Microsoft Excel through Bloomberg formulas which ensures no mistake in data exportation. We then completed this database with Treasury Stock variable from Compustat Global thanks to Professor Bascle who sent us an export from this database.

In order to combine data from the Bloomberg Terminal and those from Compustat Global, we matched the ISIN code of each company. As the ISIN code is unique, this allowed us to allocate with certainty the right amount to the right company. Proceeding in this way, we lost five companies² for which we did not find exact match with ISIN code, it explains why we have 345 companies and not the 350 of the S&P 350 Europe Index.

² The five lost firms are BHP Group PLC (BHP LN Equity - GB00BH0P3Z91), Carnival PLC (CCL LN Equity - GB0031215220), Kinnevik AB (KINVB SS Equity - SE0013256682), Nordea Bank Abp (NDA SS Equity - FI4000297767) and Unilever PLC (ULVR LN Equity - GB00B10RZP78)

TABLE 1: SUMMARY OF VARIABLES					
Variables	Obs.	Mean	Std. Dev.	Min	Max
Companies dummy	7,245	173	99.60	1	345
Countries dummy	7,245	8.275	5.099	1	17
R&D dummy	7,245	0.522	0.500	0	1
Sector dummy	7,245	5.722	2.836	1	11
Years	7,245	2.009	6.056	1.999	2.019
Crisis dummy	7,224	0.154	0.361	0	1
Total assets	6,688	91.622	233.933	183.7	1.475e+06
Leverage	6,677	0.251	0.158	0	0.668
Free cash flows	6,559	1.145	4.534	-16.276	27.964
ROE	6,429	15.55	16.74	-37.18	86.68
Dividends	6,413	614.3	998.1	0	5,536
Analyst coverage	6,411	21.41	10.15	1	44
R&D intensity _{t+1}	6,403	0.0234	0.0501	0	0.284
Tobin's Q	6,383	1.757	1.173	0.785	7.772
P/E Ratio	6,130	23.17	25.50	3.114	194.8
Repurchases	6,082	44.89	190.7	0	1,481
EBIT	5,753	1.676	2.718	-1.245	15.778
Quick Ratio	5,437	0.855	0.579	0.0526	3.945
Board size	4,505	11.80	3.760	5	21
CEO duality dummy	4,481	0.135	0.342	0	1
Institutional (%)	3,264	60.172	24.726	8.286	100
CEO founder dummy	2,258	0.0310	0.173	0	1
CEO tenure	2,247	5.931	5.248	0.170	28

We applied the winsorization process to each of our variables taking continuous values (i.e. R&D intensity_{t+1}, Repurchases, Total assets, Dividends, P/E Ratio, Tobin's Q, Quick Ratio, Leverage, Free cash flows, Analyst coverage, ROE, EBIT, Board size, Institutional (%), CEO tenure). Winsorization consists in limiting the extreme values, here thanks to the winsor STATA command replacing the 1% highest and lowest values by the next value counting inwards from the extremes. In this way, we do not lose value but limit the extremes values in the statistical data.

MEASURES (Variables Operationalization)

Dependent variable.

We measured share repurchases (Repurchases) by looking at the annual increase in treasury stock ([Fama and French, 2001](#); [Skinner, 2008](#)). We followed the operationalization given by [Caskey and Hanlon \(2013\)](#) by using the variable TSTK Compustat data, and by setting repurchases to 0 for decreases in treasury stock. The data collected from Compustat are in currencies depending on the currency used in a

country at a given year. We therefore converted the data in Euro using the annual exchange rate provided by the Bloomberg terminal.

$$\begin{aligned} \text{Repurchases}_t &= \text{Treasury Stock}_t - \text{Treasury Stock}_{t-1} \\ \text{When } TSTK_t > TSTK_{t-1} \text{ Otherwise } \text{Repurchases} &= 0 \end{aligned}$$

Independent variable.

The independent variable is the intensity in research and development expenses for the year $t+1$ ($\text{R\&D intensity}_{t+1}$), we measured it by dividing the total R&D expenditures incurred at year $t+1$ (which includes R&D in profit and loss account and capitalized R&D) by sales revenue at year $t+1$. Scaling R&D on sales is a common way to measure and compare R&D intensity in the literature ([Henderson and Fredrickson, 1996](#); [Sanders and Carpenters, 2003](#)). Like [Benner and Ranganathan \(2012\)](#), missing R&D data are coded as zero values because companies are required to report R&D expenses. We considered year $t+1$ instead of year t , since we wanted to measure what the impact of share repurchases was on the R&D intensity of the following year. Both variables were collected from Bloomberg.

$$\text{R\&D intensity}_{t+1} = \frac{\text{R\&D Expenditures}_{t+1}}{\text{Sales Revenues}_{t+1}}$$

Moderation variables.

We measured performance by using different types of variables. We collected all of the performance indicators from Bloomberg Terminal generally with support from the literature considering the operationalization of the variables. The first performance indicator which is the Price-Earnings Ratio (P/E Ratio) is calculated as the last share price divided by basic earnings per share ([Anderson and Brooks, 2006](#)).

$$\text{Price Earnings Ratio} = \frac{\text{Last Share Price}}{\text{Earnings}}$$

The second performance indicator which is the Tobin's Q (Tobin's Q) which is the ratio of the market value of a firm to the book value of assets ([Singh, Tabassum, Darwish,](#)

[Batsakis, 2018](#)). We decided to follow the operationalization given by Bloomberg Terminal.

$$\text{Tobin's } Q = \frac{\text{Market Capitalisation} + \text{Total Liabilities} + \text{Preferred Equity} + \text{Minority Interests}}{\text{Total Assets}}$$

The third performance indicator is the Quick Ratio (`Quick Ratio`) measuring liquidity through the operationalization used by [Westphal and Zajac \(2001\)](#):

$$\text{Quick Ratio} = \frac{\text{Cash \& Near Cash} + \text{Short Term Investments} + \text{Account Receivables}}{\text{Current Liabilities}}$$

The fourth performance indicator is the EBIT (`EBIT`) which is computed as the earnings before interest expenses and income taxes ([Li, 2016](#)).

Regarding the governance variables, we also extracted them from Bloomberg Terminal. We measured the relative power of the chief executive officer (CEO) by using several variables. The first is `CEO duality dummy` which indicates if the CEO is also the chairman of the board of the company through a dummy variable displaying 1 if it is true that the CEO cumulate the two positions or 0 if it is not true. The second variable is `CEO founder dummy` which indicates if the CEO of the company is also the founder of the company through a dummy variable showing 1 if the CEO is also founder of the company or 0 if he is not. The third variable is `CEO tenure` which indicates the total tenure of the current CEO, or equivalent, in years. The fourth variable is `Board size` which indicates the number of directors on the company's board, as reported by the company. The fifth variable is the institutional ownership (`Institutional (%)`) which indicates the percentage of shares outstanding held by institutions. Some data related to this variable exceeded 100% which is not something unusual according to Asquith, Pathak, Ritter (2005). According to them, when shorted shares are owned by more than one party (the original lender plus the purchaser on the other side of the short sale), institutional ownership can exceed 100%. Moreover, if a share sold short is re-borrowed and sold again, short interest ratios can also exceed 100%. We therefore capped

this variable at 100%. The last variable is `Analyst coverage` which indicates the total number of analysts making recommendations for the company.

