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An exploration of the determinants leading firms to switch between one-tier and two-tier boards

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Abstract

Academic research indicates that for firms with high levels of information asymmetry, one-tier boards are more favorable because of their enhanced information flows, while for firms with widespread opportunities for managerial private benefit extraction, two-tier models should be more suitable due to their more objective monitoring processes. This study examines whether increases in information asymmetry and opportunities for managerial private benefit extraction within firms, actually increase the likelihood of firms to switch to respectively one-tier and two-tier board structures. No statistical evidence was found for a predictive relationship between increase information asymmetry and the likelihood of a switch towards a one-tier board. However, significant evidence was found indicating a positive relationship between increased opportunities for managerial private benefit extraction and the likelihood of a firm to switch to a two-tier board structure, implying that firms might indeed switch to two-tier board structures to limit private benefit extraction by their managers.

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1. Introduction

Over the last fifteen years, many European countries have begun to allow firms to freely choose their preferred board model. Generally, firms can choose between unitary 'one-tier' systems, in which all directors are united in one board, and dual 'two-tier' systems, in which directors are divided over an executive- and a supervisory board. Until date, little is known about the reasons for firms to switch between these two systems, in countries where they are free to do so. This thesis builds forth on prior academic literature on the features and optimality of both board models. Through the following research question, it aims to make a first exploration of the factors causing firms to switch between the two systems: *Do developments in factors eventually found to differ among firms with one-tier and two-tier boards actually lead to switches between the two systems?*

This research question is primarily relevant for two groups. Recently, countries such as Italy (2004), Luxembourg (2006), Denmark (2010) and The Netherlands (2013) have adopted legislations allowing firms to choose between a one-tier and a two-tier structure. However, in practice, in many of these countries, the 'traditional' model still predominates (Barker, 2013). For regulators in these countries, knowing which factors actually induce companies to switch between board systems can help them evaluate whether resources should be allocated towards promotion and facilitation of switches between the models. If firms switch to adopt a model more suitable to the nature of their organization, this could be a purposeful practice. However, if switches rather serve practical or 'PR' purposes, actively promoting and facilitating switches might be less beneficial. Furthermore, for regulators in countries that not yet allow companies the freedom to switch, knowing the drivers of switches could help them assess whether they should follow other countries and adopt new legislations allowing firms to switch, or not.

Apart from regulators, knowledge about the drivers of firms' switching decisions can be very relevant for shareholders of companies in countries where switching is allowed. It improves their ability to understand the true intentions of boards that propose a switch at a shareholder meeting, and helps them make a better-informed decision on whether or not to approve the switch. As no other study to my knowledge has yet empirically examined changes in firm characteristics as determinants of switches between one-tier and two-tier board models, this study opens up a new chapter in the research on determinants of board structure, and can provide new insights to regulators, shareholders and those interested in the drivers of firms' board structure decisions.

The main potential determinants of board structure this study examines, are the degrees of information asymmetry and opportunities for managerial private benefit extraction within firms.

Both one-tier and two-tier boards typically consist of two groups of directors: executive board members, and supervisory board members, entitled with monitoring the executive board members. In one-tier boards, both groups of board members are unified in one board. In practice, this means that all board members attend all general board meetings, and are therefore relatively frequently and thoroughly informed with all issues concerning the firm's day-to-day business. In two-tier board systems, where supervisory board members are seated in a separate 'supervisory board', this information flow tends to be more limited, often resulting in supervisory board members being less familiar with the firm's day-to-day issues and challenges. In recent decades, theoretical studies argued that particularly firms with higher levels of internal information asymmetry benefit from the more efficient information flows in one-tier boards, as compared to two-tier boards. The rationale behind this, is that a one-tier board can partially mitigate the negative effects of information asymmetry, by enhancing efficient information flows between all board members. First empirical confirmation for this has been established by Belot, Ginglinger, Slovin & Sushka (2014), who found that firms with one-tier boards, on average have higher levels of information asymmetry.

On the other hand, one-tier board structures can have a negative impact on the effectiveness of a board. As in these boards the supervisory board members often closely engage with executive board members, interpersonal relationships are likely to develop. These interpersonal relationships impose threats on the objectivenesD and thereby the effectiveness of monitoring by supervisory board members. In literature, this mechanism is phrased as the 'monitoring-colleague dilemma'. Theoretical studies argue that this is especially problematic in firms with relatively high degrees of opportunities for managerial private benefit extraction. The rationale behind this is intuitive; if supervisory board members, due to the presence of interpersonal relationships, lose objectiveness in the monitoring of the executive board members and fail to punish behavior aimed at extraction of personal benefits, especially organizations where these private benefits are relatively easily obtained, will suffer. Hence, these organizations would benefit relatively strongly from a two-tier board structure, in which roles and tasks of executive and supervisory board members are more strictly separated, and the effectiveness of monitoring processes is less likely to be affected by

interpersonal relationships. For this theoretical notion as well, initial empirical support is established by Belot et. al (2014), who found that firms with two-tier boards, on average have more opportunities for managerial private benefit extraction.

Instead of examining the differences between firms with one-tier and two-tier boards, this study goes a step further, and examines firms that actually decided to switch between the two systems. Through statistical analysis, I will test whether their switches can actually be linked to increases in information asymmetry and opportunities for managerial private benefit extraction; are firms with a two-tier board that experienced increases in information asymmetry more likely to switch to a one-tier boards than firms with two-tier boards that did not experience this increase? And, are firms with a one-tier board that experienced increases in opportunities for managerial private benefit extraction more likely to switch towards a two-tier board than firms with a one-tier board that did not experience this increase? If indeed statistical support is found for these relationships, this brings us closer to finding out the real determinants of firms' choices between one-tier and two-tier boards.

Specifically, I hypothesize predictive powers of changes in information asymmetry and opportunities for managerial private benefit extraction in periods before T, on the probability that a firm decides to switch between a one-tier and a two-tier board or vice versa in period T. If increased information asymmetry indeed makes a one-tier board more effective, as prior research suggests, we would expect it to increase the probability of a switch towards a one-tier model. The same holds for increased opportunities for managerial private benefit extraction in relation to a switch towards a two-tier board. These hypotheses were tested using logistic regression models with the probability of a switch to occur in period T as binary outcome variable. Developments in information asymmetry and opportunities for managerial private benefit extraction are the independent variables in these models, accounted for by variables that show the change in these metrics over time intervals before T.

After consideration of all options for the context in which to conduct this study, I chose to analyze a sample of French firms. France to my knowledge is the developed economy in which firms have had the freedom to chose between one-tier and two-tier boards for a long time, and have actually frequently switched. Firms have been free to choose their board since 1966 (Aste, 1999), and since 1998, more than 100 switches between the systems have occurred[1]. Furthermore, as France is a

[1] Based on own research, see Data collection & sample description section for further explanation

relatively large economy with a wide number of listed firms, this provides me with a relatively large sample of firms, with relatively homogenous availability of data.

The main findings resulting from these analyses do not allow for one, definite answer to the research question. Coefficients obtained through the different models do not provide statistical support for a predictive relationship between increases information asymmetry, and the likelihood of a firm to switch to a one-tier board. However, concerning the hypothesized relationship between increases in opportunities for managerial private benefit extraction and increased probability of a firm to switch to a two-tier board, some statistically significant coefficients are found. These coefficients indicate that in particular increases between 2 and 1 years before T, between 3 years before T and T and between 2 years before T and T significantly increase the likelihood of a firm with a one-tier board to switch to a two-tier board. Increases in the period between 3 years and 2 years before T, as well as between 1 year before T and T, give far less or non-significant results, indicating that increases in those time intervals are no predictors of a switch to a two-tier model in year T.

Hence, the answer to the research question based on my analysis would be mixed: degree of information asymmetry, which is found to differ among firms with one-tier and two-tier board structures, does not seem to induce switches to one-tier board systems. On the other hand, the degree to which a firm offers opportunities for managerial private benefit extraction, which is also found to differ among firms with one-tier and two-tier boards, does seem to be a significant predictor a switch towards a two-tier board. These results proved robust to a robustness check using lagged control variables. Additional tests, examining the potential role played by developments in certain traits of firm ownership in the decision to switch board models, did not render significant results.

This research contributes to the thin existing body of literature on one-tier and two-tier boards by opening the debate on the real drivers of firms' switches between the two models. Regarding the trend among countries to implement new legislations allowing firms to switch freely, this debate is expected to become increasingly relevant. The significant, positive relation found between increases in opportunities for managerial private benefit extraction in certain time intervals before period T and the probability of a firm switching from a one to a two-tier board in T, might indicate that firms indeed make use of the possibility to switch towards a dual board system to mitigate

these increased opportunities for managerial private benefit extraction. This is congruent with the body of existing literature on board structure optimality, and the theoretical framework on the optimality of one-tier and two-tier boards in different circumstances by Adams & Ferreira (2007) in particular.

On the other hand, as no significant coefficients were found for the relation between information asymmetry and the probability of a firm switching towards a one-tier model, results affirm the need for a more thorough examination of the real drivers of decisions made by firms to propose a switch. As my results indicate that the predictive power of developments in firm characteristics on switch decisions also depends on the time between this development and T, additional research could also further explore this temporal component in the relation between changes in firm characteristics and decisions to switch board structure. This would help regulators to better set their priorities and provide shareholders with a deeper understanding of companies' intentions, improving the quality of their decision-making process when it comes to voting on a proposed switch at a shareholder meeting.

The remainder of the paper will be structured as follows. First, the reader will be guided through the existing literature on board composition and structure, followed by an introduction to the French context in which the study was conducted. Second, the research design, data sample and methodology used will be explained, followed by a discussion of statistical results and discussion of additional tests performed. Last, conclusions will be drawn, accompanied by a discussion of their most important implications and the limitations this study faces.

2. Theoretical background

A. One-tier- and two-tier boards – an introduction

In general, 3 models of corporate governance can be distinguished: the one-tier model, in which both monitoring and executive tasks are unified in one board, a two-tier model in which these are separated between an executive- and a supervisory board and the 'Nordic model', predominant in Scandinavian countries, which basically implements a few elements of the two-tier model in a one-tier board system of governance. Across Europe, there is a wide variance in which country uses which model. In most cases, use of one of these models is made compulsory by law, but often

predominance of a system in a country is (partially) the result of common practice, developed over time (IFC, 2015).

Two-tier board structures are most often captured in countries' legislations: in Germany, Austria, Poland and Czech Republic for example, firms are by law obliged to have a two-tier board structure. Dominance of one-tier board structures is less frequently accompanied by restrictive legislature, but is often rather the result of common practice. This holds, among others, for Anglo-Saxon countries such as the U.K., the U.S. and Ireland, and continental European countries as Spain and Poland. In a growing number of countries such as France, the Netherlands, Croatia, Denmark and Portugal, firms are free to switch between two-tier and one-tier systems (IFC, 2015). For a long time, only France let companies this freedom. However, since the EU in 2004 introduced the possibility to opt for a European legal form as a company, called 'Societas Europaea' (SE), in which firms are by default free to choose their preferred board structure, the number countries allowing firms freedom of choice has been growing. Hence, a certain trend towards more freedom for firms to choose their preferred board structure seems to exist, likely to be at least partially induced by policy made by the EU (Belot et. al, 2014). However, the French situation remains unique in terms of eligibility for examination of determinants of firms' choices to switch, as it is still the only country in which over time many actual switches between the two systems have occurred. This French situation, which will for this reason be used for analysis in this thesis, will be discussed in more detail further on in this chapter.

There have been ongoing attempts in academic literature to answer the question which one of the board models, one-tier or two-tier, is most 'optimal' when governing a firm. This section will discuss the main advantages and disadvantages of both models and conclude with viewpoints existent in academics on superiority of either one of the models.

As mentioned before, the one-tier model is dominant mainly in Anglo-Saxon countries such as the U.K., the U.S. and a number of others. This model unifies the executive and monitoring duties of a board in one group of directors, while in a two-tier board these roles are separated between an executive and a supervisory board, respectively. Executive directors typically have a full-time occupation within the company, whereas non-executive directors are considered more independent, and usually (formally) fulfill monitoring roles (du Plessis, Großfeld, Luttermann, Saenger, Sandrock & Casper, 2017; Tungler, 2000). In a unitary board, the CEO often simultaneously fulfills

the role of Chairman of the board, but the degree to which this 'CEO duality' is common practice differs per country; in the U.S. this is the case in about half of the cases (Block & Gerstner, 2016), while in French unitary boards CEO and chairman roles are almost always unified (Millet-Reyes & Zhao, 2010). Main commonly mentioned advantages of the one-tier board stem from the relatively high level of involvement by the non-executive board members. This allows for a smoother, more consistent and more transparent flow of information. As in this model, non-executive directors are usually also to some extent involved in the decision-making process by attending regular board meetings, they tend to have more direct access to information as compared to the supervisory board members in a two-tier system (Block & Gerstner, 2016; Jungmann, 2006; Krivogorsky, 2006; du Plessis et. al, 2017). Next to this, their direct involvement in the decision-making process creates a certain shared responsibility for the decisions made, increasing independent directors' incentive to gather all relevant information needed to make a well-informed decision (Jungmann, 2006; Block & Gerstner, 2016). Simultaneously, more direct involvement of non-executive board members allows for more agile, quicker decision-making processes; the board does not have to wait for approval of an infrequently meeting supervisory board and is able to take decisions more adequately (Block & Gerstner, 2016; Jungmann, 2006; du Plessis et. al, 2017). Last, Block & Gerstner (2016) mention that unification of the board enhances the interpersonal understanding between executive and non-executive directors, as they observe each other's day-to-day challenges more closely.

However, these advantages come at a cost. From prior literature, two problems which could potentially lead to less effective monitoring of a company's executive directors can be identified. First of all, task divisions between executive and monitoring directors can become less clear. As board members responsible for monitoring become involved in the decision-making process, they might end up 'monitoring their own decisions', evidently creating a threat for the objectiveness of their evaluations. Second, something that du Plessis et. al (2017) call a 'monitor-colleague dilemma' could emerge. As non-executive directors in a one-tier board tend to be close colleagues of the executive directors they have to monitor, personal relationships might come into play and limit the effectiveness of monitoring (Block & Gerstner, 2016; Jungmann, 2006; du Plessis et. al, 2017). Lastly, Block & Gerstner (2016) note that CEO duality (a CEO simultaneously being Chairman), which only occurs in one-tier boards, can lead to undesired levels of CEO dominance,

potentially deteriorating non-executive directors from speaking up against the CEO when they have the feeling they should do so.

