Director age and incentives: Effect on Firm Performance

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Abstract

As a director gets closer to retirement, she has fewer incentives to allocate as much time to each directorship as she did when younger. Using a reduction in director busyness as a result of a M&A, as in Hauser (2018), I find that firm performance increases for interlocked firms only when the director losing a directorship is older, consistent with the notion that older directors do not put in optimal effort to their directorships before the lost of a directorship. This performance comes from an improvement in advising, as shown thorough better acquisitions. and improvements in monitoring shown through changes in CEO turnover. These results are consistent with a model in which, first, the time allocated by a director in her job increases firm performance, although with diminishing increments. Second, older directors allocate less time to each directorship than younger directors due to having fewer incentives to do so.

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1 Introduction

Following scandals that resulted in part from a lack of monitoring from boards of directors, policy measures such as the Sarbanes-Oxley Act of 2002 were enacted to force public companies to include more independent directors on their boards. Sarbanes-Oxley's goal was to reduce the entrenchment of CEOs and increase boards monitoring but also had another effect. To comply with this law, firms had to either hire new independent directors to add to the board or replace inside directors, or reduce board size by dropping inside directors from the board. Most firms used the first approach, as on average board size has not decreased since the passage of the law. As a consequence, the demand for independent directors increased while the supply remained unchanged. This higher demand is particularly significant for more prominent firms, as they require experienced directors. Higher demand for independent directors has led to two developments: many directors have multiple directorships, apart from other job positions they can hold, and the average age of board members has been increasing, as shown by Masulis et al. (2019).

Regarding the multiple directorships, the busyness literature has studied whether being on multiple boards adversely affects firm performance, on the theory that busy directors are too busy to allocate the optimal amount of time to each directorship. This literature largely considers a director busy when she has at least three directorships, or six when retired (as she has more available time at her disposal). Initial results were mixed, but currently, the evidence seems to favor an adverse effect due to busyness (Hauser (2018) and Falato et al. (2014)). Based on this evidence, shareholders are often advised to vote against busy directors. For example, in their 2019 United States Proxy Voting Guidelines, Institutional Shareholder Services (ISS) states: "Generally vote against or withhold from individual directors who: Sit on more than five public company boards; or are CEOs of public companies who sit on the boards of more than two public companies besides their own."

The literature has not adequately addressed the effect of director age. To the best of my knowledge, Masulis et al. (2019) is the first paper to address the recent trend of increasing average board age and its influence on firm performance. They find a greater proportion of directors in the board who are 65 years or older is negatively associated with firm performance. Shareholders recommendations do not focus on this topic. Still, ISS recommends: "Vote against management and shareholder proposals to limit the tenure of outside directors through mandatory retirement ages." Although ISS's recommendation concentrates on tenure, we can see here a discrepancy between empirical results on age and shareholder recommendations.

In this paper, I study the affect on firm performance of the interaction between director age and multiple directorships. I concentrate on directors' incentives, trying to address if directors allocate as much time as needed to their positions. The literature has not concentrated on how the director's incentives determine how much time she allocates to her job[1] based on her career evolution; this paper tries to address this limitation.

As a director gets closer to retirement, her incentives to allocate time into her job start decrease. One reason is that the present value of each of her directorships is small when she is closer to retirement. A second reason, as Fama and Jensen (1983) conjecture, is that a big part of directors' incentives are to gain new positions, and this is less likely and valuable when they are close to retirement. Therefore, the benefits that a director gets from a directorship decrease with age. Assuming the costs do not decrease with age, an older director will allocate less time than a younger director to the same number of directorships, all else equal.

The busyness literature has concentrated on whether directors' busyness is detrimental to firm performance, where busyness is determined solely based on the number of directorships held. Here, I employ a different approach. Directors of different age have different incentives values, which produce varying allocation of time. If a director is valuable for a firm, these decreasing incentives as she ages could lead to older directors allocating less-than-optimal time for the firm. If this is the case, firm performance will increase if the director reduces

[1]An exception is Masulis and Mobbs (2014), who show that directors put a higher effort into directorships that they consider more relevant for their reputation.

their number of directorships.

Empirically, the effect of number of directorship on firm performance is difficult to test as the number of directorships, and whether a director accepts or abandons a position, are endogenous. High-quality directors are appointed to more seats, while lower quality ones tend to have fewer seats. To minimize this problem, I need an exogenous change in the number of directorships a director holds. Following Hauser (2018), I use a M&A as a shock to a director busyness. When a firm is acquired, generally its board is disbanded, so its members lose a directorship. Hence, this reduction should be exogenous to interlocked firms. After this shock, affected directors have more time to allocate among their remaining directorships, potentially increasing firm performance, and I can study how this effect differs depending on the shocked director's age.