Regarding the `Crisis` dummy variable, we used the database from [Laeven and Valencia \(2020\)](#) which is considered as a standard reference for information on banking crises worldwide. Their data base covers banking crisis episodes around the globe from 1970 to 2017. This data base was the most complete available to us since it covers all the countries in our sample from 1999 to 2017. However, the years 2018 to 2019 were not covered by the data base. As a result, we used the real GDP from the OECD to complete the data base. Whenever the real GDP was decreasing, we considered this decrease as an indicator of a period of crisis. We proceeded like this for each country except for Norway where we took the mainland GDP (which excludes petroleum production and shipping) as it is considered as a better indicator of the sustainable income potential of the country according to the OECD. This dummy variable displays 1 to signify it is a crisis year or 0 to signify it is a non-crisis year.

Control variables.

We controlled for several variables in an attempt to control for alternative explanation. As for almost all our variables, we extracted them from Bloomberg Terminal. The first variable is `Total assets` which is the total of all short and long-term assets as reported on the balance sheet. The second variable is `Dividends` which are dividends actually paid out as cash disbursements for both common shareholders and preferred shareholders. The third variable is `Leverage` which we computed as total debt to total assets ([Zmijewski and Hagerman, 1981](#)).

$$Leverage = \frac{Short\ Term\ Debt + Long\ Term\ Debt}{Total\ Assets} = \frac{Total\ Debt}{Total\ Assets}$$

The fourth variable is `Free cash flows` which represents the cash that a company is able to generate after laying out the money required to maintain or expand its asset base. Bloomberg's operationalization of this variable is not consistent with the literature,

but we had no choice to use it as too many observations would have been lost if we would have computed it ourselves based on the literature. This is the reason why we used it as a control variable.

$$\text{Free cash flows} = \text{Operating Cash flow} - \text{Capital Expenditures}$$

The fifth variable we controlled is R&D dummy which is a dummy variable displaying 1 to indicate if the company spent in R&D or 0 to indicate there were no or missing R&D expenditure ([Benner and Ranganathan, 2012](#)).

The last variable we controlled is the return on equity (ROE) which represents how much profit a company generates with the money shareholders have invested. We decided to follow the operationalization given by Bloomberg Terminal.

$$ROE = \frac{\text{Net Income}}{\text{Average Total Common Equity}}$$

ANALYSES

From our literature and our database, we have established a starting point with an ordinary least-square (OLS) regression. An OLS regression models the linear relationship between a dependent variable and several independent variables. For this purpose, we use regress STATA command to compute an OLS regression between the R&D investments at year t+1 scale on sales revenue of year t+1 as dependent variable (R&D intensity_{t+1}) and several continuous and dichotomous variables as independent variables (i.e. Repurchases, Total assets, Dividends, P/E Ratio, Tobin's Q, Quick Ratio, Leverage, EBIT, ROE, Analyst coverage, Institutional (%), Free cash flows, and R&D dummy)

From this OLS regression, we tested the presence of heteroscedasticity. Heteroscedasticity occurs when homoscedasticity requirements regarding constant error terms in a regression model are not met. Not having constant error terms may lead to invalid inference ([Breusch and Pagan, 1979](#)). To test the presence of heteroscedasticity in our model, we used hettest STATA command which showed us strong evidence of

heteroscedasticity. Therefore, in order to make our standards errors robust to heteroscedasticity, we used `robust` option at the end of the STATA code.

After that, we generated dummy variables for companies (`cfe`), years (`yfe`), sectors (`sfe`) and countries (`cofe`) so that each variable has a dummy. Then we grouped all variables just created so that `cfe1` to `cfe345` are included under `cfedum`, `yfe1` to `yfe21` are included under `yfedum`, `sfe1` to `sfe11` are included under `sfedum` and `cofe1` to `cofe17` are included under `cofedum`. The aim of this was to compute fixed effects which are parameters that are specific to each individual (firm) but constant overtime ([Bester and Hansen, 2016](#)). Then, in order to neutralise factors that vary from one company to another but are constant over time, we added each of our grouped variables (`cfedum`, `yfedum`, `dfedum` and `cofedum`) to our model. We then run `test` STATA command which performs a joint hypothesis test (i.e., F-statistic) to reveal whether fixed effects matter. The tests revealed that we needed to include all those four-way fixed effects in the OLS regression.

At this moment, we have to test if there is autocorrelation. Autocorrelation occurs when the error term at any particular period is correlated with any other value of itself in the series. Not correcting autocorrelated error terms should often be a mistake ([Cochrane and Orcutt, 1949](#)). To know if we have to control autocorrelation in our model, we used `xtserial` STATA command followed by all of our variables previously used in OLS regression (including fixed effects). This showed us proof of autocorrelation in our model. The `regress` STATA command that does not allow us to control both heteroscedasticity and autocorrelation at the same time, we then corrected standard errors robust to heteroscedasticity and autocorrelation thanks to the `reghdfe` STATA command.

Before fully validating this statistic model, we examined whether there is self-selection with Heckman two step procedure. This two-step procedure consists of two equations: the “selection equation” where the probability of having R&D expenses is analysed

through a dummy variable and whose aim is to compute the correction factor (i.e. inverse Mills ratio), and the “outcome equation” corresponding to our regression model with the previously computed correction factor ([Bascle, 2008](#)). Variables estimated on selected samples generally do not estimate population and comparison between selected and unselected samples results in a biased estimate of the random effect ([Heckman, 1979](#)). To do so, we applied `heckman` STATA command to our reference model from which we have removed the `R&D` dummy variable to avoid misinterpretation as the Heckman selection was equal to this variable. This test of self-selection revealed us no significant IMR (inverse Mills ratio) and therefore no evidence of self-selection bias in our statistical model.

Therefore, our reference model (M1) is an OLS regression, robust to heteroscedasticity and autocorrelation, between the `R&D` investments at year $t+1$ scale on sales revenue at year $t+1$ as dependent variable (`R&D_intensityt+1`) and several independent variables that are `Repurchases`, `Total assets`, `Dividends`, `P/E Ratio`, `Tobin's Q`, `Quick Ratio`, `Leverage`, `EBIT`, `ROE`, `Analyst coverage`, `Institutional (%)`, `Free cash flows`, and `R&D dummy`.

As you may have noticed, the vast majority of our governance variables are not yet included in our reference model (M1). Indeed, we have found that, if we incorporated all of our governance variables directly into this model, we would lose a substantial number of observations. For this reason, we have decided to use as many models as governance variables to be incorporated. Therefore, we generated a second model (M2) that corresponds to the reference model to which the `CEO duality` dummy variable has been added; a third model (M3) that corresponds to the reference model to which the `CEO founder` dummy variable has been added; a fourth model (M4) that corresponds to the reference model to which the `CEO tenure` variable has been added; a fifth model (M5) that corresponds to the reference model to which the `Board size` variable has

been added; a sixth model (M6) that corresponds to the reference model to which the `Institutional (%)` variable has been added. We finally generated a seventh model (M7) that corresponds to the reference model to which the `Crisis` dummy variable has been added in order to analyse the crisis moderator impact.