Theoretically, a two-tier board structure is perfectly suitable to mitigate these weaknesses of the one-tier model. The design of two-tier board structures differs per country, but it typically consists of an executive board on which executive, 'inside' directors serve, and a supervisory board in which 'outside' non-executive directors are seated. In some countries, such as Germany and France, firms are by law required to have a proportion of direct employee representation in their supervisory boards, while in others, such as the Netherlands, this is not the case (Fulton, 2015). The core advantage of a dual board structure is the clear separation of executive and monitoring tasks, preventing directors from having to monitor their own decisions. Furthermore, as the supervisory board members generally operate more independently from the executives than non-executive directors in a unitary board, the monitoring process is less likely to be influenced by interpersonal relationships, thereby mitigating potential 'monitoring-colleague' dilemmas (Block & Gerstner, 2016; Demb & Neubauer, 1992; Jungmann, 2006; du Plessis et. al, 2017).

However, just like the one-tier design, this structure has its disadvantages. First, supervisory boards in two-tier systems typically have a more distant relationship with the executive directors in the executive board, causing their control to be rather 'ex-post'. In other words, supervisory boards mainly prevent executives from making the same mistake twice, whereas in unitary boards the non-executive directors might prevent the mistake in the first place by steering the decision-making process in another direction (Jungmann, 2006; du Plessis et. al, 2017). Another, possibly even more problematic issue with two-tier boards is the emergence of a 'game', in which executive directors within the executive board attempt to exploit the more distant position of the supervisory board to the decision-making process to influence the monitoring process. In the two-tier system, the executive board typically has exclusive first-hand access to information. Generally, they are legally obliged to share all information unfiltered with the supervisory board, but practice often turns out differently. This not in the last place because the infrequently meeting supervisory boards often lack the time to process all this information. As a result, information asymmetry between executive and monitoring directors is usually higher in two-tier board systems, threatening the effectiveness of monitoring (Block & Gerstner, 2016; Jungmann, 2006; Tungler, 2000). An empirical, qualitative study among supervisory board members in the Netherlands by Peij, Bezemer & Maassen (2012)

underwrites this conclusion. The respondents in this study claim they often receive incorrect information, and state that executive board members regularly pressure them not to make their information requests too extensive. Not less interestingly, many of them even felt the executive directors barely made use of their remarks. Block & Gerstner (2016) conclude that for two-tier boards to work effectively, it is essential that appropriate procedures are implemented guaranteeing a transparent and continuous flow of information.

From the above comes forth that both structures have their strengths and weaknesses, making it hard to point one of them out as 'superior'. This is in line with the observed situation in which similar countries exhibit different 'default' board structures, and perhaps even more interesting, where in countries with a freedom of choice such as France, switches between the two systems occur. However, given that both models seem to have their strengths and weaknesses, it is not unthinkable that for some firms a one-tier model is most optimal, while for others the two-tier model suits best. This notion lies at the foundation of this study, which examines whether changes in the underlying business reality actually induce firms to switch their board structure, in a way prior theoretical research described above would predict. However, some scholars argue that in practice, the two systems show signs of convergence; both systems 'learn' from each other's strengths and use these lessons to mitigate their own weaknesses (Krivogorsky, 2006; du Plessis et. al, 2017). Following this line of argumentation, switching between the two systems would become less relevant for functional purposes related to the underlying business nature of the firm.

B. Background: the determinants of board structure in general

As from the previous section it became clear that neither one of the two models are undisputedly considered 'superior', it becomes interesting to examine the reasons why firms make their decisions to choose for a certain structure. Although neither one of the models seems to be superior for all firms, this might be different when individual differences between firms are taken into account. To explore this further, we first zoom out and consider academic literature on board structure decisions in general, after which we zoom back in and discuss prior attempts made to examine the determinants of firms' choices between unitary and dual board structures, a less explored field of research. The latter form the theoretical basis this paper aims to contribute to.

Most prevailing studies on the determinants of board structure focus on board size and proportion of 'insider' and 'outsider' board members, typically in one-tier board settings, which are dominant in countries (U.S. and U.K.) in which most of the research is conducted. Insider directors are 'direct stakeholders' in a company and mostly have a fulltime occupation within the firm as officer or employee, and hence tend to depend on their position in the company for their living. Outsider directors on the other hand do not have a direct stake in the company other than their (monitoring) position in the board. Several studies make use of comparable methods in which empirically, through statistical analysis, attempts are made to unravel which factors are related with different insider/outsider compositions and different board sizes. One of the first of these studies was established by Hermalin & Weisbach (1988). Through empirical analysis, they found that insider-/outsider split within boards might be affected by CEO-succession events, in which a CEO is succeeded by a new one; after a succession, a decrease in insider- and increase in outsider fraction was observed. This first scratching of the surface on determinants of board composition was followed by a number of other, more recent studies, in which many different sets of potential determinants were examined. Starting point for many of these studies appears to be the theoretical model established by Raheja (2005), who argues that, rather than being the result of events or time-varying performance, as Hermalin & Weisbach (1988) suggested, different board structures can be a logical result of differences in the underlying business nature of firms, such as the possibility for insiders to extract private benefits or the stage of its lifecycle a company is in. Raheja (2005) argued that for firms with more possibilities for managerial private benefit extraction, a board with a higher insider fraction might be more optimal, as it increases their incentive to report to the supervisory directors in case the CEO makes an inferior decision. As it comes to firm age, Raheja (2005) argues older firms have their technologies already better understood and experience decreased levels of verification costs, lowering the need for insiders on the board. A number of studies in a way expanded on this framework and attempted to empirically identify certain firm characteristics as being potential determinants of board structure choices. I will examine and compare the results of three traditionally prominent papers and one more recent paper in this field; the study by Linck, Netter & Yang (2008), which established a logit analysis on 7000 American firms, work by Boone, Field, Karpoff & Raheja (2007), analyzing board compositions of 1019 firms in the USA in the 10 years after their IPO, research by Coles, Daniel and Naveen (2008) who performed comparable analyses with over 9000 firm-year observations from the U.S. in 1990 and lastly Chen (2014) who

conducted a study examining 1263 board elections among 295 Taiwanese firms. As these studies did not use identical sets of variables it is not possible to compare them on all points, but a few clear common patterns emerge when examining these studies. All four find that larger, more complex firms tend to have larger and more independent boards. The rationale behind this, is that these firms have larger advising needs and need more expertise on their board. Another common pattern is that increased CEO influence is accompanied by a higher fraction of insiders; when a CEO exhibits more power, he would tend to place more 'friendly' insiders on the board (Linck et. al., 2008; Boone et. al, 2007; Coles et. al, 2008; Chen, 2014). On the other hand, when managers enjoy high possibilities for private benefit extraction, firms seem to increase monitoring intensity by either increasing board size (Boone et. al, 2007) or placing more outsiders on the board (Linck et. al, 2008). Furthermore, Link et. al (2008) and Coles et. al (2008) both find that firms with high R&D expenses tend to have a higher fraction of insider directors, arguing that these firms need more firm-specific expertise for their 'high-tech' businesses. Other determinants found are high growth opportunities and high stock volatility (both negative with board size and insider fraction, Link et. al (2008)), presence of constraints on CEO influence (negative with outsider fraction, Boone et. al (2007)) and monitoring costs (positive with board size in Boone et. al (2007) and positive with insider fraction in Chen (2014)).

C. The determinants of choice between a one-tier and a two-tier board

The thin line of existing research on the determinants of firms' choices between one-tier and two-tier structures can be considered an extension to the formerly discussed literature on the determinants of board structure in terms of size and insider fraction. The scarcity of existing literature on one-tier and two-tier boards could potentially be a result of the fact that traditionally only in a small number of countries, firms are free to switch between the two systems and actually make use of this freedom. However, in the light of recent developments, fed by EU efforts to stimulate free choice between board structure, and in which many countries such as Portugal (2006), Denmark (2008) and the Netherlands (2013) are opening up this choice for companies, this field of research is likely to gain in relevance in the coming years (Belot et. al 2014).

The theoretical debate on determinants of one-tier vs. two-tier boards was started by Adams & Ferreira (2007). Through their theoretical framework, comparable to the framework Raheja (2005) proposed for the determinants of board size and outsider/insider composition, they argued that there

is no universally 'optimal' structure for all firms, but that differences in firm characteristics could lead to different optimal structures. If, for example, the possibilities for managerial private benefit extraction would become significantly large, it might be rational for the shareholders to put a two-tier structure in place with a more 'stringent' supervisory board; this is in line with the notion by Block & Gerstner (2016), Demb & Neubauer (1992), Jungmann (2006) and Du Plessis et. al (2017) that two-tier boards allow for more independent monitoring processes, less influenced by personal relationships. As long as these benefits of managerial control do not exceed a certain level, a unitary board structure would remain optimal, as monitoring quality by independent board members can benefit from information obtained through the initial advisory process, which is more intense in one-tier board systems (Adams & Ferreira, 2007).

Graziano & Luporini (2012) extend this theoretical basis, by introducing another theoretical situation in which a two-tier board could potentially be preferable. When an institutional shareholder owns a large part of the shares and has a supervisory seat on the board, it might be beneficial for the shareholder to implement a two-tier board system in which the initiative is left to the managerial board, increasing managerial effort, potentially resulting in more favorable outcomes for the shareholder as well. When ownership concentration is low, a unitary board system remains preferable in their model, in line with Adams & Ferreira (2007).

Congruent with the way the formerly discussed empirical papers did on the determinants of board structure in general, two papers attempted to empirically gain insights into the determinants of firm's choices to operate under either a one-tier or a two-tier board. Pellegrini, Pellegrini & Sironi (2010) examined differences between Italian firms which switched from the traditional Italian system to either a one-tier or a two-tier board structure, after legislators created this opportunity. With a logistic model, the authors tried estimate which factors affect the likelihood of a firm having either one of the systems in place. The number of independent variables they use in their analysis is limited, but in line with the Graziano & Luporini (2012) framework they found that a larger ownership concentration among the 1st and 2nd largest shareholder was a significant predictor for a firm having a two-tier board structure instead of a traditional Italian structure, while not being a significant predictor for having a one-tier board.

A more extensive study on this topic was conducted by Belot et. al (2014), with a sample consisting of French firms. The authors of this paper argue that, as French firms have the freedom to switch

between the two board structures, each year they make a repetitive choice on which system is optimal for them. Through a logistic analysis, the authors attempt to estimate predictors of the outcomes of these choices, for which they elect independent variables based on many of the papers discussed before in this section. Based on findings by Coles et. al (2008) and Linck et. al (2008) that firms with high firm-specific information needs, resulting in increased information asymmetry, tend to have more insiders on the board, the authors hypothesize that this type of firms will be more likely to choose for unitary boards, reflecting a similar need for more intensely 'involved' directors. They proxy these needs quantitatively with a R&D/Asset ratio, and indeed find a positive relationship between this ratio and the likelihood of having one-tier board model in place. Furthermore, the authors find, congruently with Adams & Ferreira (2007), that firms with relatively wide opportunities for private benefit extraction tend to have two-tier boards. The proxy they use for these opportunities is a dummy for firms representing over 10% of total sales of listed firms in their département (French formal region), assuming those firms have a larger potential for private benefit extraction. This operationalization is derived from theory by Gompers, Ishii & Metrick (2009); in recent history, a number of major fraud cases occurred in which the firms in question are the major employers in their region. For example, executives of these dominant local companies use corporate funds to take gain the status of a local benefactor. Generally, Gompers et. al (2009) suggest that being the largest employer in a region enhances opportunities for extraction of private benefit of control by insiders, as the firm possesses relatively high bargaining power as a result of being the major employer in the region.

Furthermore, Belot et. al (2014) also test the predictions by the Graziano & Luporini (2012) framework, with several dummies specific for 'Closely held' firms in which the largest shareholder owns more than 10% of the stock and is member of the group responsible for controlling the management as well. They find that the theoretical framework of Graziano & Luporini (2012), who argued that two-tier boards might be useful for firms with large controlling shareholders as it enhances managerial motivation by fully delegating responsibilities, only holds in cases where the CEO can be classified as being a 'professional manager'; in those cases, a company was indeed significantly more likely to operate under a two-tier board. Closely held firms where the CEO was not specified as a 'professional manager' however, where more likely to have a unitary board structure, following an alternative line of theory by scholars as Admati, Pfleiderer & Zechner (1994) and Bolton & Von Thadden (1998) that the presence of a large shareholder (block holder)

can be a substitute for monitoring, thereby reducing the need for more 'severe' monitoring by a separate monitoring board.

D. The determinants of an actual switch between the two systems

Belot et. al (2014) argue that French firms each year evaluate their optimal board structure and decide whether a one-tier or a two-tier system is preferred. This line of arguments only holds when switches between the systems would be induced by changes in relevant firm characteristics such as degree of information asymmetry, possibilities for managerial private benefit extraction or ownership structure. However, switches by firms to another model could also serve more 'practical' purposes. Aste (1999) mentions three of these reasons as the most common reasons why firms choose to implement a two-tier board. The first, is to soften the exit of a director who resigns or is dismissed; by implementing a two-tier structure, this director can be moved into the supervisory board and leave their executive position without 'losing face'. Second, when a new generation of managers follows up the older generation, the latter might not immediately have full confidence in the new directors' competencies. In order to be able to keep an eye on them, the old board might decide to move to a two-tier structure and implement a supervisory board. Lastly, a two-tier structure can be very useful in mergers, when both parties want to maintain the idea that they are in charge to a certain extent. In this case, one of the parties gets to fill the CEO position, while the other can elect one of its directors as Chairman of the Board (Aste, 1999). The suggestion that switches between the two board models are rather executed for practical purposes than being the result of changes in firm characteristics, is in line with the earlier mentioned notion in academic literature that the two board models show signs of convergence. Learning from each other's strengths, real systematic differences between the two could be expected to diminish in the future (Krivogorsky, 2006; du Plessis et. al, 2017). Furthermore, this notion aligns with the earlier discussed findings by Hermalin & Weisbach (1988), who observed significant changes in board structure in terms of insider fraction around CEO turnover events.