Then, in order to determine the direction of the impact of our moderation variables on the relationship between R&D investments and share repurchases, for each of our moderation variables, we generated a model including the interaction effects. Each interaction effects is obtained by multiplying the moderation variable by the share repurchases variable. This implies that we generated 11 additional models: `M1_peratio` corresponding to the reference model including the interaction effect with the Price-Earnings Ratio; `M1_tobinq` corresponding to the reference model including the interaction effect with the Tobin's Q; `M1_quick` corresponding to the reference model including the interaction effect with the Quick Ratio variable; `M1_ebit` corresponding to the reference model including the interaction effect with the EBIT; `M1_analyst` corresponding to the reference model including the interaction effect with the analyst coverage; `M2_duality` corresponding to second model including the interaction effect with the CEO duality; `M3_founder` corresponding to the third model including the interaction effect with the CEO founder; `M4_tenure` corresponding to the fourth model including the interaction effect with the CEO tenure; `M5_board` corresponding to the fifth model including the interaction effect with the board size; `M6_inst` corresponding to the sixth model including the interaction effect with the institutional ownership; `M7_crisis` corresponding to the seventh model including the interaction effect with the crisis.

For our models with moderating dichotomous variables interactions (`M2_duality`, `M3_founder` and `M7_crisis`), we used `lincom` STATA command in order to analyse the interaction effect of the independent variable `Repurchases` when the dichotomous

moderating variable takes the value of 1. While for our models with moderating continuous variables (all the others), we used `grinter` STATA command in order to graphically analyse the direction of the interrelationship as well as the values for which the relationship is significant at a 90% confidence interval.

IV. RESULTS

Pairwise Pearson correlations are displayed in [TABLE 2: PAIRWISE CORRELATIONS](#).

The Pearson correlation is a measure of linear association between variables, measure which is centred on the value 0 whose extremes are -1 and +1 ([Lee Rodgers and Nicewander, 1988](#)). If the correlation is less than 0, it means that the variables are inversely correlated and therefore move in opposite directions, whereas if the correlation is greater than 0, it means that the variables move in the same direction. Moreover, the more the correlation differs from 0, the stronger the correlation is.

[TABLE 3: SUMMARY OF RESULTS \(PART I, PART II, PART III\)](#) shows all the results of our different models. [PART I](#) shows our reference model (M1) as well as all models including interactions with Repurchases. [PART II](#) shows models where we incorporated continuous governance variables with and without the interactions with Repurchases. [PART III](#) shows models where we incorporated dichotomous variables with and without the interactions with Repurchases.

TABLE 2: PAIRWISE CORRELATIONS

VARIABLES	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]	[10]	[11]	[12]	[13]	[14]	[15]	[16]	[17]	[18]	[19]	[20]	[21]	[22]	[23]
[1]Year	1.000																						
[2]Companies dummy	0.000	1.000																					
[3]Countries dummy	0.000	0.022	1.000																				
[4]Sector dummy	0.000	-0.048	0.061	1.000																			
[5]Crisis dummy	0.017	-0.006	-0.119	-0.011	1.000																		
[6]R&D dummy	-0.108	-0.064	-0.031	-0.166	0.027	1.000																	
[7]R&D intensityt+1	0.040	0.025	0.032	0.086	-0.034	-0.432	1.000																
[8]Repurchases	0.002	0.001	0.038	-0.046	0.010	-0.031	-0.002	1.000															
[9]Dividends	0.156	-0.038	-0.005	-0.103	0.012	-0.094	0.028	0.263	1.000														
[10]Total assets	0.076	-0.117	-0.016	-0.084	0.018	0.263	-0.133	0.142	0.350	1.000													
[11]ROE	-0.005	-0.003	-0.014	-0.057	0.006	-0.023	-0.037	0.036	0.058	-0.148	1.000												
[12]P/E Ratio	0.015	0.002	-0.019	-0.013	-0.035	-0.051	0.101	-0.037	-0.067	-0.056	-0.161	1.000											
[13]Tobin's Q	0.024	0.029	0.049	-0.083	-0.080	-0.115	0.261	-0.029	-0.082	-0.222	0.440	0.170	1.000										
[14]Quick Ratio	0.016	-0.014	0.164	0.068	-0.071	-0.083	0.319	-0.048	-0.138	-0.188	0.010	0.083	0.338	1.000									
[15]Leverage	-0.046	0.005	0.055	0.104	0.045	0.038	-0.152	0.009	0.023	0.035	-0.011	-0.020	-0.188	-0.246	1.000								
[16]EBIT	0.089	-0.053	0.032	-0.103	0.004	-0.159	0.014	0.273	0.784	0.554	0.141	-0.139	-0.081	-0.133	0.053	1.000							
[17]Free cash flows	0.064	-0.028	0.017	-0.073	0.036	0.016	0.003	0.074	0.342	0.281	0.004	-0.040	-0.040	-0.082	-0.014	0.494	1.000						
[18]Analyst coverage	0.326	-0.125	0.053	-0.116	0.068	-0.097	0.095	0.161	0.422	0.299	-0.062	-0.048	-0.089	-0.082	-0.013	0.416	0.203	1.000					
[19]Institutional(%)	0.195	0.052	-0.364	-0.030	0.192	0.145	-0.106	-0.081	-0.139	-0.052	0.079	0.045	-0.028	-0.127	-0.002	-0.179	-0.070	-0.232	1.000				
[20]CEO duality dum.	-0.025	-0.092	0.048	0.010	-0.027	-0.047	-0.011	0.061	0.019	-0.045	-0.050	-0.009	-0.063	-0.038	0.049	0.084	0.021	0.063	-0.164	1.000			
[21]CEO founder dum.	0.005	-0.021	-0.127	-0.123		-0.003	0.216	0.000	-0.056	-0.063	-0.026	0.110	0.154	0.184	-0.111	-0.022	-0.016	-0.084	0.002	0.148	1.000		
[22]CEO tenure	0.005	-0.011	-0.001	-0.031		0.005	0.052	0.038	-0.066	-0.117	0.047	-0.037	0.072	0.074	-0.018	0.008	-0.032	-0.044	-0.108	0.247	0.364	1.000	
[23]Board size	-0.064	-0.078	-0.104	-0.066	0.003	-0.011	-0.061	0.110	0.280	0.318	-0.146	-0.065	-0.272	-0.190	0.100	0.321	0.151	0.375	-0.177	0.188	-0.010	-0.027	1.000

As you can observe from [TABLE 3: SUMMARY OF RESULTS \(PART I\)](#), the adjusted R-squared for our reference model (M1) is 0.903 and is equal or higher for each of the other models. This means that more than 90% of R&D investments at year $t+1$ is explained by our models.

RELATION BETWEEN SHARE REPURCHASES AND RESEARCH AND DEVELOPMENT INVESTMENTS (H1)

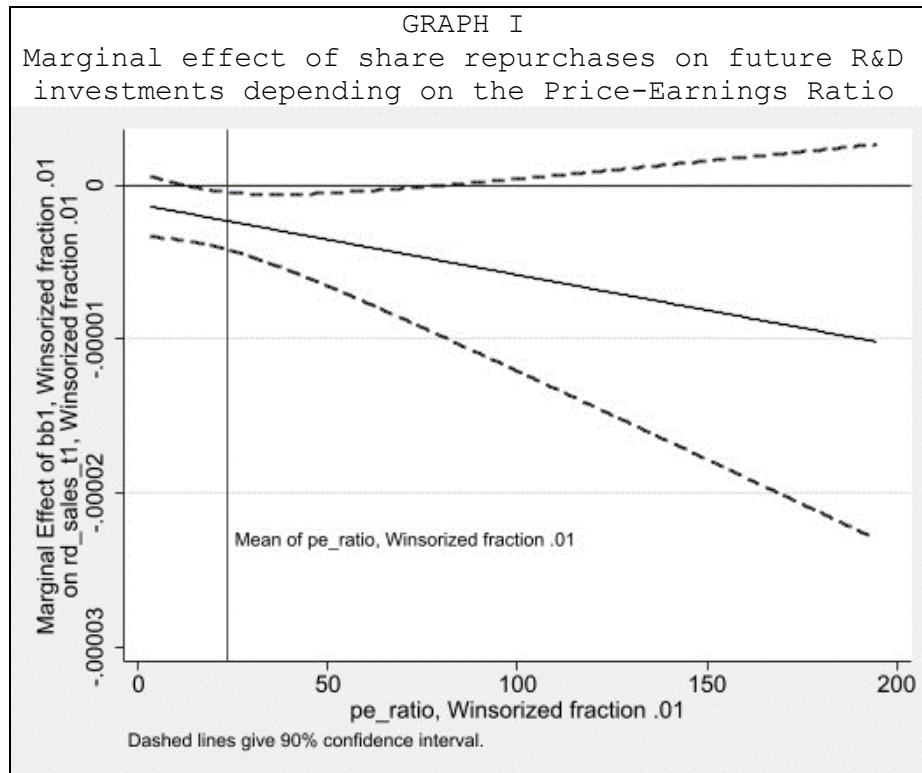
Hypothesis 1 (H1): Share repurchases have a negative impact on research and development investments.

The results of our reference model (M1), that you can observe in [TABLE 3: SUMMARY OF RESULTS \(PART I\)](#), are consistent with this baseline hypothesis as they show a negative coefficient with a significant correlation ($p\text{-value}=0.049$). Thus, there is evidence that share repurchases expenditures at year t have a negative and significant impact on research and development intensity at year $t+1$ ($R\&D_{t+1}/Sales_{t+1}$).

MODERATOR IMPACT OF PRICE-EARNINGS RATIO (H2)

Hypothesis 2 (H2): The negative impact of share repurchases on research and development investments will be magnified when the Price-Earnings Ratio increases in setting of high performance.

The [GRAPH I](#) allows us to observe the marginal effect of share repurchases expenditures at year t on research and development intensity at year $t+1$ ($R\&D_{t+1}/Sales_{t+1}$) when the Price-Earnings Ratio varies. The moderator impact of P/E Ratio on the negative relationship between share repurchases and R&D investments is significant when it takes a value between 11.7 and 80.7. This maximum and minimum respectively correspond to percentiles 24.7 and 96.9 of our data. This means that the negative relationship between share repurchases and R&D investments is significant for 72.2% of the observations for P/E Ratio. Furthermore, as the line on [GRAPH I](#) is below 0 and its slope is negative, it shows that P/E Ratio has a negative moderator impact on the relationship which is even more negative when P/E ratio increases.



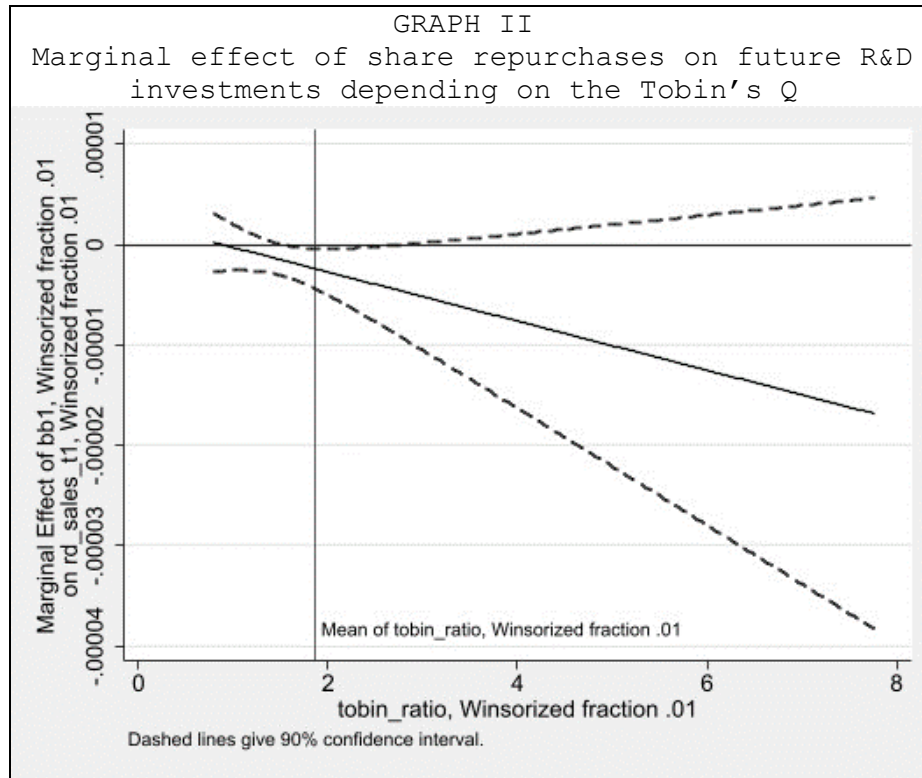
These results are consistent with our second hypothesis (H2) as they suggest that the CEO displays less power over the allocation of financial resources when the performance indicator increases since the negative relation between share repurchases and R&D intensity is incrementally magnified when the Price-Earnings Ratio increases.

MODERATOR IMPACT OF TOBIN'S Q (H3)

Hypothesis 3 (H3): The negative impact of share repurchases on research and development investments will be magnified when the Tobin's Q increases in setting of high performance.

The [GRAPH II](#) allows us to observe the marginal effect of share repurchases expenditures at year t on research and development intensity at year $t+1$ ($R\&D_{t+1}/Sales_{t+1}$) when the Tobin's Q varies. The moderator impact of Tobin's Q on the negative relationship between share repurchases and R&D investments is significant when it takes a value between 1.5155 and 2.7675. This maximum and minimum respectively correspond to percentiles 59.2 and 87.5 of our data. This means that the negative relationship between share repurchases and R&D investments is significant for 28.3% of the observations for

Tobin's Q. Furthermore, as the line on [GRAPH II](#) is below 0 (in the confidence interval) and its slope is negative, it shows that Tobin's Q has a negative moderator impact on the relationship which is even more negative when Tobin's Q increases.