To my knowledge, no study has yet been conducted specifically examining the determinants of firms' decisions to switch from a one-tier to a two-tier board system, or reverse. The studies by Belot et. al (2014) and Pellegrini et. al (2010) examined the effect of certain variables on the likelihood of a firm having a certain system in place; through this thesis I want to examine whether

I can identify factors significantly affecting the likelihood of a firm actually switching to another system, and thereby extending the existing literature on the topic.

I aim to explore the question whether these decisions are induced by developments in firm characteristics like Pellegrini et. al (2010) and Belot et. al (2014) seem to suggest, or should alternative explanations related to more practical reasons, in line with Aste (1999) and Hermalin & Weisbach (1988), be considered as well? This question is gaining relevance as more and more countries are giving firms the freedom to choose their desired board structure. This paper aims to offer a new perspective on the true drivers of board structure switches: does the freedom to switch actually help firms to opt for board model that better suits their changed underlying business reality, in line with the theoretical frameworks discussed, or could it rather be just another tool for management to satisfy issues raised by shareholders and/or the public? The latter is not unthinkable, given the notion by Krivogorsky (2006) and du Plessis et. al (2017) that real differences between both systems are diminishing over time, as they 'learn' from each other's strengths. Before moving into the hypothesis formulation, the reader will be given a short introduction into the specific situation in France, which provides the context in which this study is conducted.

E. Switching between one-tier and two-tier boards: the French situation

Although more countries, such as the Netherlands, Italy and Denmark, nowadays allow firms to choose between a one-tier and a two-tier model, France is the only leading economy in which firms have been doing so for the last decades. As this study focuses on empirical examination of switches between the systems that took place over time, France remains the only suitable country for analysis; no other country can yet provide a dataset which enough switches between the models to potentially produce statistically significant results. In this paragraph, the reader will be provided with a thorough introduction to the French situation, in order to gain a proper understanding of the context in which this study is conducted.

Until 1966, French firms were only allowed to operate under a one-tier board structure. In that year, lawmakers proposed a bill allowing firms to switch between one-tier and two-tier board models. Aste (1999) argues this happened primarily for three reasons. First, introduction of two-tier boards

would enhance the quality of corporate management and lead to improved international competition by French firms. Secondly, it was considered a step towards unification of European corporate governance practices as Germany, another dominant European power, already exhibited their traditional two-tier system of governance. Lastly, increased flexibility for firms in their corporate governance policies resulting from the freedom to switch freely between board structures was considered a desired outcome by itself.

Since 1966, French firms are free to switch between the two models of governance. However, both models are still subject to a number of requirements, which are discussed below.

A one-tier board should consist of a minimum of three, and a maximum of 24 directors, both executive and non-executive. The 'President Directeur General' (PDG), the equivalent of a CEO, in most of the cases simultaneously holds the position of Chairman of the board. This is fundamentally different from many European countries with one-tier board structures such as the UK and Spain, where this 'CEO duality' occurs to a far lesser extent (IFC, 2015). Hence, CEO's in French one-tier boards tend to be rather powerful: they select their own board members, for which they only need formal approval of the entity's shareholders (Millet-Reyes & Zhao, 2010). Generally spoken however, the French unitary board system is comparable to the Anglo-Saxon system, even more since in 2001 French firms with a unitary board are no longer obliged to unify the roles of CEO and Chairman but can switch freely, like in the U.S. and the U.K. (Belot et. al, 2014).

A French two-tier board consists of an executive 'directorate' and a supervisory board. The directorate is fairly small and consists of three to five executive board members. The supervisory board has a size of 3 to 24 members with a required proportion of employee representatives up to one third, depending on a firm's size (Aste, 1999). As these directors are elected by the employees, their appointments are out of the shareholders' control. In a two-tier board model, the CEO takes seat in the directorate, while the supervisory board elects a chairman among its members. As a consequence, in this model the roles of chairman and CEO are by definition separated. The members of the directorate are appointed for a period of 4 years by the members of the supervisory board, who are in turn appointed by the company's shareholders. This is different from a unitary board system, in which shareholders have elective power over all board members, both executive and supervisory (Millet-Reyes & Zhao, 2010).

The following description of the institutional process of a switch in board structure is derived from Belot et. al (2014). First, the board has the responsibility to submit an amendment expressing their desire for a switch. In case of an initial two-tier structure, both the executive- and supervisory board have to approve. Then, if existent, the works council and the governance committee have to give their approval. If no obligations are met here, an 'Extraordinary general meeting' (EMG) can be conducted in order to propose the switch to the shareholders. In this meeting, two-thirds of the present shareholders should vote in favor of the switch. This does usually not cause problems, as normally 90 to 100% of shareholders vote in favor of the switch.

Since its introduction in 1966, the legal possibility to adopt a two-tier model of corporate governance has not led to an overwhelming switch from one-tier to two-tier models as its initiators presumably desired to achieve (Aste, 1999). However, in recent decades a significant number of firms such as Carrefour and LVMH chose to switch between the two structures; in the period 1998-2018, I identified 103 switches between the two board models. This increased number allows for a statistical analyses on the determinants of these switches.

F. Hypothesis development

This thesis attempts to investigate whether developments in factors eventually found to differ among firms with one-tier and two-tier boards, which are in line with theoretical academical literature, can in practice be observed to lead to switches between the two structures.

With the prior academic literature on the topic as a basis, hypotheses will be formulated which will be used as anchor point for analysis on this research topic.

The first hypothesis follows the findings of Belot et. al (2014) that firms with more information asymmetry are more likely to exhibit a one-tier board structure, in line with earlier theoretical works by Block & Gerstner (2016), Jungmann (2006), Krivogorsky (2006) and Du Plessis et. al (2017) which described the advantages of one-tier models in terms of more efficient flows of information. Furthermore, empirical results obtained by Coles et. al (2008) indicate increases in insider proportion when more firm-specific knowledge is needed. As in unitary systems, 'supervisory' directors are more intensively involved in the company's day-to-day business than supervisory directors in a two-tier system, they can comparatively be considered to be more of an

'insider'. Belot et. al (2014) argue that the higher levels of information symmetry they find for firms with one-tier boards compared to firms with two-tier boards, indicate that information asymmetry might be a determinant of firms' decisions to switch to a one-tier board. The goal of analysis through this hypothesis, will be to test whether we actually observe increases in information asymmetry in the years before a firm decides to switch to a one-tier board. If that is true, this would support theoretical literature and the empirical argument made by Belot et. al (2014), that information asymmetry can be a determinant in the choice for a one-tier board. Recent increases in information asymmetry could (partially) explain why firms decide to switch to a one-tier system, while they decided to maintain a two-tier system in the years before. Following this line of reasoning, supported by theoretical literature on board structure optimality, the first hypothesis is formulated:

Hypothesis 1: Increased information asymmetry in prior years, operationalized by RD/Asset ratio, is a predictor of a switch to a one-tier board in later years.

This hypothesis will be accepted, if statistical analysis shows significant predictive power of increases in information asymmetry in periods before T, on a switch towards a one-tier board in T. A detailed description of this analysis will be provided in the methodology section.

The second hypothesis is congruent with the Adams & Ferreira (2007) framework, which argues that increased opportunities for managerial private benefit extraction might render a two-tier board structure to be optimal. Theoretical literature by Block & Gerstner (2016), Demb & Neubauer (1992), Jungmann (2006) and Du Plessis et. al (2017) support this reasoning; in a two-tier board, the monitoring process is to a lesser extent affected by personal relationships, causing so called 'monitoring-colleague dilemma's, enhancing the independence of the monitoring process. Linck et. al (2008) confirmed empirically that firms with more opportunities for managerial private benefit extraction tend to place more outsiders on their board, which translates into potential favorability of a two-tier board, as independent directors in two-tier boards hold more of an outside position than independent directors in one-tier boards. In our research, we operationalize opportunities for managerial private benefit extraction through the percentage a company represents of total sales of all listed firms in its département, based on theory by Gompers et. al (2009) and in line with Belot et. al (2014). As mentioned before, Gompers et. al (2009) argue that historically, major employers within regions have often been involved in high-profile fraud cases.

For example, they use corporate funds to play local benefactor. Hence, being a major employer within a region, is considered to positively affect opportunities for managerial private benefit extraction. A wide base in academic literature on board structure states that high opportunities for managerial private benefit extraction favor a board with a large outsider fraction, which two-tier boards are an example of. Belot et. al (2014) found that firms with two-tier boards indeed exhibit higher levels of private benefit extraction. Through hypothesis 2, I will investigate whether can actually relate increases in opportunities for managerial private benefit extraction to switches to dual board structures, challenging the assumption made my Belot et. al (2014) that cross-sectional differences between the subsamples of firms with one-tier and two-tier boards can actually be considered to explain switching behavior. With the aforementioned operationalization of opportunities for managerial private benefit extraction, hypothesis 2 follows:

Hypothesis 2: Increased opportunities for private benefit extraction in prior years, operationalized by a firm's portion in total sales by listed firms in its département, is a predictor of a switch to a two-tier board in later years.

This hypothesis will be accepted, if statistical analysis shows significant predictive power of increases in opportunities for managerial private benefit extraction in periods before T, on a switch towards a two-tier board in T. This would suggest that firms decide to no longer hold on to their one-tier model but decide that a two-tier model is more suitable for their business, at least partially as a result of increases in opportunities for private benefit extraction, in line theoretical predictions by Adams & Ferreira (2007).

As discussed before, Belot et. al (2014) found a third significant predictor of a firm's board structure; in case a CEO was identified as a 'professional manager', increased large shareholder ownership would be a predictor of a firm having a two-tier board structure in place. As I was unable to, within the time constraints to which I was subject while writing this thesis, identify for each observation whether a CEO could be identified a 'professional manager', I am not able to examine whether this construct is a significant predictor of a firm's switch towards a two-tier board. However, in addition to tests related to these hypotheses, I conduct a number of additional tests, in which ownership variables will be used as independent factors of interest.

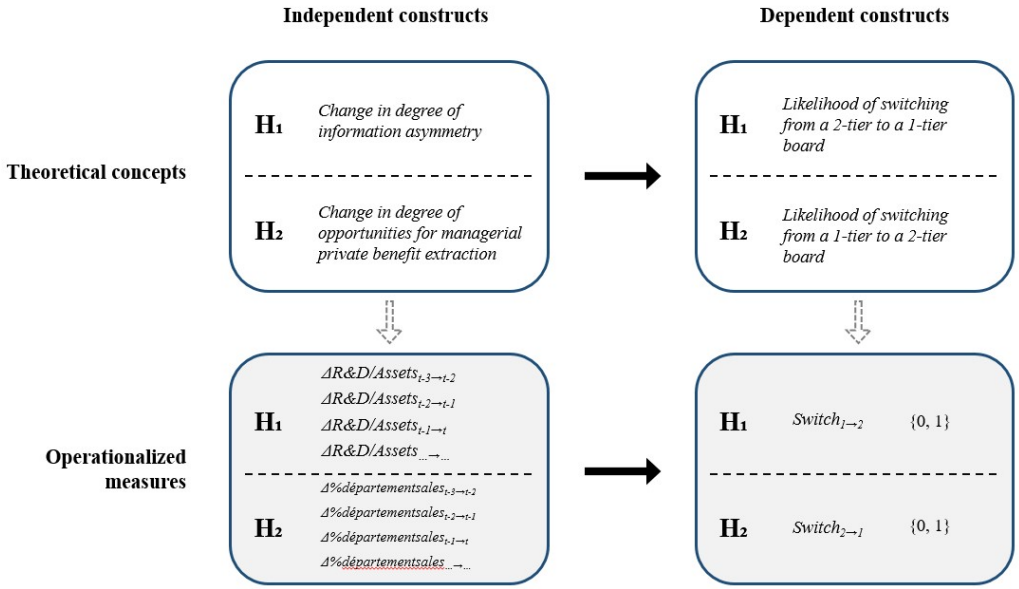
3. Research design, methodology and sample description

Table 1
Graphical representation of the relationships tested, both conceptual and operationalized

A.

Fig

wh



On the upper side of the figure, the relationship tested is expressed through theoretical constructs. Congruent with the hypotheses formulated in the previous section, the independent constructs of interest are temporal changes in the degree of information asymmetry, and changes in the degree of opportunities for managerial private benefit extraction. Through analysis, we examine their impact on the respective dependent constructs; the likelihood of a firm to switch from a two-tier to a one-tier board, and the likelihood to switch from a one-tier to a two-tier board. The bottom half of the figure contains the operationalized measures used to test both hypotheses. The independent

constructs are operationalized by different first-difference variations of R&D/Asset ratio for hypothesis 1, and a company's share of total sales by listed firms in its département. These first-difference variables represent changes in the independent variables of interest in periods before the year to which a particular firm-year observation belongs. The dependent construct is operationalized by dummy variables, for each firm-year observation indicating whether a switch from one-tier to two-tier, or from two-tier to one-tier has occurred.

This way, I examine whether changes in these characteristics in time intervals between T-3 and T are significant predictors of one-tier/two-tier switches in T. This is fundamentally different from the research design by Belot et. al (2014) which examines the cross-sectional differences between firms with one-tier and two-tier boards, at the same point in time. If results of this study show that firms that switched from a one-tier to a two-tier board structure experienced an increase in opportunities for private benefit extraction in the years leading to the switch relative to firms that chose to maintain the one-tier structure, this adds to the robustness of the theoretical framework by Adams & Ferreira (2007), empirical findings by Belot et. al (2014) and the wider body of literature describing the implications of firm information asymmetry and opportunities for managerial private benefit extraction on firms' optimal board structures. The same would hold if results show a significant increase in likelihood of a switch from a two-tier to a one-tier model, resulting from increases in degree of information asymmetry. If no significant predicting relationships are found, it becomes at least uncertain whether these factors actually induce firms' decisions to switch board structure, or that these are for example rather induced by practical factors such as suggested by Aste (1999).