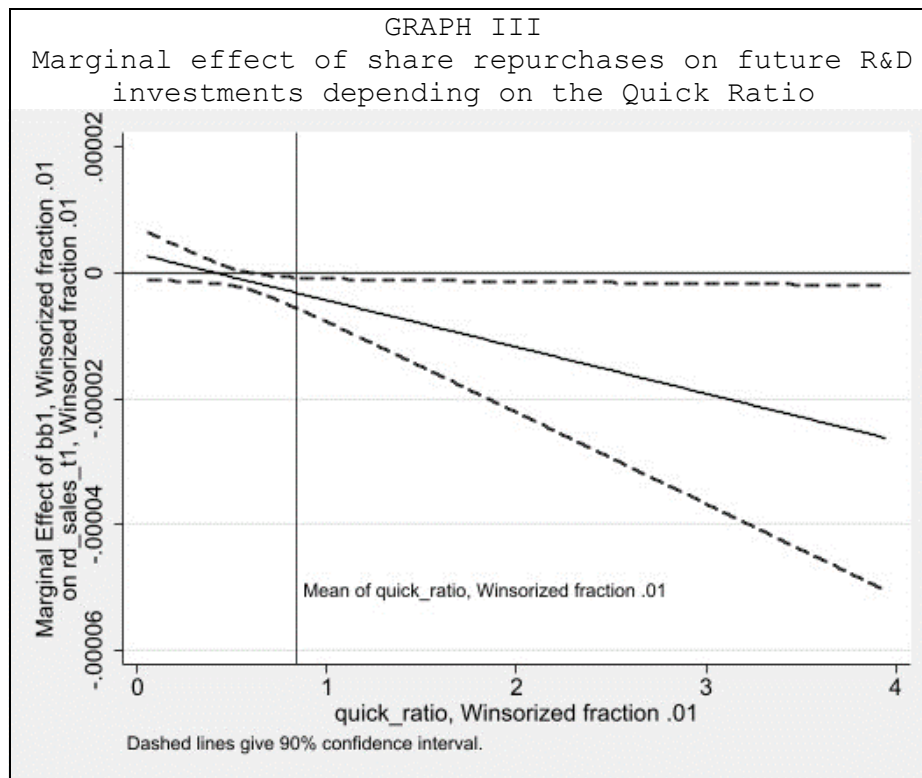
These results are consistent with our third hypothesis (H3) as they suggest that the CEO displays less power over the allocation of financial resources when the performance indicator increases since the negative relation between share repurchases and R&D intensity is incrementally magnified when Tobin's Q increases.

MODERATOR IMPACT OF QUICK RATIO (H4)

Hypothesis 4 (H4): The negative impact of share repurchases on research and development investments will be magnified when the Quick Ratio increases in setting of high performance.

The [GRAPH III](#) allows us to observe the marginal effect of share repurchases expenditures at year t on research and development intensity at year $t+1$ ($R\&D_{t+1}/Sales_{t+1}$) when the Quick Ratio varies. The moderator impact of Quick Ratio on the negative relationship between share repurchases and R&D investments is

significant when it takes a minimum value of 0.5977. This minimum corresponds to the percentile 34.5 of our data. This means that the negative relationship between share repurchases and R&D investments is significant for the 64.5% highest value of the observations for Quick Ratio. Furthermore, as the line on [GRAPH III](#) is below 0 (in the confidence interval) and its slope is negative, it shows that Quick Ratio has a negative moderator impact on the relationship which is even more negative when Quick Ratio increases.

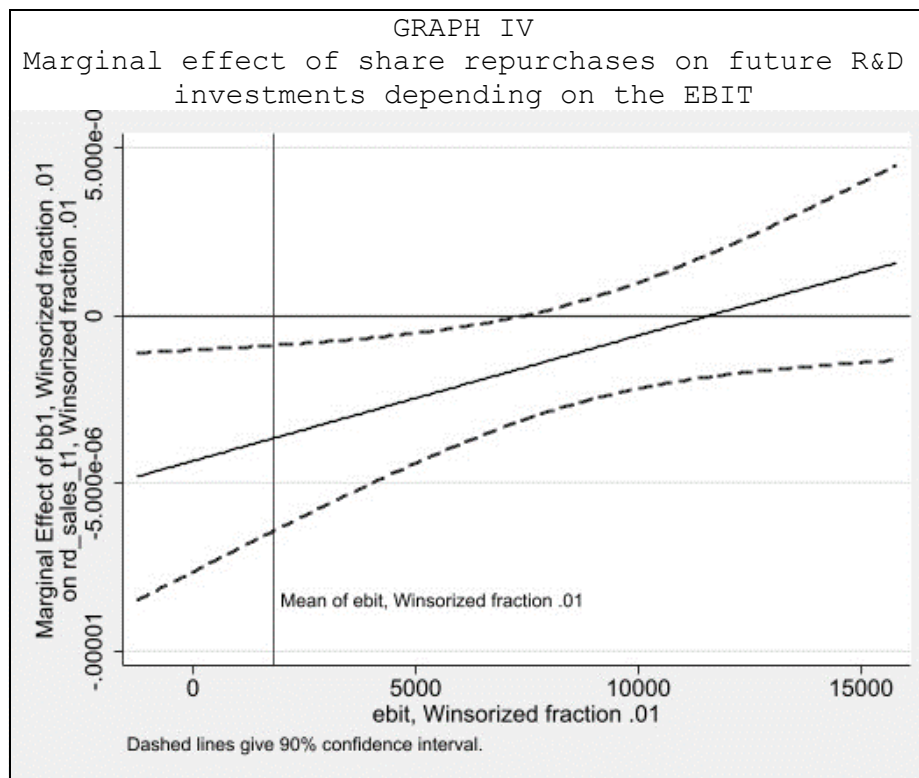


These results are consistent with our fourth hypothesis (H4) as they suggest that the CEO displays less power over the allocation of financial resources when the performance indicator increases since the negative relation between share repurchases and R&D intensity is incrementally magnified when the Quick Ratio increases.

MODERATOR IMPACT OF EBIT (H5)

Hypothesis 5 (H5): The negative impact of share repurchases on research and development investments will be magnified when the EBIT increases in setting of high performance.

The [GRAPH IV](#) allows us to observe the marginal effect of share repurchases expenditures at year t on research and development intensity at year $t+1$ ($R\&D_{t+1}/Sales_{t+1}$) when the EBIT varies. The moderator impact of EBIT on the negative relationship between share repurchases and R&D investments is significant when it takes a maximum value of 7402. This maximum corresponds to the percentile 94.9 of our data. This means that the negative relationship between share repurchases, and R&D investments is significant for 93.9% of the observations for EBIT. Furthermore, as the line on [GRAPH IV](#) is below 0 (in the confidence interval) and its slope is positive, it shows that EBIT has a positive moderator impact on the relationship which is therefore less negative when EBIT increases.



These results are not consistent with our fifth hypothesis (H5) as they suggest that the CEO displays more power over the allocation of financial resources when the performance indicator increases since the negative relation between share repurchases and R&D intensity is incrementally softened when the EBIT increases.

MODERATOR IMPACT OF CEO DUALITY (H6)

Hypothesis 6 (H6): The negative impact of share repurchases on research and development investments will be softened when the chief executive officer is also the chairman.

As you can observe from [TABLE 3: SUMMARY OF RESULTS \(PART III\)](#), when we incorporate the CEO duality dummy variable into our reference model (M2), the negative relation between share repurchases at year t and R&D intensity at year $t+1$ is no longer significant. This is not significant whatever the value of the dichotomous variable, 0 or 1 (see M2_duality).

This means that the results are not consistent with our sixth hypothesis (H6) as they do not allow us to observe a moderating effect from also being chairman of the board for a CEO in the relation between share repurchases and R&D intensity.

MODERATOR IMPACT OF CEO FOUNDER (H7)

Hypothesis 7 (H7): The negative impact of share repurchases on research and development investments will be softened when the chief executive officer is also the founder.

As you can observe from [TABLE 3: SUMMARY OF RESULTS \(PART III\)](#), when we incorporate CEO founder dummy variable into our reference model (M3), the negative relation between share repurchases at year t and R&D intensity at year $t+1$ is no longer significant. This is not significant whatever the value of the dichotomous variable, 0 or 1 (see M3_founder).

This means that the results are not consistent with our seventh hypothesis (H7) as they do not allow us to observe a moderating effect from also being founder for a CEO in the relation between share repurchases and R&D intensity.

MODERATOR IMPACT OF CEO TENURE (H8)

Hypothesis 8 (H8): The negative impact of share repurchases on research and development investments will be softened when the chief executive officer tenure increases.

The [GRAPH V](#) allows us to observe the marginal effect of share repurchases expenditures at year t on research and development intensity at year t+1 ($R\&D_{t+1}/Sales_{t+1}$) when the CEO tenure varies. The moderator impact of **CEO tenure** on the negative relationship between share repurchases and R&D investments is significant when it is **longer than 13.03** years. This minimum corresponds to the percentile 91.2 of our data. This means that the negative relationship between share repurchases and R&D investments is significant only for the 7.8% of the highest values of observations for CEO tenure. Furthermore, as the line on [GRAPH V](#) is above 0 (in the confidence interval) and its slope is positive, it shows that CEO tenure has a positive moderator impact on the relationship which even makes it positive when the CEO is at this position (or equivalent) for a very long time.

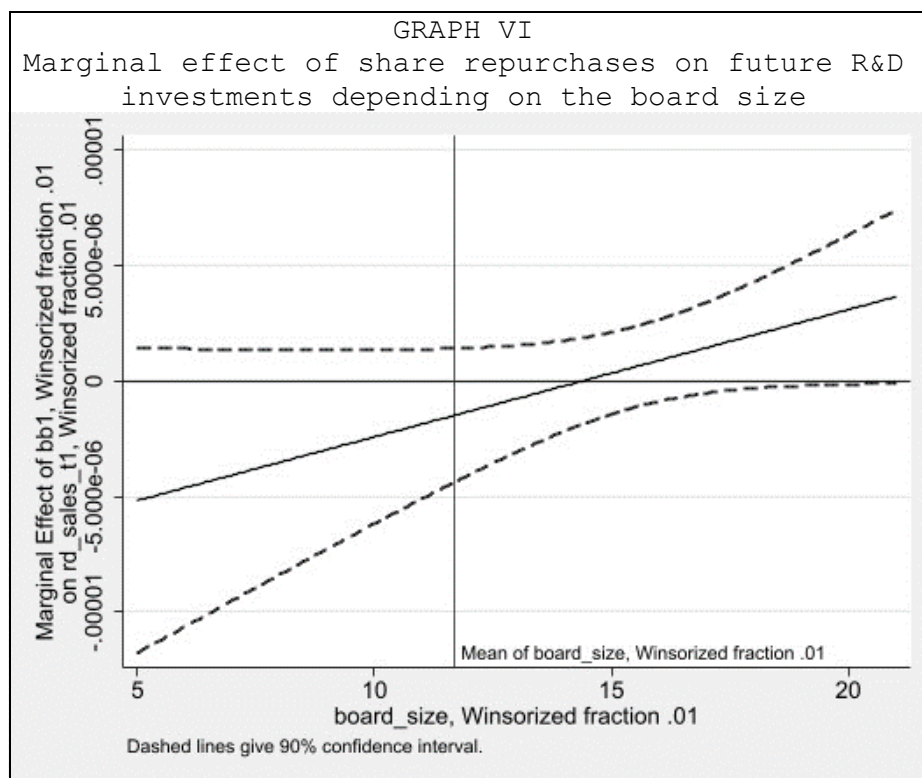


These results are not consistent with our eighth hypothesis (H8) as they suggest that, when the CEO has been in this position (or equivalent) for a very long time, the CEO has so much power that the negative relation between share repurchases and R&D intensity becomes positive while we suggested the relationship to be less negative but remaining negative.

MODERATOR IMPACT OF BOARD SIZE (H9)

Hypothesis 9 (H9): The negative impact of share repurchases on research and development investments will be softened when the board size increases.

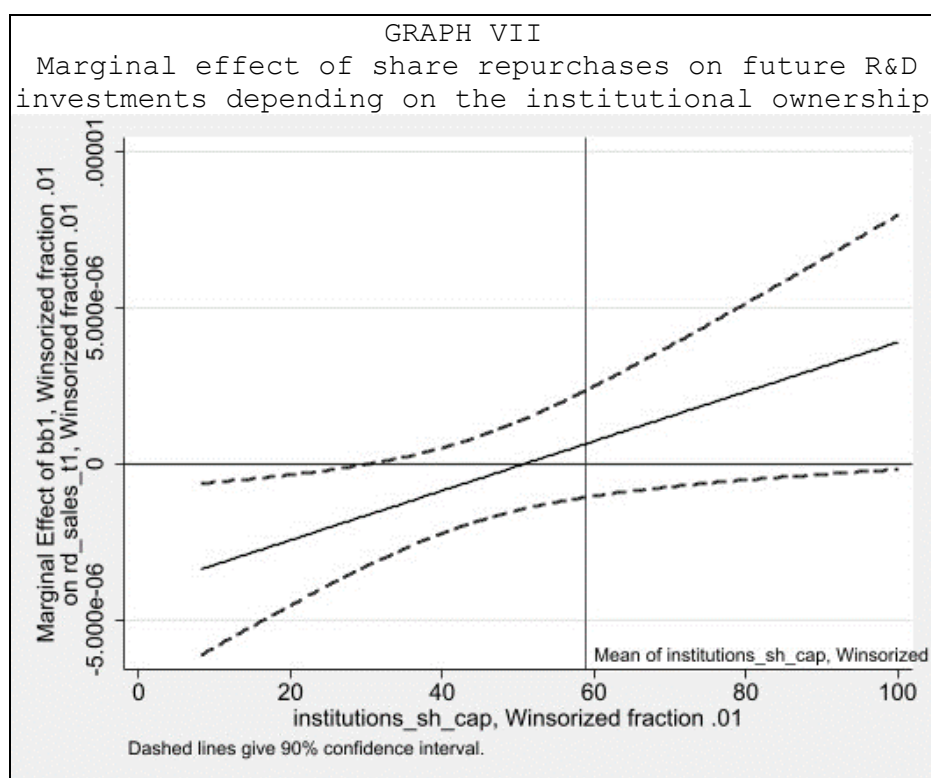
The [GRAPH VI](#) allows us to observe the marginal effect of share repurchases expenditures at year t on research and development intensity at year t+1 ($R\&D_{t+1}/Sales_{t+1}$) when the board size varies. The moderator impact of the board size on the negative relationship between share repurchases and R&D investments is not significant but is near to be significant for a very high board size. This means that the board size variable does not play a moderating role for the data.



These results are not consistent with our ninth hypothesis (H9) as they suggest that the board size has no moderating effect in the relation between share repurchases and R&D intensity.

MODERATOR IMPACT OF INSTITUTIONAL OWNERSHIP (H10)

Hypothesis 10 (H10): The negative impact of share repurchases on research and development investments will be magnified when the institutional ownership increases.