B. Methodology

In order to test the hypothesized relationships between the independent and dependent constructs introduced in the previous section, the following regression equations are established for firms *i* in time periods *t*:

Equation 1)
$$Switch_{1\to 2\ i,t} = \propto + \beta_1 \Delta Sharedepsales_{i,\ t-3\to t-2} + \beta_2 \Delta Sharedepsales_{i,\ t-2\to t-1} + \beta_3 \Delta Sharedepsales_{i,\ t-1\to t} + \beta_4 logAssets_{i,\ t-1} + \beta_5 Leverage_{i,\ t-1} + \beta_6 ROA_{i,\ t-1} + \beta_7 Personnelownership_{i,\ t-1} + \beta_8 USownership_{i,\ t-1} + + \beta_9 Pbindustry_{i,\ t} + \mu_t + \varepsilon$$

Equation 2)
$$Switch_{1\to 2\ i,t} = \propto + \beta_1 \Delta R\&D/Assets_{i,\ t-3\to t-2} + \beta_2 \Delta R\&D/Assets_{i,\ t-2\to t-1} + \beta_3 \Delta R\&D/Assets_{i,\ t-1\to t} + \beta_4 logAssets_{i,\ t-1} + \beta_5 Leverage_{i,\ t-1} + \beta_6 ROA_{i,\ t-1} + \beta_7 Personnelownership_{i,\ t-1} + \beta_8 USownership_{i,\ t-1} + + \beta_9 Pbindustry_{i,\ t} + \mu_t + \varepsilon$$

In both equations, the dependent variables are dummy variables, indicating for each firm-year observations whether or not a specific switch occurred; $Switch_{1\rightarrow 2}$ takes value 1 when a switch from a one-tier to a two-tier board occurs in a given firm-year observation and 0 otherwise, likewise $Switch_{2\rightarrow 1}$ equals 1 when a switch from a one-tier to a two-tier board occurs and 0 otherwise. This way, the models allow to check for significant relationships between historical developments in opportunities for private benefit extraction and degree of information asymmetry and the likelihood of switching between the two different board structures. Important to note here, is that for analysis of equation 1, only the subsample of observations is used in which a two-tier system was present or in which a switch towards a one-tier system occurred, and for analysis of equation 2 only observations in which a one-tier system was present or a switch to a two-tier system occurred. Furthermore, year fixed effects are in effect in all analyses, denoted by *'μ_t'*. This way, developments within the same time periods are compared, between firms which decided either to maintain a specific board structure, and firms that decided to leave that structure. Apart from that, year fixed effects eliminate potential biases resulting from time trends affecting the likelihood of switching. Descriptive statistics on distributions of switches over different years as well as prevalence of board structure systems will be provided in section C of this chapter. Definitions of all variables are included in the appendix.

As the dependent variables are dummies and take binary values, either a logit/probit model should be used to assess the predictive power of the independent variables on the dependent constructs. A problem with using conventional forms of these models, however, is that they might suffer from small-sample bias when event occurrences are rare, which is the case in my sample: within 5031 firm-year observations, only 23 switches from a one-tier to a two-tier structure, and 54 switches from a 2- to a one-tier structure occur. A conventional way of reducing this bias, available in widely used statistical software as Stata, is using 'penalized likelihood' estimators, introduced by David Firth in 1993 (Firth, 1993). As recent as 2018, Richard Williams, professor at the Department of Sociology at Notre Dame University, argued that Firth's logistic regression model is most suitable for analyzing datasets with rare event occurrences (Williams, 2018). Consequently, this version of the default logistic regression method is used as method of analysis for this study.

The independent variables of interest in the regression equations, representing the developments in information asymmetry and opportunities for managerial private benefit extraction over preceding time intervals, are conventional first difference variables for R&D/Asset ratio and the share in total department sales. These are constructed as shown by the equation below, with the example of the variable for the change in R&D/Asset ratio for firm i between years T-3 and T-2:

$$\Delta R\&D/Assets_{i,\ t-3\to t-2} = R\&D/Assets_{i,\ t-3} - R\&D/Assets_{i,\ t-2}$$

Likewise, variables are constructed for the other time intervals displayed in equations 1) and 2). Furthermore, first difference variables are constructed for other time intervals such as $t-3 \to t-1$ and $t-2 \to t$ in order to allow for variations in the analyses performed, enabling robustness checks of results obtained through initial equations 1) and 2).

For all coefficients linked to the independent variables of interest, denoted by coefficients β_1- β_3 in the equations 1) and 2) we expect to find significant, positive values given our hypotheses. Positive significant values for these coefficients, would imply a positive relationship between historical increases in information asymmetry operationalized by R&D/Asset ratio and the probability of a firm to switch towards a one-tier board in period *t,* and likewise a positive relationship between the opportunities of managerial private benefit extraction in previous periods and the probability of a firm to switch towards a two-tier board in period *t.* I decided not to 'mix up' equations 1) and 2), by using R&D/Asset ratio variables as independent in equation 2) and vice versa, as I found no indications in existing literature suggesting that increased information asymmetry calls for the implementation of a two-tier board, neither indications that increased opportunities for managerial private benefit extraction would make a unitary board more favorable. In some variations of equations 1) and 2), including the baseline versions, multiple first-difference variations of the same variables are used. As these variations are likely correlated to each other, rightful concerns about the presence of multicollinearity could be raised. Therefore, all variations of the independent variables which are jointly used in regressions where tested for multicollinearity, of which the results are displayed in appendix A.3. All VIF-values resulting from these tests are close to 1, which clearly indicates there are no problematic correlation between the correlations between the independent variables of interest, mitigating possible concerns about multicollinearity when these variables are used jointly in regression analyses.

Next to dependent variables and independent variables of interest, the regression equations contain various control variables. These variables are included to control for factors potentially influencing both the dependent variable and the independent variables of interest, such as firm size and profitability, forming a threat of Omitted Variable Bias (OVB), if they would have been omitted. However, as the availability of specific control variables was highly dependent of their inclusion in specific databases used for constructing the data sample, I will first introduce the sample and describe the data collection process, after which a discussion of the control variables follows. Together with the introduction of these variables, summary statistics and correlation coefficients will be provided for all variables used.

C. Data collection & sample description

Note: exact variable definitions can be found in the variable definition list in the appendix

As this thesis, to a certain extent, attempts to challenge the robustness of the conclusions drawn and the assumptions made by Belot et. al (2014), their sample is used as a point of reference in the sample selection process. In that study, the authors examined the firms listed at the SBF250, and index comprised of the 250 most traded French stocks, for the period 1998-2008. However, as annual reports before 2001 were not uniformly available, and I aimed at including as many structure shifts in my sample as possible for statistical significance purposes, I eventually established my sample period at 2001-2018. In this section, I will guide the reader through the entire process of data collection, providing step-by-step explanation, which should enable anyone to replicate the sample used for the empirical analysis.

First, a list of firms included in the SBF250 and its successor, the CAC All-Tradable, which succeeded the SBF250 in 2011, was obtained from CompuStat. Although the CAC All-Tradable consists of more stocks than the SBF 250 (313 currently[2]), I considered it to be the most valid substitute for the SBF250 for the period after 2011, for the simple reason it is the index' only official successor after its termination in 2011[3]. This list of firm-year observations consisted of all firms included in the SBF250/CAC All-Tradable, for each year between 2001-2018.

[2] Source: https://www.marketscreener.com/CAC-ALL-TRADABLE-7655/components/
[3] Source: https://www.bloomberg.com/quote/SBF250:IND

The process of data collection which had to be conducted to gather all data input needed to execute the regression equations on this list of firm-year observations, can be divided in two main parts; one part consisted of manual collection of data on which board structure a firm used (one-tier/two-tier) and identification of the switches that occurred over time. This data is needed in order to construct the dependent variables, and to properly assign the non-switch firm-year observations to the right control groups, which represent firms that maintained either a one-tier or a two-tier system in a given year. After a long, thorough search, I concluded there was unfortunately no dataset available which could provide me with data on board structure, being one-tier or two-tier for French listed firms, meaning I had to collect this information manually. Next to this, the analysis required financial, geographical and ownership data on the firms in the sample, which could be retrieved in a more straightforward manner from CompuStat and Orbis databases.

First, I will elaborate on the manual data collection process, through which board structures in place and switches between the two systems were identified. Belot et. al (2014) mentioned that they found 91 switches between the two board systems in the period 1998-2008, providing a first anchor point in the search for switches, and more importantly, assuring me that the number of switches which occurred over the past decades is high enough to potentially obtain some statistically significant results. Twice, I requested these authors to share this list of switches, which unfortunately was rejected. Hence, I had to manually construct a list of as many switches between the two systems as I could possibly identify. Through thorough exploration of articles found through databases as Thomson One, Factiva and Eikon, I found only 43 switches during this period. In order to increase this number, I decided to expand the time period of investigation to 1998-2018, leading to the identification of 36 additional switches. Important to notice at this point, is that news articles from before 2001 are very rarely found in these databases, potentially leading to an underrepresentation of switches from those years. The next step was to divide the sample into firms with a one-tier vs. firms with a two-tier system, in order to properly identify control groups for the statistical analysis as discussed in section B. This was done by assessing 2 annual reports of each firm; one for the first year of the firms' inclusion in the SBF250/CAC All-Tradable index (or 1998 if the firm was already included in the index before 1998) and one for the last year of the firms' inclusion in the index (or 2018 if the firm was still included in the index in 2019). These annual reports were obtained from Bloomberg and Eikon, and matched with the firms in the initial list of firms included in the SBF250/CAC All-Tradable based on their ISIN codes. Most of these annual

reports are written in French, but identification of the board model in place is relatively straightforward; when a firm operates under a 'conseil d'administration' (board of directors), this implies a one-tier board structure, whereas a 'conseil de surveillance' (supervisory board) and 'directoire' (directorate) indicate the presence of a dual board structure. When in both annual reports the same board structure is found, the firm is assumed to have maintained this structure throughout its inclusion in the SBF250/CAC All-Tradable index and is assigned to either the one-tier or two-tier subsample. When the two annual reports show different systems, this, logically, indicates a switch. On top of the before mentioned 79 switches, this enabled me to find 24 additional switches, leading to a list of in total 103 switches between the two structures. It should be noted that this method of identifying board structure based on the structure present in only 2 points in time could, by nature, result in incidental errors if, for example, a firm switches twice during the period between the two points of measurement, and these switches are both not identified during the examinations of news articles I made before. However, as time constraints did not permit me to scan all annual reports for all 577 firms that were included in the index during the period 1998-2018, I considered the method I used as the first best feasible option, still requiring manual examination of more than 1100 annual reports.

Further cropping of this list of switches resulted from merging this manually constructed dataset on board structure with datasets obtained from CompuStat including data on a list of financial and geographical variables. This dataset initially consisted of all available firm-year observations in the period 1998-2018 for all firms included in the SBF250/CAC All-Tradable somewhere in this period, resulting in a dataset of 10.418 firm-year observations in total. First, all 393 firm-year observations for firms subject to the legislation of another country (indicated by an ISIN-code not starting with 'FR') were dropped. Second, manual comparison of the data from this dataset with financial data provided by Bloomberg, showed that financial data in this dataset the years 1998-2000 in most of the cases was not reliable, leading me to exclude all 1.430 firm-year observations prior to 2001, including 5 firm-year observations in which I identified a switch. On top of that, all firm-year observations in which a firm was not included in the SBF250/CAC All-Tradable index were excluded, dropping out an additional number of 3.365 firm-year observations, among which 19 in which a switch between the two board structures occurred. This was done for the sake of comparability; firms which are included in the index, all are among the most-traded French stocks, and can therefore reasonably be considered 'large' firms, with similar corporate cultures. Take,

however, a firm-year observation from 2001, for a firm which only entered the index in 2011. If the company had just started its operations in 2000, for example, this firm-year observation could actually represent a very different natured firm, with rather a 'small enterprise'-culture. An exemption was made for firm-year observations in which a firm was not in the CAC All-Tradable, but lead to a firms' switch of board structure within a maximum of 3 years after the observation. Leaving these firm-year observations out would further reduce the already relatively small number of switches examined. As these firm-year observations were, at maximum, 3 years before a firm was included in the CAC All-Tradable, it seems fairly reasonable to assume that these firms did not differ extremely in their nature from other firms in the index.

Next, as the analysis makes use of historical first difference variables, 130 firm-year observations standing alone (i.e. with no preceding or consecutive firm-year observation left after prior exclusions) for any reason, were excluded. Lastly, 47 double observations (i.e. two or more observations with the same firm-year combination) were excluded, most of which were exact copies of each other. However, in some cases, double firm-year combinations differed from each other in certain variables, as a result of a switch in date on which the fiscal year ended. In that case, I decided to keep the observation with the latest record date throughout the year, and drop the other one. All in all, the remaining dataset comprised of 5.053 firm-year observations, stretching over the period 2001-2018. Next to the exclusion of firm-year observations, the fact that only data from 2001 on seems to be reliable, imposes limitations on the analysis of the switches which occurred during the years 2001-2003, as for these switches no reliable data up to 3 years prior to the switch was available, which is required in order to perform the analysis with first difference variables for all time intervals as displayed in equation 1) and 2). This applies to a total of 15 switches, of which one is excluded from the dataset as it is a 'stand-alone' observation for the specific firm and therefore by definition has no value in the analysis, as no historical developments in independent variables can be identified. The remaining 14 switch firm-year observations in the period 2001-2003 are kept in the dataset. They provide data in order to create first difference variables for later firm-year observations, and can be included in variations of the regression in which first differences on shorter historic time intervals are used (between T-2 and T instead of T-3 and T, for example). Concluding, 63 switches remain which allow for an integral analysis on the development of the

independent variables of interest in the period up to three years before the switch, and 14 switches allow for partial analysis in certain variations of the regression models.

Using the manually composed dataset on board structure for each of the included firms, all firm-year observations were assigned to a board-structure group using the following numbers as indicators: 1=one-tier board, 2=two-tier board, 3=switch from a one-tier to a two-tier structure (indicating a switch in that year) and 4= switch from a two-tier to a one-tier structure. Table 1 shows the distribution of firm-year observations over these groups over time. Please note that the sharp increase in total firm-year observations between 2010 and 2011 is caused by the evolution of the SBF250 index into the CAC All-Tradable, which although being the official successor of the SBF250, consisted of more firms.

Table 1
Temporal distribution of firm-year observations over board structures
The sample contains 5,031 firm-year observations divided over the period 2001-2018. Each firm-year observation is assigned to a group characterizing its board structure. 'one-tier' and 'two-tier' imply that, for a given firm-year observation, the board structure remained constant during that year. 'Switch 1>2' and 'Switch 1>2' imply that during the time period of a firm-year observation a switch occurred, in the direction specified. Values for the years 2001-2003 are Italic, as switch-observations from those years are only of partial relevance for the present analysis, as discussed in the methodology section

	Years											
Groups	***2001***	***2002***	***2003***	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**
One-tier	*149*	*170*	*165*	162	157	169	168	175	169	195	271	267
Two-tier	*63*	*69*	*63*	60	71	72	72	70	61	64	76	72
Switch 1>2	*3*	*3*	*2*	2	5	3			1			1
Switch 2>1	*1*	*0*	*5*	1	3	4	3	6	7	5	3	
Total	***216***	***242***	***234***	**225**	**236**	**248**	**243**	**251**	**238**	**264**	**350**	**340**

	2013	**2014**	**2015**	**2016**	**2017**	**2018**	**Total**
One-tier	258	268	270	256	258	233	3,760
Two-tier	69	76	74	62	57	44	1,195
Switch 1>2				2		1	23
Switch 2>1	1	2	4	1	5	3	54
Total	**328**	**346**	**348**	**321**	**320**	**281**	**5,031**

For the 216 observations in 2001, naturally no historical first difference variables can be conducted, limiting their use to providing numbers with which historical first difference variables for later firm-year observations can be constructed. The same holds for 421 other firm-year observations after 2001 which represent the first year of a firm's inclusion in the SBF250/CAC All-Tradable index.

The second part of the data collection process involved collecting data on the independent variables of interest and control variables. For the independent variable 'SHAREDEPSALES', representing the share of a firm in the total sales of all listed firms in its département, sales data as well as information on which département the firms belong to, had to be collected. Sales data was relatively easily obtainable from CompuStat, as well as postal codes of each firm. The first two digits of these postal codes represent the département to which a firm belongs. Hence, I could sum the sales within a specific département for each year, and calculate the shares of these sales for each firm, for each year. Important to notice, is that in calculating these shares, sales numbers of all non-duplicate firm-year observations included in the initial dataset are taken into account, also those in which the firm was not included in the SBF250/CAC All-Tradable during that specific year. This was done in order to, despite the fact that I did not have sales totals for all listed firms in a département, as Belot et. al (2014) state to use, the numbers used are as complete as possible, and thereby shape an optimal image of a company's regional dominance.

The other independent variable of interest, the R&D-expense/Asset ratio, was constructed with data on R&D-expenses and total asset value obtained from CompuStat, for each firm-year. According to this data, many firms did not seem to have incurred R&D-expenses, as visible in the descriptive statistics in table 2. In order to check whether this was valid, rather than be the result of missing data in the CompuStat database, I checked a random subset of R&D-expense values equal to zero with income statements obtained from Bloomberg, and in all cases data from CompuStat turned out to be correct.

Control variables

Now, the control variables introduced in the methodology section will be discussed more in detail. As mentioned before, the purpose of control variables is to mitigate potential biases resulting from the dependent and independent constructs both being correlated with a third construct 'omitted' in an analysis. First, I controlled for 'conventional' control factors as size (log(Assets)), profitability (Return On Assets (ROA)) and financial distress (Leverage); by including these variables in the regression equations, I prevent the effects of these variables on the likelihood of a firm to switch between board models to be falsely attributed to the independent variables of interest. The latter two of these control variables, ROA and LEVERAGE were constructed manually by, respectively,

dividing a firms' net income by total assets, and dividing total financial obligations by the value of common equity. Furthermore, I included the variable 'PB INDUSTRY'. This dummy variable takes 1 for certain 4-digit SIC values which represent industries active in the sports- and entertainment businesses. Demsetz & Lehn (1985) argue that in these industries, managers enjoy non-monetary benefits such as influence over the public opinion and visibility, thereby enhancing the opportunities for private benefit extraction for these managers. This control variable only suited analysis of Equation 2), as including it in analysis of Equation 1) rendered multicollinearity problems. All data used for construction of these variables was obtained from CompuStat.

Next to these 'conventional' control variables, I manually constructed two control variables in order to control for the effects of ownership-related factors. Intuitively, shifts in ownership might influence both the independent variables of interest, through influencing decision-making towards different operational strategies, as the outcome variables, as the dependent outcome variables, as the shareholders of a firm eventually have decisive power over decisions to switch models. Therefore, I considered it very important to include some ownership controls, in certain relevant manners allowed by the data I had to my disposition. Unlike for U.S. based listed firms, shareholder data for French listed firms only appeared obtainable through manual processing of detailed shareholder lists. Hence, I constructed some ownership variables manually, based on detailed shareholder specifications for each of the firms in my sample obtained through the Orbis database. Eventually I decided to construct two ownership controls for my model: the share of ownership by personnel of the firm, and the share of ownership by US-based shareholders.

Personnel ownership

In France, firms with 5,000 or more employees worldwide or 1,000 nationally, are by law obliged to have employee representation on their boards; in boards with up to 12 board members, at least one employee representative should be seated, in boards with more than 12 board members at least two. This rule applies to both the unitary and the two-tier structure. In case of a two-tier board, the employee representative becomes part of the supervisory board, in case of a one-tier board, of course, in the board of directors. As members of the (unitary) board of directors are generally more closely involved in the company's day-to-day governance practices, it seems rational for personnel shareholders to aim to expand their influence by pressuring a switch to a one-tier board structure.

In order to control for this, I considered it relevant to include the share of personnel share ownership in my analyses. I calculated the ownership share held by firms' personnel by examining the shareholder lists of the companies in my sample, and for each year take the sum of stakes held by owners with 'Personnel' in its name. This control is considered to be relevant for both models; considering to the aforementioned conceptual favorability of one-tier models for firms' personnel, it might be interesting to see whether, in the opposite direction, an increase in personnel ownership might make such a switch more unlikely.

US ownership

Over the past decades, U.S.-based firms have been setting the tone in the global world of business. A number of annual reports I examined, in which French firms announce their switch from a two-tier to a one-tier board structure, a reason for the switch was provided in the sphere of 'in order to align more with global practices'. In that light, it is not unthinkable that the likelihood of a switch to a one-tier board structure might be higher for firms that have a higher U.S.-based ownership stake. In order to control for this possible underlying cause for a switch, for each firm-year observation I calculated the total ownership share of U.S.-based shareholders. Data on the country of origin of shareholders was available in the same database (Orbis) as where I obtained the initial shareholder lists from. Following the same line of reasoning as with the personnel ownership control, I consider this control to be relevant for both models, as an increase in US-ownership stake might, for example, be associated with a lower likelihood of a switch from a one-tier to a two-tier board structure.

In the table 2, Pearson correlation coefficients and summary statistics are provided for the independent (control) variables. For the independent variables of interest, only the 'base' versions (and not the first differences) are provided. Appendix A.3 contains the results of multicollinearity checks for all independent variables of interest jointly used in regression models.

Panel A clearly shows that there are no problematically high correlation coefficients between the variables. Panel B depicts a relatively large number of missing data values for 'PERSONNELOWNERSHIP' and 'USOWNERSHIP', the dummies controlling for influences of certain changes in ownership. The cause of these missing values lies in the incompleteness of the

Orbis dataset, which does not incorporate ownership data on all the firms in our initial sample and only includes data from 2003 on. Therefore, variations in the regression equations will be executed without these ownership controls, in order to still be able to perform the analysis on the full set of firm-year observations. The variables R&D/ASSETS and LEVERAGE were winsorized at the 1/99 cutoffs due to the presence of extreme outliers. This also explains why in panel C, which shows summary statistics separately for firm-year observations with one-tier and two-tier boards, the maximum value for LEVERAGE is the same for both groups of firms.

A number of interesting inferences can be made from these descriptive statistics. There seems to be a relatively high concentration of ownership; on average, the largest 2 shareholders possess 53,8% of the shares of the firms in our sample. Average ownership by firms' personnel is limited to 0,9%, and 2,4% of shares on average is owned by U.S.-based shareholders. Furthermore, only 0,5% of firm-year observations represents firms in industries classified by Demsetz & Lehn (1985) to exhibit particularly high levels of opportunities for private benefit extraction.

Perhaps more interesting, is to examine the differences in descriptive statistics between firm-year observations with one-tier and two-tier boards as displayed in Panel C. The rightmost column in this panel contains T-statistics on the mean differences between the groups for each variable. Interestingly, these differences show a pattern in line with observations by Belot et. al (2014). Congruent with their findings, panel C shows that firms with one-tier boards on average exhibit higher levels of information asymmetry looking at their R&D/Asset ratio, and firms with two-tier boards generally exhibit more opportunities for managerial private benefit extraction, as they on average make up a larger part of total sales of listed firms in their départements. In line with this, firms with two-tier boards are significantly more often operating in industries with relatively high opportunities for managerial private benefit extraction.

Table 2

Descriptive variable statistics

Panel A contains Pearson correlation coefficients. Table B displays summary statistics for the independent- and control variables used in Eq. 1) and Eq. 2), and table C provides summary statistics separate for subsamples of firm-year observations with one and two-tier structures. In the rightmost column, t-statistics of t-tests on the mean differences between the two groups are provided for each variable. Variable definitions are provided in the appendix. Single asterisks (*) denote that a correlation coefficient is significant at the 5% level (P ≤ 0.05). Double asterisks (**) denote that a variable was winsorized due to the presence of extreme outliers.

Panel A: Pearson correlation matrix

Variables	R&D/ASSETS**	SHAREDEP SALES	LEVERAGE**	LOG(ASSETS)	ROA	PB INDUSTRY	PERSONNEL OWNERSHIP	US OWNERSHIP
R&D/ASSETS**	-							
SHAREDEP SALES	-0.097*	-						
LEVERAGE**	-0.092*	-0.010	-					
LOG(ASSETS)	-0.282*	-0.003	0.402*	-				
ROA	-0.392*	0.044*	-0.062*	0.158*	-			
PB INDUSTRY	-0.028*	0.137*	0.012	0.007	-0.041*	-		
PERSONNEL OWNERSHIP	-0.030	-0.027	0.149*	0.255*	0.014*	-0.016	-	
US OWNERSHIP	0.094*	-0.041*	-0.015*	0.128*	-0.082*	-0.018	0.068*	-
2LARGEST SHARES	-0.084*	0.069*	0.007	0.017*	0.090*	0.014	0.001	-0.117*

Panel B: Summary statistics, entire sample

Variables	N	MEAN	ST. DEV	MIN	MEDIAN	MAX
R&D/ASSETS**	5,052	0.025	0.064	0.000	0.000	0.391
SHAREDEPSALES	5,053	0.117	0.258	-0.001	0.006	1.000
LEVERAGE**	5,041	2.696	4.875	-6.282	1.569	31.828
PB INDUSTRY	5,053	0.005	0.070	0.000	0.000	1.000
LOG(ASSETS)	5,023	6.910	2.336	2.196	6.638	13.574
ROA	4,893	0.015	0.119	-1.472	0.029	1.151
PERSONNELOWNERSHIP	3,940	0.009	0.027	0.000	0.000	0.416
USOWNERSHIP	3,937	0.024	0.062	0.000	0.000	0.817
2LARGESTSHARES	3,956	0.538	0.280	0.000	0.565	1.000

Panel C: Summary statistics, grouped by board structure

Summary statistics of variables used in analysis of the dataset, grouped by board structure. The 77 firm-year observations in which a switch between the two models occurred, are not included in this table

	One-tier boards						Two-tier boards						
Variables	N	MEAN	ST. DEV	MIN	MEDIAN	MAX	N	MEAN	ST. DEV	MIN	MEDIAN	MAX	T-STATISTIC OF DIFFERENCE BETWEEN MEANS
R&D/ASSETS**	3,762	0.028	0.068	0.000	0.000	0.391	1,213	0.016	0.051	0.000	0.000	0.391	5.87***
SHAREDEPSALES	3,763	0.109	0.251	-0.001	0.005	1.000	1,213	0.140	0.277	0.000	0.006	1.000	-3.72***
LEVERAGE**	3,753	2.782	5.103	-6.282	1.548	31.828	1,211	2.400	4.075	-6.282	1.620	31.828	2.37**
PB INDUSTRY	3,763	0.002	0.049	0.000	0.000	1.000	1,213	0.013	0.114	0.000	0.000	1.000	-4.63***
LOG(ASSETS)	3,757	6.900	2.459	-0.944	6.596	14.547	1,211	6.878	2.030	1.666	6.687	13.497	0.28
ROA	3,651	0.014	0.122	-1.472	0.029	1.151	1,188	0.019	0.103	-1.096	0.030	0.378	-1.25
PERSONNELOWNERSHIP	3,013	0.010	0.026	0.000	0.000	0.310	890	0.008	0.030	0.000	0.000	0.416	1.37
USOWNERSHIP	3,010	0.024	0.064	0.000	0.000	0.817	890	0.023	0.056	0.000	0.000	0.500	0.20
2LARGESTSHARES	3,010	0.548	0.280	0.000	0.577	1.000	890	0.506	0.274	0.000	1.000	1.000	3.94***

This indicates that this sample is indeed suitable to challenge the assumptions and conclusions of made by Belot et. al (2014), which imply that cross-sectional differences observed between firms in both groups are determinants of their choice for a certain board structure. As my sample shows similar cross-sectional differences to theirs, incongruence of the results from the analyses with the hypotheses around actual switches between the two systems, would impose serious doubts on the idea that the cross-sectional differences between the two groups of firms would actually be the underlying reason for firms to switch between the two models.

Lastly, we observe that firms with a one-tier board structure have a significantly higher concentration of ownership with the largest two shareholders. This is contradictory with the theoretical frameworks by Adams & Ferreira (2007) and Graziano & Luporini (2012), which argue that two-tier board systems should be optimal in cases of high ownership concentration, as taking a seat in the supervisory board could be an effective monitoring mechanism for institutional shareholders. No significant differences are observed in average LOG(ASSETS) and ROA values, implying that firms in both groups are similar in size and profitability. Neither are significant differences visible in the degree of US-based ownership and ownership by firms' personnel.

4. Results

A. Main regressions

In this section, the results of the analyses will be discussed. First, the results of the main baseline equations, as denoted in the methodology section, will be thoroughly assessed. Consecutively, the results of a number of additional tests will be discussed. These additional tests are aimed at gaining deeper insights in the possible determinants of firms' decisions to switch between the systems, by further exploiting the possibilities offered by this dataset.