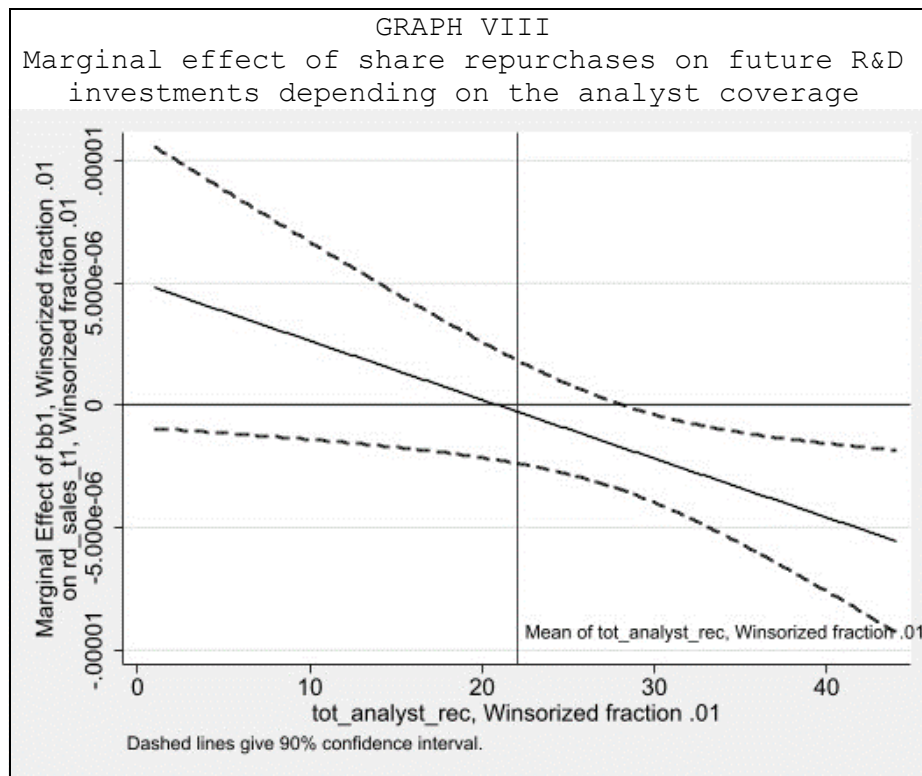
The [GRAPH VII](#) allows us to observe the marginal effect of share repurchases expenditures at year t on research and development intensity at year $t+1$ ($R\&D_{t+1}/Sales_{t+1}$) when the institutional ownership varies. The moderator impact of institutional ownership on the negative relationship between share repurchases and R&D investments is significant when it is lower than 30.45%. This maximum corresponds to the percentile 12 of our data. This means that the negative relationship between share repurchases, and R&D investments is significant for the 11% of the lowest values of observations for institutional ownership. Furthermore, as the line on [GRAPH VII](#) is

below 0 (in the confidence interval) and its slope is positive, it shows that institutional ownership has a positive moderator impact on the relationship which is less negative when institutional ownership increases.

These results are not consistent with our tenth hypothesis (H10) as they suggest that the CEO displays more power over the allocation of financial resources when the institutional ownership increases since the negative relation between share repurchases and R&D intensity is incrementally softened when the institutional ownership increases.

MODERATOR IMPACT OF ANALYST COVERAGE (H11)

Hypothesis 11 (H11): The negative impact of share repurchases on research and development investments will be magnified when the analyst coverage increases.



The [GRAPH VIII](#) allows us to observe the marginal effect of share repurchases expenditures at year t on research and development intensity at year $t+1$ ($R\&D_{t+1}/Sales_{t+1}$) when the number of analysts making recommendations varies. The moderator impact of the analyst coverage (i.e. Number of analysts making

recommendations) on the negative relationship between share repurchases and R&D investments is significant when it takes a minimum value of 28.247. This minimum corresponds to the percentile 74.2 of our data. This means that the negative relationship between share repurchases and R&D investments is significant for the 24.8% highest value of the observations for the analyst coverage. Furthermore, as the line on [GRAPH VIII](#) is below 0 (in the confidence interval) and its slope is negative, it shows that the analyst coverage has a negative moderator impact on the relationship which is even more negative when the analyst coverage increases.

These results are consistent with our eleventh hypothesis (H11) as they suggest that, when the firm is highly covered by analyst recommendations, the CEO displays less power over the allocation of financial resources when the number of analysts making recommendations increases since the negative relation between share repurchases and R&D intensity is incrementally magnified when the firm analyst coverage increases.

MODERATOR IMPACT OF CRISIS (H12)

Hypothesis 12 (H12): The negative impact of share repurchases on research and development investments will be softened in period of crisis.

From [TABLE 3: SUMMARY OF RESULTS \(PART III\)](#), you can observe for M7_crisis model that share repurchases have an even more significant negative impact when the crisis dummy variable takes the value of 0 while this negative impact is no longer significant when it takes the value of 1. These results suggest that the negative relation between share repurchases and R&D investments significantly occurs in non-crisis period and not in crisis period.

This means that the results are not consistent with our last hypothesis (H12) as they suggest that period of crisis has no significant moderating effect in the relation between share repurchases and R&D intensity.

V. CONCLUSION

DISCUSSION OF THE RESULTS

The findings from our baseline hypothesis demonstrate a significant negative impact of share repurchases on R&D investments. The findings related to our performance hypothesis show that, in case of high P/E Ratio, Tobin's Q and Quick Ratio, the CEO allocates cash to share repurchases rather than R&D investments. This suggests that, when performance is high, the CEO is under more external pressure to deliver cash through share repurchases and therefore loses power over the allocation of financial resources. However, findings related to EBIT are not consistent with this view. Analysis of EBIT results suggests that the relation between share repurchases and R&D investments becomes less negative when EBIT increases. We believe that, as EBIT is a better indicator of cash flow at the disposal of the CEO than the other performance indicators mentioned above, it could explain why EBIT is not in line with the other performance indicators.

Regarding our governance findings, we found no significant results for CEO duality as well as for CEO founder. This suggests that also being the chairman of the board and/or the founder of the company for a CEO has no significant impact on the relation between share repurchases and R&D investments. The analysis of the board size did not give us a significant result either, although we are not far from being significant for a very large board. In regard to the results for institutional ownership, we do not have observation for high level of institutional ownership, but it seems that a low level of institutional ownership shows a negative impact which is incrementally softened when institutional ownership increases. However, as mentioned earlier, results about this relationship are no longer significant above a certain level of institutional ownership. Significant results demonstrate that the negative impact of share repurchases on R&D investments is even more negative when a firm is highly covered by analysts. Finally, while we suggested the CEO tenure to have a positive moderating impact on the relation between share

repurchases and R&D investments, we did not predict that the results would demonstrate a positive relation. This means that, when the CEO has been in this position (or equivalent) for a very long time, the CEO has so much power that the negative relation between share repurchases and R&D investments becomes positive.

Concerning the crisis, we did not find significant results for what we expected, i.e. a softened negative impact on the relation between share repurchases and R&D investments during period of crisis due to a centralisation of the power in the CEO. However, we found significant results showing a negative relation between share repurchases and R&D investments during non-crisis period.

CONTRIBUTION TO THE LITERATURE

This work contributes to the existing literature in several ways. Firstly, we extend the literature regarding share repurchases by focusing on European companies while most of the literature is almost exclusively dealing with share repurchases in the US. Our data are consistent with the literature on an upward trend in share repurchases in Europe.

Secondly, we contribute to the literature by confirming the general negative relation that allocation of financial resources to share repurchases has on R&D investments ([Bushee, 1998](#); [Sanders and Carpenter, 2003](#); [Allen and Michaely, 2003](#), [Grullon and Michaely, 2004](#); [Graham Harvey and Rajgopal, 2005](#); [Lazonick, 2014](#); [Almeida, Fos and Kronlund, 2016](#); [Wang, Yin and Yu, 2021](#)).

Thirdly, we extend the literature regarding the Agency Theory from Jensen and the Socio-political Approach from Zajac and Westphal by studying how powerful CEOs deal with external pressures and retain financial resources at their disposal to invest in R&D. Results from Performance indicators such as Price-earnings Ratio, Tobin's and Quick Ratio suggest that well performing companies are subject to a greater external pressure to distribute cash through share repurchases, which reduces the power of the CEOs over the allocation of financial resources. Our results from our analyst's coverage variable are

also consistent with the socio-political approach from Zajac and Westphal. After a certain number of analysts covering a firm, the external pressure is so high that the CEO may lose power over the allocation of financial resources preferring meeting shorter term rather than longer term expectations, this is in line with [Benner and Ranganathan \(2012\)](#) findings and the socio-political approach Zajac and Westphal ([Westphal and Zajac, 1998](#); [2001](#); [2004](#); [2013](#)).

Fourthly, we contribute to the literature through unexpected significant results. The first involved variable is the EBIT, which is also a performance indicator, displays an opposite relation than the other performance indicators suggesting the better the firm performance the stronger the CEO power. We believe that we experienced such a result because the EBIT may be a better indicator of free-cash flow at the disposal of the CEO than the other performance indicators mentioned above. Therefore, it would be not surprising that a company with a lot of free cash flow spends it indifferently on R&D and share repurchases. A second variable is the CEO tenure for which the results suggest that, after a certain long tenure as CEO, the relation between share repurchases and research and development turns positive. This means that when CEOs, which are at this place for a very long time, spend in share repurchases, they also invest in R&D. This result might suggest that these CEOs have more power over the allocation of financial resources and that they spend on share repurchases if R&D investments are guaranteed. Finally, another opposite result is related to institutional ownership. The percentage of institutional ownership seems to go in the opposite direction than expected by increasing the power of the CEO as the institutional ownership increases, but results are significant only for a relative low percentage of institutional ownership. We are still convinced that institutions put strong external pressure on the CEO, but they are probably more interested in the long term than we suggested. They could therefore be in favour of innovation through R&D investments and would therefore not represent a pressure

against the CEO but a pressure that support the CEO as they would have this common interest.

ADVICE TO PRACTITIONERS

In this section, we are sharing advice to practitioners based on the results we obtained. By practitioners, we mean companies' managers as well as investors and analysts.

CEOs who achieve high financial performance should pay attention not to cut research and development investments to satisfy short-term expectations. Based on our results, we believe that CEOs leading companies with high performance indicators are more likely to distribute cash to shareholders by inadvertently cutting in research and development investments. We therefore advise these CEOs to always be careful not to underinvest in the long-term of the company they lead.

Investors looking for short-term satisfaction should favour companies with a strong analyst coverage. Since a large number of analysts making recommendations on a firm seems to put a considerable pressure on the CEO to distribute cash through share repurchases instead of investing it on research and development, we believe that shareholders with short-term expectations will be more satisfied in a company with a strong analyst coverage. Although we advise these shareholders to opt for highly coverage firms, we do not advise shareholders to have short-term expectations as this is to the detriment of the long-term health of the company.

CEOs who are concerned about institutional pressure should not be worried about any loss of power over the allocation of financial resources to research and development. Since our results show that the higher the proportion of institutional in a company's shareholding is, the less the investments in research and development suffer from share repurchases expenditures, we believe that CEOs should not be worried about the pressure that will be put on them by the institutions regarding research and development expenditures. Institutional pressure could have the same interest as the

CEO in the innovation through research and development investments and therefore do not represent a pressure against the CEO but a pressure supporting the CEO in this common interest.

PERSONAL CONTRIBUTIONS

In this part, we will individually share with you the many personal and professional skills that the completion of this thesis has permitted to strengthen. However, before sharing this with you, we would like to point out the common difficulty that we had to face in creating the database. Indeed, our initial objective was to analyse the determinants of decoupling of share repurchases in Belgium. Unfortunately, due to a truncated and unreliable database provided by FSMA, we had to redirect our subject because we were unable to compare effective and announced share repurchases.

When it comes to me (Bertrand Biren), this assignment allowed me to strengthen my ability to cooperate and work in pairs. It also convinced me that working in group is likely to give a better outcome since everything is always reviewed and discussed with another person. This master thesis also taught me that we should never give up when we are struggling and that there is always a solution to the problem we are facing. In top of that, this work taught me how to conduct an empirical research as well as how to read, use and put in practice scientific articles. Moreover, it also extended my knowledge on the usage of platforms such as Bloomberg and STATA as well as improving my overall level of English.

From a personal point of view (Simon Haentjens), the main skill that this work has brought to me concerns the collaborative work for a long period of time. At the first glance, I was sceptical about writing a joint master thesis, but I must admit that it was really an asset to be able to confront your ideas with those of your partner. I think this allowed us to make a better job through a good collaboration, and that the collaboration is essential as a professional skill. Another useful skill that I was able to develop through

this work is database searching and building. As technology becomes more and more part of the working environment, I see this as an interesting professional skill. The writing of this master thesis also allowed me to improve my ability to synthesise and my critical thinking. Finally, reading scientific papers and writing this thesis allowed me to enhance my English writing and reading skills.

LIMITATIONS

Our study involves several limitations which should be considered in light of our results.

The first limitation comes from the way we measured share repurchases. With data at our disposal, we had no other option than to use the approach presented by [Fama and French \(2001\)](#) that enabled us to compute the net share repurchases. However, as we have discussed earlier, shares that are repurchased can be either destroyed or held in the treasury of the company. Consequently, this method may underestimate the shares that are repurchased by ignoring the ones that are destroyed. We therefore believe that it would be interesting to study this relationship between share buybacks and R&D investments with another operationalization regarding share repurchases that would not only include net repurchases, but the effective total amount spent on share repurchases.

The second limitation comes from the company sample itself. The limitation lies in the fact that we only considered the European companies in the S&P 350 which is composed by high-performance companies and excludes all the companies which are not in this index. This sample did not allow us to fully test our hypothesis and, according to us, low performance companies should also result an even more magnified negative relation between share repurchase and R&D since low performance means lower power for the CEO ([Ocasio, 1994](#)) and that external pressure increases in period of low performance ([Schnatterly, Gangloff and Tuschke, 2018](#)). The results we have obtained are applicable to large companies, so the extent to which this is applicable to small listed companies should be studied in further research.

The third limitation we have identified is related to three variables. Those variables, that are Free-cash flow, Tobin's Q and ROE, follow Bloomberg operationalization and are not fully backed by the literature. Tobin's Q and ROE Bloomberg's operationalization are very near to the literature. However, with regard to free cash flow, operationalization seems to be quite far from the literature. But, as previously mentioned, we decided to proceed with it, otherwise too many observations would have been lost. We have therefore placed free cash flow as a control variable, but we believe it would be appropriate to study the moderator impact of free cash flow on the relationship between share repurchases and R&D investments in further research.

The last identified limitation comes from the way we measured crisis periods. As previously mentioned, the variable crisis is related to systematic banking crisis only. As a result, we might not capture all the types of crises in our variable. It would therefore be interesting to undertake further research considering several other types of crises.

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