Table 3
Results of main regressions
Panel A contains the results of a logistic regression using penalized likelihood estimators, following different variations of Equation 1), as presented in the methodology section, with a switch dummy for a switch from a two-tier to a one-tier model as dependent variable. In these models, only firm-year observations in which either a two-tier board was present, or a switch to a one-tier board occurred, are included. Panel B presents the results of a logistic regression following different variations of Equation 2), with a switch dummy for a switch from a one-tier to a two-tier model as dependent variable. Variable descriptions are provided in the appendix. In these models, only firm-year observations in which either a one-tier board was present, or a switch to a two-tier board occurred, are included. Asterisks denote significance levels at 1% (***), 5% (**) or 10% (*) levels.

Panel A: Switch from a two-tier to a one-tier board as dependent variable

Variable	(1)	(2)	(3)	(4)	(5)
ΔR&D/ASSETS$_{T-3 \rightarrow T-2}$	-7.030				-7.140
	(-0.94)				(-0.98)
ΔR&D/ASSETS$_{T-3 \rightarrow T}$		-8.208			
		(-1.20)			
ΔR&D/ASSETS$_{T-2 \rightarrow T-1}$	-13.428				-14.190
	(-1.31)				(-1.50)
ΔR&D/ASSETS$_{T-2 \rightarrow T}$			-5.493		
			(-0.76)		
ΔR&D/ASSETS$_{T-1 \rightarrow T}$	-3.946			2.563	-4.525
	(-0.38)			(0.21)	(-0.41)
ROA	-0.846	-0.768	-0.917	-2.160**	-1.193
	(-0.52)	(-0.47)	(-0.58)	(-2.10)	(-0.83)
LEVERAGE	0.034	0.030	0.019	0.004	0.023
	(0.82)	(0.77)	(0.52)	(0.12)	(0.61)
log(ASSETS)	0.041	0.051	0.109	0.135*	0.052
	(0.43)	(0.57)	(1.26)	(1.65)	(0.58)
PERSONNELOWNERSHIP	2.049	2.509	2.262		
	(0.47)	(0.61)	(0.53)		
USOWNERSHIP	1.282	1.099	1.112		
	(0.52)	(0.44)	(0.45)		
Constant	-5.576***	-4.651***	-3.181***	-4.826***	-3.990***
	(-2.90)	(-2.97)	(-3.74)	(-4.78)	(-3.84)
Year fixed effects	Yes	Yes	Yes	Yes	Yes
No. of observations	629	640	744	1,088	796
Pseudo R^2 (McFadden)	0.073	0.072	0.075	0.068	0.057

Panel B: Switch from a one-tier to a two-tier board as dependent variable

Variable	(1)	(2)	(3)	(4)	(5)
ΔSHAREDEPSALES$_{T-3 \rightarrow T-2}$	-10.456				-8.409
	(-1.41)				(-1.33)
ΔSHAREDEPSALES$_{T-3 \rightarrow T}$		10.413***			
		(3.56)			
ΔSHAREDEPSALES$_{T-2 \rightarrow T-1}$	14.111***				13.300***
	(3.04)				(-3.12)
ΔSHAREDEPSALES$_{T-2 \rightarrow T}$			10.214***		
			(3.73)		
ΔSHAREDEPSALES$_{T-1 \rightarrow T}$	6.590			3.444*	3.078
	(1.59)			(1.68)	(1.49)
ROA	-3.847***	-3.640***	-3.702***	-2.401**	-3.177***
	(-2.85)	(-2.92)	(-2.97)	(-2.26)	(-2.60)
LEVERAGE	0.032	0.035	0.034	0.029	0.031
	(0.71)	(0.80)	(0.73)	(0.85)	(0.77)
log(ASSETS)	0.112	0.102	0.121	0.015	0.017
	(0.77)	(0.64)	(0.74)	(0.13)	(0.13)
PB INDUSTRY	3.144**	3.277**	3.101**	2.957**	3.207**
	(1.99)	(2.07)	(1.98)	(1.96)	(2.05)
PERSONNELOWNERSHIP	-3.031	-2.514	-2.993		
	(-0.26)	(-0.23)	(-0.26)		
USOWNERSHIP	-2.383	-2.054	-1.971		
	(-0.47)	(-0.50)	(-0.37)		
Constant	-5.780***	-5.988***	-6.178***	-4,273***	-4.090***
	(-3.26)	(-0.39)	(-3.34)	(-4.23)	(-3.66)
Year fixed effects	Yes	Yes	Yes	Yes	Yes
No. of observations	2,178	2,209	2,465	3,253	2,503
Pseudo R^2 (McFadden)	0.290	0.279	0.283	0.158	0.249

Panel A of table 3 shows the results of analysis of different variations of Equation 1). Models (1)-(4) incorporate different temporal varieties of the first difference variables for R&D-expense/Asset ratio. Models (1)-(3) include ownership control variables, but model (4) excludes them for the following reason: ownership data is only available from 2003. If one would include the ownership controls in model (4), all firm-year observations from 2002 would be automatically dropped, which causes the main reason to limit time intervals, namely to reduce the number of firm-year observations dropped, to lose validity. For models (1)-(3) this problem does not occur, as for these years all observations prior to 2003 are automatically dropped, as no first difference data for the time interval T-3 and T-2 is available for those observations. Model (5) is a variation on model (1) and excludes the variables controlling for ownership-related factors, allowing for observations for firms not included in the Orbis ownership database. Panel A shows exclusively insignificant results for the regression analysis of Equation 1); firms that choose to shift from a two-tier to a one-tier model do not seem to experience a significantly different development in their R&D-expense/Asset ratio in the years prior to their switch. The insignificant negative coefficients visible in all models rather indicate an opposite relationship compared to the hypothesis, namely a negative correlation

between an increase in R&D/Asset-ratio and the likelihood of switches from a two-tier to a one-tier board. However, considering their insignificance, no conclusions should be drawn based upon them. Please note that the differences in observation numbers between the models result from differences in data availability; for models (1)-(4) this stems from the fact that first difference variables using data from 3 years back in time will contain more missing values, than those using data from only 2 or even 1 year back. All in all, the results in panel A do not provide statistical support for hypothesis 1. Concerning the coefficients for the control variables, none of these coefficients consistently suggests an impact of the control variables on the probability of a switch towards a one-tier model.

In contrary to panel A, results in panel B seem to be at least partially in support of the hypothesis tested. This panel shows the results of analyses of several variations of Equation 2), varying in similar manner as the different models in panel A. Highly significant, positive coefficients are found for variables describing developments in the share of total département sales for the intervals T-3 → T-0, T-2 → T-0 and T-2 → T-1, implying that increases in opportunities for private benefit extraction within these intervals significantly increase the likelihood of a firm to switch to a two-tier model in period T. Coefficients for developments in the share of total département sales between T-1 and T are positive but less or not significant; only the coefficient in model (4) is significant at the 10% level. Therefore, the model provides less support for developments in time interval T-1 and T being a significant predictor for a switch towards a two-tier model in period T. Remarkably, coefficients for developments in time interval T-3 → T-2 in model (1) and (5) are negative, be it insignificantly; increases in opportunities for private benefit extraction in this time interval are no significant predictors of a switch towards a two-tier board. Coefficients for the first difference variables of time intervals towards T (so T-1/T-2/T-3 → T) should be interpreted with care; if a firm-year observation is marked as being a 'switch' observation, the switch occurred in that specific year, year T. Hence, if a switch occurs during that year, it is being planned somewhere during that year, or potentially even in the year before, when sales figures for year T were not (entirely) known yet. Hence, one has to be very careful with interpreting this significant coefficient as being a valuable predictor of a switch. In order to mitigate this threat, a robustness test will be performed later on in this section.

Altogether, results in panel B seem to support hypothesis 2 at least partially; increases in the share of total département sales in certain time intervals (T-3 → T, T-2 → T and T-2 → T-1) significantly increase the likelihood of switches from a one-tier- to a two-tier board, while for other intervals significance is weak (T-1 → T), or coefficients are negative (T-3 → T-2), be it insignificantly. For the extent that significant positive coefficients are found, these results are congruent with prior academic literature by Block & Gerstner (2016), Demb & Neubauer (1992), Jungmann (2006), Du Plessis et. al (2017), Linck et. al (2008) and Belot et. al (2014) which suggests that firms can use more stringent and independent monitoring in order to mitigate increased opportunities for managerial private benefit extraction.

Considering the control variables, no significant relationships are found between the dependent variable and firm size (log(ASSETS)), firm financial distress (LEVERAGE) and ownership variables USOWNERSHIP and PERSONNELOWNERSHIP. However, two control variables consistently produce significant coefficients. Firstly, firm profitability operationalized by ROA in all variations of the model renders significantly negative coefficients, indicating a negative relationship between firm profitability and the likelihood of switching from a one to a two-tier board. Apparently, more profitable firms are less likely to switch to a two-tier board than their less profitable peers, and in reverse, less profitable firms are more likely to switch towards a dual board structure. This is in line with the notion by Aste (1999), who states that two-tier boards can be the preferred board choice if there is no full confidence in the competences of a board of directors. Lastly, the positive coefficients for dummy variable PBINDUSTRY, indicate that firms operating in industries with relatively high possibilities for private benefit extraction as suggested by Demsetz & Lehn (1985), indeed have a higher probability of switching to a two-tier model. This offers additional support for our hypothesized positive relationship between opportunities for private benefit extraction and the probability of a firm to shift from a one to a two-tier board.

B. Robustness test

One could argue that, as final decisions on a shift between a board structure are mostly made on shareholder meetings somewhere during the first half of the year, often around March, the decision by top management to opt for a switch is more likely to be made somewhere in the previous year, or in the first months of the year. At this time, the financial metrics of that year (T) cannot be

assessed or predicted with reasonable certainty. In order to control for this argument, the main regressions are also executed with lagged control variables for T-1, and time intervals for the independent variables of interest ending at T-1 the latest instead of T, as in the models of Table 3. Detailed results of these regressions are provided in the Appendix. Overall, these results are similar to those in table 3; for results regarding hypothesis 1, negative, insignificant coefficients are found, and coefficients for the models testing hypothesis 2 are significantly positive, with exception of coefficients for time interval T-3 → T-2. In addition to the significantly positive first difference variables found in panel B of table 3, this robustness test ads a positive coefficient for developments in the share of total département sales in time interval T-3 → T-1, significant at the 1% level. This indicates that increases in managerial private benefit extraction in time interval T-3 → T-1 significantly increase the likelihood of a firm to switch from a one-tier to a two-tier board in period T. Further differences between the results of table 3 and the results of these robustness tests are mainly found in significance and coefficient sizes of certain control variables.

C. Additional tests

Next to the above discussed logistic regressions which were introduced in the methodology section, a number of additional tests are performed, aimed at optimally using the dataset to my disposal to explore the potential determinants of firms' decisions to switch between the board structures.

The first additional test further explores the possibility of factors of ownership influencing these decisions. During the examination of annual reports of firms in years that they switched from a two-tier to a one-tier board, several times an explanation was found along the lines of 'Converging to a global standard'. One-tier boards are known to be dominant in the U.S., and therefore it appears not unthinkable that French firms switch from the traditional, continental-European two-tier board system to the Anglo-Saxon one-tier structure in order to be compatible with American business practice, or even becoming more interesting for American investors. In order to test for this, I examined whether a pattern could be identified in the development of US-based ownership stakes after a switch from a one-tier to a two-tier structure, using an OLS-regression with US-ownership stakes in future years as dependent variables. Results of these regressions are presented in table 4.

Table 4
Development of US-ownership share after switch from a two-tier to a one-tier structure

Ordinary Least Squares (OLS) regressions with first difference variables for the development of the share of ownership by U.S. based shareholders for different time intervals as dependent variable. The control group consists of firm-year observations in which a two-tier structure remained in place. Variable descriptions are provided in the Appendix. Asterisks denote significance levels at 1% (***), 5% (**) or 10% (*) levels. Robust standard errors are used.

Variable	(1) Dep: $\Delta USOWNERSHIP_{T \rightarrow T+1}$	(2) Dep: $\Delta USOWNERSHIP_{T \rightarrow T+2}$	(3) Dep: $\Delta USOWNERSHIP_{T \rightarrow T+3}$
$SWITCH_{2 \rightarrow 1}$	-0.004	0.003	-0.003
	(-0.33)	(0.28)	(-0.26)
ROA	-0.003	-0.007	0.012
	(-0.12)	(-0.11)	(0.23)
LEVERAGE	-0.000	-0.000	-0.000
	(-0.47)	(-0.19)	(-0.29)
log(ASSETS)	0.000	0.000	0.000
	(0.25)	(0.26)	(0.11)
PERSONNELOWNERSHIP	-0.042	-0.055	-0.013
	(-0.77)	(-0.77)	(-0.32)
Constant	0.022**	0.021*	0.019
	(2.20)	(1.74)	(1.58)
Year fixed effects	Yes	Yes	Yes
No. of observations	823	737	655
R^2	0.016	0.019	0.014

Coefficients for $SWITCH_{2 \rightarrow 1}$ are slightly negative in model (1) (time interval T → T+1 for the dependent variable) and model (3) (time interval T → T+3), slightly positive in model (2) (time interval T → T+2), and insignificant in all three models. Hence, for the switches from a two-tier to a one-tier board in my dataset, no significant increase in US-based ownership stake is identified in the years following their switch, leaving no indication that French firms switch to a one-tier board model to become more attractive for U.S.-based investors.

The second additional test considers the potential influence of developments in large ownership stakes on firms' decisions to switch from a one-tier to a two-tier board. As discussed in the review of relevant academic literature, the theoretical framework by Graziano & Luporini (2012) suggests that high ownership concentration might make a two-tier board structure more favorable; this would leave the initiative with the managerial board, enhancing their levels of effort which eventually leads to beneficial outcomes for the large shareholder as well. This notion was supported by empirical findings by Pellegrini et. al (2010), who found that a larger combined ownership concentration by the largest and second largest shareholder was a significant predictor of a firm having a two-tier board structure in place.

In order to test whether this ownership concentration among the largest shareholders could in fact influence firms' decisions to switch from a unitary to a dual board, I examined, in a similar manner as main regression equations 1) and 2), whether developments in ownership concentration among the two largest shareholders in time intervals preceding T can be identified as significant predictors of a switch to a two-tier board in period T. Results of these regressions are provided in Table 5. In all four models, the independent variables of interest show insignificant correlations with the dependent variable. Hence, based on these models, there is no indication that increased combined ownership share by the two largest shareholders can be a predictor of a firms' switch to a two-tier board. Please note that, in contrast to the models in table 3, in all models in table 5 ownership

Table 5
Alternative determinant of a switch to a two-tier board: large shareholder ownership
Results of a logistic regression using penalized likelihood estimators, following a variation of Equation 2), with a dummy variable for a switch from a one-tier to a two-tier board as dependent variable, and historical first-difference variables indicating intertemporal changes in the ownership share by the two largest shareholders of a firm. The control group consists of firm-year observations in which a one-tier structure remained in place. Variable descriptions are provided in the Appendix. Asterisks denote significance levels at 1% (***), 5% (**) or 10% (*) levels.

Variable	(1)	(2)	(3)	(4)
Δ2LARGESTSHARES$_{T-3 \rightarrow T-2}$	0.975			
	(0.79)			
Δ2LARGESTSHARES$_{T-3 \rightarrow T}$		-0.798		
		(-0.78)		
Δ2LARGESTSHARES$_{T-2 \rightarrow T-1}$	0.828			
	(0.57)			
Δ2LARGESTSHARES$_{T-2 \rightarrow T}$			-1.408	
			(-1.71)	
Δ2LARGESTSHARES$_{T-1 \rightarrow T}$	-1.414			-0.568
	(-1.13)			(-0.59)
ROA	-2.477**	-2.650**	-3.196***	-3.139***
	(1.99)	(-2.11)	(-2.69)	(-2.66)
LEVERAGE	0.080*	0.071	0.042	0.039
	(1.84)	(1.55)	(0.93)	(0.91)
log(ASSETS)	-0.072	-0.034	0.078	0.102
	(-0.45)	(-0.19)	(0.51)	(0.70)
PB INDUSTRY	3.027*	2.941*	2.764*	2.850*
	(1.92)	(1.74)	(1.79)	(1.87)
PERSONNELOWNERSHIP	1.055	2.955	-1.999	-2.913
	(0.09)	(0.22)	(-0.18)	(-0.25)
USOWNERSHIP	-3.122	-6.486	-3.094	-3.019
	(-0.33)	(-0.13)	(-0.46)	(-0.46)
Constant	-3.300	-2.961**	-3.495***	-5.970***
	(-2.14)	(-2.29)	(-3.04)	(-3.44)
Year fixed effects	Yes	Yes	Yes	Yes
No. of observations	2,003	2,033	2,279	2,591
Pseudo R^2 (McFadden)	0.341	0.317	0.285	0.256

controls were included. This was done because of the fact that by default all firm-observations omitting ownership data were excluded in these analyses, as the dependent variable is constructed

based on ownership data. Leaving these ownership controls out, would therefore not increase the sample size and is hence not relevant here.

D. Alternative explanations: a qualitative exploration of reasons given by firms

In previous sections, no statistically significant predictors for switches from two-tier to one-tier board structures, hypothesized to be significant predictors of firms having a one-tier board based on prior theoretical and empirical literature, were found. For switches from a one-tier to a two-tier board, results suggest that developments in opportunities for private benefit extraction might indeed play a role in switches, as hypothesized. Next to these quantitative, statistical tests, I also attempted to look into alternative explanations for switches between the models, which could be more in line with notions by Aste (1999), who stated some specific examples in which switches from one-tier to two-tier boards are rather the result of practical factors such as mergers between two firms, or shifts towards a new, young management team. Likewise, Hermalin & Weisbach (1988) observed significant changes in board composition after CEO succession events. In the situations described by Aste (1999), a shift to a two-tier board structure can be instrumental. In a merger, both merging parties can obtain a 'key' position through a two-tier board structure, by letting one party provide the CEO (management board) and the other the Chairman of the supervisory board. When a company decides to replace the (older) management team with a new, young generation of managers, a two-tier board might form an ideal transition mechanism; the old managers can take a seat in the supervisory board and stay involved within the company, while the real operational responsibilities are let to the new generation operating in the management board. As a starting point for exploration of these alternative determinants for firms' choices to switch between the systems, I examined annual reports and news articles around switches, looking for reasons given by the company for the switch. An overview of these reasons can be found in table 7. I simplified the wide variety of reasons given by manually assigning them to several 'general' reasons, based on my own interpretation.

As is visible in panel A of this table, the most mentioned reason given for a switch from a two-tier to a one-tier board fell in the category 'enhanced reactivity and efficacy'. This seems to be in line with theory by Block & Gerstner (2016), Jungmann (2006), Krivogorsky (2006) and du Plessis et. al, (2017) as discussed in the theoretical background; unitary boards are quicker and more agile, as

they allow for smoother decision-making processes, resulting from independent directors being more closely involved in the company's day-to-day executive management. This is also reflected by the fourth most mentioned reason, 'enhanced involvement by independent directors'. Other important reasons are related to shareholders. 'Ownership issue' contains a variety of reasons involving certain restructurings of ownership or agreements among owners. 'Improved shareholder influence' reflects situations in which a switch to a one-tier board was reportedly induced by the desire of shareholders to increase their influence; this could probably be achieved better in a one-tier board, as independent directors in a unitary, among which often a shareholder-representative, are more closely involved with the company's day-to-day decision making process relative to independent directors in a dual board system. Among other reasons encountered are 'Changed regulations', 'Align with international standards' and 'Return to old situation'. In the latter case, a firm explicitly mentions that, after having exhibited the two-tier model for a number of years, the company wants to return to its 'traditional' one-tier board model, without further specifying why such a return was considered desirable.

Panel B displays a summary of reasons found to be stated by companies that decided to switch from a one-tier to a two-tier board model. Remarkably, in 7 of the 14 cases in which a reason was specified, it was related to an improved separation of roles between the executive and supervisory organs of governance. Like is the case with the major reason given for a firms' decision to switch to a one-tier board, this 'separation of roles'-argument is in line with the most important theories on two-tier boards as discussed in the theoretical background of this thesis, by Block & Gerstner (2016), Demb & Neubauer (1992), Jungmann (2006) and du Plessis et. al (2017), and is hence also in line with the statistically significant results found in analysis of hypothesis 2 of this study.

Again, ownership-related reasons such as ownership- agreements and restructurings play a significant role here. Apart from that, a recent crisis experienced by the company and transitions to a new, 'younger' generation of managers play a role, the latter being explicitly in line with the reasons Aste (1999) mentioned for firms' switches to a two-tier model.

Table 6

Summary of reasons for switches found in annual reports and news articles around firms' switches

Panel A shows list of reasons found through scanning of related annual reports and news articles of firms that decided to switch from a 2- to a one-tier board, simplified based on own interpretations. In the column *'Frequency'* is denoted how often a certain reason was encountered. This column's total exceeds (55) exceeds the total number of switches from a 1- to a two-tier board (54), as in 1 occasion two reasons were mentioned. The column *'Percentage'* simply divides the frequency of a reason by total number of reasons found (55). Panel B expresses the same for switches from a 1- to a two-tier board. In this panel the sum of frequencies (24) exceeds the total number of shifts from a 2- to a one-tier board (23) as well, for the same reason as for panel A. *Represents reasons of unclear character such as 'to bring status more in line with the way the company operates' and 'in order to follow best practices in governance'. **Represents the number of cases in which no reason was mentioned in either the annual reports around a switch or news articles obtained through the Factiva search engine.

Panel A: Reasons stated by firms for a switch from a two-tier to a one-tier board

Reason (multiple is possible)	Frequency	Percentage
Enhanced reactivity and efficacy	10	18%
Ownership issue	4	7%
Improved shareholder influence	3	5%
Enhanced involvement by independent directors	3	5%
Merger	3	5%
Changed regulations	2	4%
Align with international standards	2	4%
Return to traditional situation	2	4%
Enhanced efficiency	1	2%
Part of a restructuring process	1	2%
Avoid statutory age limit president supervisory board	1	2%
Simplification of governance	1	2%
Unclear*	6	11%
Unknown**	16	29%

Panel B: Reasons stated by firms for a switch from a one-tier to a two-tier board

Reason (multiple is possible)	Frequency	Percentage
Better separation of roles	7	29%
Ownership-related issue	3	13%
Company crisis	2	8%
Transition to a new management team	2	8%
Unclear*	1	4%
Unknown**	9	38%

Although incompletely and partially colored by own interpretation, these lists offer another perspective on determinants of companies' decisions to switch between the two systems of board structure; these reasons are the reasons for switches the companies choose to communicate with the public. These stated reasons, for both switching directions, seem to be more in accordance with

literature on the topic, than empirical results of the statistical analysis in this study might suggest, especially as it comes to switches towards one-tier board structures. Hence, from this we can infer that it is not unthinkable that these reasons do not always capture the real underlying reasons a company decided to switch.

In the next, concluding section of this paper, the implications of the findings discussed in this results section will be assessed.

5. Conclusion, limitations and directions for future research

The aim of this thesis was to conduct a first exploration of the factors leading firms to opt for a switch between one-tier- and two-tier boards, through an attempt to answer the question: *Do developments in factors eventually found to differ among firms with one-tier and two-tier boards actually lead to switches between the two systems?* Where a few studies had been conducted in order to examine differences between firms using the different systems, this thesis is, to my knowledge, the first to explicitly examine statistical predictors of actual shifts between the systems. A small number of prior studies established cross-sectional differences between groups with one-tier and two-tier boards, and made inferences from this about determinants of board structure choices. However, these studies assume that cross-sectional differences are the true underlying reason for these firms to opt for this model. This study challenged this assumption, and tested whether, in the years before a switch, we could actually observe changes in firm characteristics which we would, based on prior academic literature, expect to lead firms to switch between the models.

In the light of a rapidly increasing number of countries enabling companies to make their own choices regarding the board structure they want to operate, the question what drives these switches in practice becomes increasingly relevant; are they indeed driven by factors related to firm characteristics, such as opportunities for managerial private benefit extraction and information asymmetry, or, alternatively, could more practical reasons also play their part?

This paper built forth on theoretical models by Adams & Ferreira (2007) and Graziano & Luporini (2012), and the empirical study on predictors of firms using either one of the board models by Belot et. al (2014). Based on findings of these studies, hypotheses were constructed predicting that

increases in information asymmetry would be associated with an increased probability of a switch to a one-tier model, and increased opportunities for managerial private benefit extraction would be associated with an increased probability of a switch to a two-tier model in consecutive periods. Results obtained through extensive empirical testing of these hypotheses on an extensive sample of French listed firms included in the SBF250/CAC All-Tradable index over a period of 2001-2018, in which 77 switches between the two board systems were identified, provide mixed support for these hypothesized relations.

With regard to hypothesis 1, predicting a positive relationship between increases in information asymmetry and the probability of a switch from a dual to a unitary board structure in consecutive years, logistic models did not render statistically significant results. Hence, my analyses do not indicate that increases in information asymmetry are related to switches towards one-tier models in consecutive years, implying that hypothesis 1 cannot be accepted. However, through analysis of the second hypothesis, I found consistent statistical evidence that increases in opportunities for managerial private benefit extraction in intervals T-3 → T, T-2 → T-1 and T-2 → T are highly significant predictors of a switch from a one-tier to a two-tier board in year T. For time intervals T-3 → T-2 and T-1 → T non-significant positive or even negative coefficients were found. From this, one could make certain inferences about the timeline of decision-making processes related to board structure switches. Given the insignificant coefficient for T-3 → T-2, one could conclude that when increased levels of managerial private benefit extraction are observed, firms typically do not wait 2-3 years before switching to a two-tier board. Given the insignificant coefficient for T-1 → T, neither does it appear likely that firms act immediately. Rather, results suggest that firms typically respond with a switch towards a two-tier board within 1-2 years since the moment they observe increased levels of managerial private benefit extraction. However, as coefficients for developments over time intervals T-3 → T and T-2 → T are still significant, further research to examine this temporal pattern is necessary.

Revisiting the research question, I cannot give one, definite answer. Based on statistical analyses of the presented hypotheses, degree of information asymmetry, which is found to differ among firms with one-tier and two-tier board structures, does not seem to induce switches to one-tier board systems. On the other hand, the degree to which a firm offers opportunities for managerial private

benefit extraction, which is also found to differ among firms with one-tier and two-tier boards, does seem to be a significant predictor a switch towards a two-tier board.

Hence, answering the research question, this paper indicates that *developments in some factors eventually found to differ among firms with one-tier and two-tier boards seem to actually lead to switches between the two systems, while developments in others do not.*

Thus, this thesis partially underwrites existing academic literature on conditional optimality of one-tier and two-tier board structures, such as the theoretical framework by Adams & Ferreira (2007), stating that two-tier board structures are optimal for firms with widespread opportunities for managerial private benefit extraction. In the broader context of board structure decisions, these findings are in line with a wide basis of theoretical work (Block & Gerstner, 2016; Demb & Neubauer. 1992; Jungmann, 2006; Du Plessis et. al, 2017) as well as the empirical research (Linck et. al, 2008) which found that high levels of opportunities for managerial private benefit extraction calls for more outsiders on a board.

On the other hand, no support can be given for the notion increased levels of information asymmetry would induce firms to opt for a one-tier board structure, as suggested by Adams & Ferreira (2007). However, to state that my results undermine this theoretical construct is too short sighted; my study suffers several limitations which I will address next, such as small numbers of events limiting their use in refuting conclusions drawn by professional financial academicians through an extensive study.

Furthermore, to my opinion, results of this study show that the assumption that cross-sectional differences between firms with one-tier and two-tier boards on certain variables imply that these variables are determinants of board structure choices, deserves further questioning.

This brings me to what is, to my perception, the major contribution of this thesis to the academic literature on the determinants of board structure decisions. Pellegrini et. al (2012), as well as Belot et. al (2014) have made first attempts to, through empirical analysis, identify the determinants of the choice between a one-tier and two-tier board structure, by examining cross-sectional differences between groups who chose a different structure. Although, as my descriptive statistics show, my sample shows similar cross-sectional differences between the two groups of firms as the sample of Belot et. al (2014), developments in the determinants established by Belot et. al (2014)

only have limited predictive power on switch decisions by firms. Therefore, I believe my thesis shows that although this initial cross-sectional analysis provides a useful bridge between theoretical literature as the framework by Adams & Ferreira (2007), more extensive research on the determinants of firms' board structure choices is needed to uncover the true, underlying factors of these decisions, examining of developments around switches, rather than cross-sectional differences between firms with different board structures. My qualitative examination of the reasons given by firms for their switches rendered widely varying results; some indeed mention advantages of board models which correspond with existing theories, but others give rather practical reasons, or do not provide any motivation for their decision. The best way to achieve this might even be by combining quantitative and qualitative research methods, as both board structure models are observed to be converging as they learn from each other (Krivogorsky, 2006; du Plessis et. al, 2017), and switches might often serve rather ad-hoc, practical purposes, than truly providing the company with a board structure optimally fitting its underlying business reality (Aste, 1999).

To my own understanding, this research faces three major limitations. First of all, the small number of switches observed limits the statistical power of the analyses, and causes individual cases to have a relatively large impact on the eventual coefficients. This holds especially for switches to a two-tier model, of which only 23 were identified in the period 2001-2018. Next to enlarged impact of individual observations, small numbers of events cause standard errors to inflate, limiting the statistical significance of results.

Second, the model only incorporates a very limited list of control variables. The paper by Belot et. al (2014), on which this paper aims to build forth, uses a far wider variety of control variables, such as dummy variables for CEO tenure, bid-ask spreads, firm age and the issuance of dual class shares. Many of these variables were collected through time consuming data collection processes, which time constraints did not allow me to replicate. Omission of these control variables limits the comparability of my results to the findings by Belot et. al (2014), and therefore limits the extent to which they can be used to question the implications of their findings.

Third, the external validity of the results is questionable, as they just represent the unique French situation. Countries differ a lot in their corporate cultures, legislations, and practices, and if we really want to know whether allowing firms to choose their board model freely is something that

should be promoted on a global scale, we should have quantitative results on samples of firms from different countries.

Following these limitations, I believe future research on the topic should primarily be performed on a wide international basis, with inclusion of a wide variety of control variables. Examining samples of firms in multiple countries increases the number of switches examined and increases the external validity of the results. A problem with this, is that many countries only very recently implemented regulations allowing firms to switch freely between board structures. Hence, it might take some time before enough data is available to perform such a large-scale research. However, when these conditions are met, a more definite answer can be given on the question what really drives firms to switch between different board structures. In the light of the increasing list of countries allowing firms to switch, results of such a study will become interesting for an increasing group of regulators, shareholders and other stakeholders of companies in Europe and all around the world, for which the driving forces behind switches to other board models can have meaningful implications.

Bibliography

Adams, R. B., & Ferreira, D. (2007). A theory of friendly boards. *The journal of finance*, 62(1), 217-250.

Admati, A. R., Pfleiderer, P., & Zechner, J. (1994). Large shareholder activism, risk sharing, and financial market equilibrium. *journal of Political Economy*, *102*(6), 1097-1130.

Aste, L. J. (1999). Reforming French corporate governance: A return to the two-tier board. *Geo. Wash. J. Int'l L. & Econ.,* 32, 1.

Barker, R. (2013). *The diversity of board structures in Europe (public companies).*

Belot, F., Ginglinger, E., Slovin, M. B., & Sushka, M. E. (2014). Freedom of choice between unitary and two-tier boards: An empirical analysis. *Journal of Financial Economics,* 112(3), 364-385.

Block, D., & Gerstner, A. M. (2016). One-tier vs. two-tier board structure: A comparison between the United States and Germany.

Bolton, P., & Von Thadden, E. L. (1998). Blocks, liquidity, and corporate control. *The journal of finance*, *53*(1), 1-25.

Boone, A. L., Field, L. C., Karpoff, J. M., & Raheja, C. G. (2007). The determinants of corporate board size and composition: An empirical analysis. *Journal of financial Economics* 85(1), 66-101.

Boyd, B. K. (1995) CEO Duality and Firm Performance: A Contingency Model. *Strategic Management Journal,* 16: 301±312.

Chen, M. Y. (2014). Determinants of corporate board structure in Taiwan. *International Review of Economics & Finance*, 32, 62-78.

Coles, J. L., Daniel, N. D., & Naveen, L. (2008). Boards: Does one size fit all? *Journal of financial economics*, 87(2), 329-356.

Davies, P. L. (2001). Board structure in the UK and Germany: convergence or continuing divergence? Available at SSRN 262959.

Demb, A., & Neubauer, F. F. (1992). The corporate board: Confronting the paradoxes. *Long range planning*, 25(3), 9-20.

Demsetz, H., Lehn, K., 1985. The structure of corporate ownership: causes and consequences. *Journal of Political Economy*, 93, 1155–1177.

Du Plessis, J. J., Großfeld, B., Luttermann, C., Saenger, I., Sandrock, O., & Casper, M. (2017). *German corporate governance in international and European context*. Springer.

L. Fulton (2015) Worker representation in Europe. Labour Research Department and ETUI

Firth, D. (1993). Bias reduction of maximum likelihood estimates. *Biometrika*, *80*(1), 27-38.

Graziano, C., Luporini, A., 2012. Ownership concentration, monitoring, and optimal board structure. *Economics Bulletin,* 32, 3333–3346.

Gompers, P. A., Ishii, J., & Metrick, A. (2009). Extreme governance: An analysis of dual-class firms in the United States. *The Review of Financial Studies*, *23*(3), 1051-1088.

Hermalin, B. E., & Weisbach, M. S. (1988). The determinants of board composition. *The RAND Journal of Economics*, 589-606.

International Finance Corporation. (2015). *A guide to corporate governance practices in the European Union*

Jungmann, C. (2006). The effectiveness of corporate governance in one-tier and two-tier board systems– Evidence from the UK and Germany–. *European Company and Financial Law Review*, 3(4), 426-474.

Krivogorsky, V. (2006). Ownership, board structure, and performance in continental Europe. *The International Journal of Accounting,* 41(2), 176-197.

Linck, J. S., Netter, J. M., & Yang, T. (2008). The determinants of board structure. *Journal of financial economics*, 87(2), 308-328.

Millet-Reyes, B., & Zhao, R. (2010). A comparison between one-tier and two-tier board structures in France. *Journal of International Financial Management & Accounting,* 21(3), 279-310.

Peij, S. C., Bezemer, P. J., & Maassen, G. F. (2012). The effectiveness of supervisory boards: an exploratory study of challenges in Dutch boardrooms. *International Journal of Business Governance and Ethics*, 7(3), 191-208.

Pellegrini, C. B., Pellegrini, L., & Sironi, E. (2010). Why Do Italian Joint Stock Companies Adopt One or Two-Tier Board?. *Rivista Internazionale di Scienze Sociali*, 3-25.

Raheja, C. G. (2005). Determinants of board size and composition: A theory of corporate boards. *Journal of financial and quantitative analysis,* 40(2), 283-306.

Roe, M., 1993. Some differences in corporate structure in Germany, Japan, and the United States. *Yale Law Journal* 102, 1927–2003

Tricker, R. (1994) International Corporate Governance, Prentice-Hall, New York

Tungler, G. (2000). Anglo-American Board of Directors and the German Supervisory Board-Marionettes in a Puppet Theatre of Corporate Governance or Efficient Controlling Devices. *Bond L. Rev.*, 12, i.

Williams, R. (2018). Analyzing Rare Events with Logistic Regression. University of Notre Dame. International Finance Corporation. (2015). *A guide to corporate governance practices in the European Union.*

Appendix

1 - Variable definitions

$SWITCH_{1 \rightarrow 2}$ – Dummy variable taking value 1 for firm-year observations in which a switch from a one-tier- to a two-tier board occurred *(source: Factiva, ThomsonOne, annual reports, retrieved from Bloomberg and Eikon)*

$SWITCH_{2 \rightarrow 1}$ - Dummy variable taking value 1 for firm-year observations in which a switch from a two-tier- to a one-tier board occurred *(source: Factiva, ThomsonOne, annual reports, retrieved from Bloomberg and Eikon)*

R&D/ASSETS – Continuous variable calculated by dividing a firm's R&D-expense by its total value of assets *(source: CompuStat)*

SHAREDEPSALES – Continuous variable calculated by dividing a firm's sales by the total firms of listed firms included in the dataset which operated in the same French département *(source: CompuStat, regions-et-departements.fr)*

LEVERAGE – Continuous variable calculated by dividing the total value of a firm's financial obligations by the total value of common equity *(source: CompuStat)*

PB INDUSTRY – Dummy variable taking value 1 for firms with the following SIC-codes: 7911, 7922, 7929, 7933, 7941, 7948, 7991–7993, 7996–7997 and 7999 *(Source: CompuStat)*

log(ASSETS) - Continuous variable calculated by taking the natural logarithm of a firm's total value of assets *(Source: CompuStat)*

ROA – Return on assets, continuous variable calculated as a firms' total net income divided by total value of assets *(Source: CompuStat)*

PERSONNELOWNERSHIP – Continuous variable, calculated as the sum of all ownership shares of a firm owned by entities with 'Personnel' in its name *(Source: Orbis)*

USOWNERSHIP - Continuous variable, calculated as the sum of all ownership shares of a firm owned by entities based in the U.S. *(Source: Orbis)*

2LARGESTSHARES – Continuous variable, calculated as the sum of ownership shares by the largest and second largest shareholder *(Source: Orbis)*

2 - Results of robustness test with lagged control variables

Table 7

Robustness check of main regressions, omitting data from observation year itself

Panel A contains the results of a logistic regression using penalized likelihood estimators, following different variations of Equation 1), as presented in the methodology section, with a switch dummy for a switch from a two- to a one-tier model as dependent variable. In these models, only firm-year observations in which either a two-tier board was present, or a switch to a one-tier board occurred, are included. Panel B presents the results of a logistic regression following different variations of Equation 2), with a switch dummy for a switch from a one- to a two-tier model as dependent variable. Variable descriptions are provided in the appendix. In these models, only observations in which either a one-tier board was present, or a switch to a two-tier board occurred, are included. Asterisks denote significance levels at 1% (***), 5% (**) or 10% (*) levels.

Panel A: Switch from a two-tier to a one-tier board as dependent variable

Variable	(1)	(2)	(3)	(4)
ΔR&D/ASSETS $_{T-3 \rightarrow T-2}$	-7.039			-8.167
	(-1.19)			(-1.39)
ΔR&D/ASSETS $_{T-3 \rightarrow T-1}$		-7.743		
		(-1.49)		
ΔR&D/ASSETS $_{T-2 \rightarrow T-1}$	-8.320		-4.296	-9.729
	(-1.27)		(-0.77)	(-1.50)
ROA$_{T-1}$	-2.331	-2.248	-1.383	-2.823*
	(-1.47)	(-1.40)	(-0.97)	(-1.86)
LEVERAGE $_{T-1}$	0.047	0.047	0.045	0.037
	(1.35)	(1.39)	(1.30)	(1.15)
log(ASSETS) $_{T-1}$	0.027	0.027	0.061	0.041
	(0.29)	(0.30)	(0.67)	(0.47)
PERSONNELOWNERSHIP $_{T-1}$	0.519	0.578	1.317	
	(0.09)	(0.10)	(0.26)	
USOWNERSHIP $_{T-1}$	2.947	2.967	2.894	
	(1.21)	(1.21)	(1.27)	
Constant	-4.538***	-4.549***	-4.942***	-3.984***
	(-2.88)	(-2.89)	(-3.15)	(-3.90)
Year fixed effects	Yes	Yes	Yes	Yes
No. Of observations	632	635	708	799
Pseudo R^2 (McFadden)	0.087	0.087	0.088	0.067

Panel B: Switch from a one-tier to a two-tier board as dependent variable

Variable	(1)	(2)	(3)	(4)
ΔSHAREDEPSALES$_{T-3 \rightarrow T-2}$	-11.492			-9.028
	(-1.56)			(-1.38)
ΔSHAREDEPSALES$_{T-3 \rightarrow T-1}$		11.716***		
		(3.23)		
ΔSHAREDEPSALES$_{T-2 \rightarrow T-1}$	13.328***		12.890***	13.038***
	(3.08)		(3.14)	(3.15)
ROA $_{T-1}$	4.179	-1.455	-1.182	3.592
	(1.62)	(-0.45)	(-0.21)	(1.33)
LEVERAGE $_{T-1}$	0.049	0.037	0.037	0.036
	(1.12)	(0.87)	(0.80)	(0.90)
log(ASSETS) $_{T-1}$	-0.002	0.003	0.021	-0.012
	(-0.01)	(0.02)	(0.13)	(-0.09)
PB INDUSTRY $_{T-1}$	3.379**	3.067*	3.039*	3.278**
	(2.09)	(1.95)	(1.93)	(2.05)
PERSONNELOWNERSHIP $_{T-1}$	5.834	5.740	5.327	
	(0.62)	(0.66)	(0.59)	
USOWNERSHIP $_{T-1}$	1.755	1.544	1.680	
	(0.76)	(0.64)	(0.69)	
Constant	-5.306***	-5.384***	-5.592***	-3.985***
	(-3.05)	(-2.98)	(-3.17)	(-3.49)
Year fixed effects	Yes	Yes	Yes	Yes
No. of observations	2,184	2,185	2,378	2,511
Pseudo R^2 (McFadden)	0.259	0.253	0.262	0.222

3 - Results of multicollinearity test for independent variables of interest

Table 7

Results of multicollinearity testing of independent variables of interest for hypotheses 1 and 2

Table contains VIF-coefficients for the different first-difference variations of the main independent variables of interest examined in the paper's analysis. Values >5 typically indicate problematic multicollinearity, making variable unsuitable for joint analysis. Panel A contains VIF values for the independent variables of interest used to test hypothesis 1, concerning the relationship between changes in R&D/Asset ratio and the probability of a firm to switch from a two-tier to a one-tier board. Panel B contains VIF values for the independent variables of interest used to test hypothesis 2, concerning the relationship between changes in the share of listed firms in the same département and the probability of a firm to switch from a one-tier to a two-tier board.

Panel A: Independent variables of interest, hypothesis 1

Variable	VIF
ΔR&D/ASSETS$_{T-3 \rightarrow T-2}$	1.11
ΔR&D/ASSETS$_{T-2 \rightarrow T-1}$	1.18
ΔR&D/ASSETS$_{T-1 \rightarrow T}$	1.14

Panel B: Independent variables of interest, hypothesis 2

Variable	VIF
ΔSHAREDEPSALES$_{T-3 \rightarrow T-2}$	1.00
ΔSHAREDEPSALES$_{T-2 \rightarrow T-1}$	1.01
ΔSHAREDEPSALES$_{T-1 \rightarrow T}$	1.00