My model assumes an increasing and concave benefit function for the time allocated by a director in a seat, and an increasing but convex cost function of this time allocated. My model shows that older directors (with their lower benefits) will assign less time to each position than a younger director, ceteris paribus. My results assume that a director increases firm performance with time allocated, but with decreasing productivity. This assumption comes from the law of diminishing returns. In this case, when an older director loses a directorship, the effect on firm performance can be more favorable than if the director is younger.

I proxy firm performance with ROA and Tobin's Q and find that interlocked firms for which the shocked director is at least 65 years old are the primary beneficiaries of his or her reduction in busyness. When one of these older directors loses one position, the firm increases on average its ROA by 0.4% annually and the logarithm of Tobin's Q by 1.25%; where both results are statistically significant at 1%. The effects of a younger director are small and not statistically significant. These results also appear when I just consider the actual age of the shocked director instead of a dummy variable; as age increases, firm performance does so after the busyness change.

Older directors have obviously been with their firms for a longer period of time; maybe this higher tenure is the cause of the gains in firm performance. Kim et al. (2014) find that outside directors tenure affects monitoring and advising quality. Huang and Hilary (2018) show that board tenure exhibits an inverted Ushaped relation with firm value. I check this hypothesis by dividing the sample of shocked firms based on whether the shocked director has been on the firm at least seven years or not. Results show the opposite effect; directors with lower tenure are the ones that increase firm performance, so results due to director's age are not driven by their tenure.

In addition, the model assumes that directors benefit the same from all directorships and therefore employ the same amount of time in each position, but this may not be the case. More visible firms affect directors reputation more, which means a director might put more effort into more prominent firms, as shown by Masulis and Mobbs (2014). Therefore, again, I divide the sample of shocked firms on firms that are above or below that shocked director's average firm's size. I find, consistent with Masulis and Mobbs (2014), that directors allocate more of their extra time on more prominent firms. Still, smaller firms also benefit from the director's extra time , because as she was spending less time on them before the loss of a directorship the marginal benefit of this extra time is high.

I study three different channels that can explain this improvement on firm performance: director participation, advising role, and monitoring role. On director participation, I study if directors that lose a directorship are less likely to miss most of the board meetings and if they accept more positions on a firm's committees. In both cases, I concentrate on whether these changes are different depending on the director's age. For attendance, I test whether directors have fewer attendance problems the year after losing a position due to an acquisition; a director is considered to have an attendance problem when she misses at least 75% of the annual board meetings. As most directors do not miss that high a percentage of meetings, the results are small and insignificant when considering all directors, so I consider only directors that had an attendance problem or firms where this situation occurred during the sample period. Using these two specifications, I find that older directors are less likely to have attendance problems the year after the shock, although none of these results is significant. Considering committee participation, I find that younger directors are likely to increase the number of positions in committees after the shock, both as a member or as a chair, whereas this change is not present for older directors. Based on these two tests, it does not seem that the improvement in firm performance comes from older directors being more involved in their boards.

I also study abnormal returns around an acquisition to test a director's monitoring improvements after losing a directorship. I find that firms make better acquisitions when such an acquisition occurs the year after a director loses a position, but this effect is only statistically significant when the director is at least 65 years old, wherein firm returns increase by nearly a 1% during days -2 to +2 of the acquisition. This result shows that in part, at least, firm performance increases due to improved advising by an older director that has extra time to allocate.

To check changes in monitoring effort, I study CEO turnover. Firms at which a director loses a directorship are more likely to change CEOs following underperformance. This effect occurs mainly when an older director is the one who lost a position. The lack of more explicit results could be a consequence of the heterogeneous characteristics of the directors involved and how they contribute to different areas of a board's responsibilities.

This paper contributes to the literatures on director's incentives, director's busyness, and the importance of directors' characteristics.

First, a director's job is susceptible to the principal-agent problem, whereby an agent (director) works for a principal (shareholders). Because only the agent suffers the cost of effort, the principal has to incentive the agent to employ optimal effort. Director compensation has some particularities; members are generally paid the same amount based on their committee memberships, as it is also difficult to disentangle individual performance on the board. Therefore, as Fama and Jensen (1983) stated, directors are often motivated by career concerns. This has been studied in the literature such as Gibbons and Murphy (1991), who show that these concerns are stronger when a worker is further from retirement. In this paper, I build on this idea, showing that, as incentives are lower for directors closer to retirement, they put less time than ideal for the firm – and so when they are willing to allocate more time in their directorships, firm performance increases. This is not the first paper that studies the relationship between incentives and effort. For example, Fos et al. (2018) find that directors that are closer to reelection put a higher effort on their monitoring activity to improve the likelihood of being reelected. However, as incentives diminish with age, so too does the likelihood of dissent, as found by Jiang et al. (2016) using data from Chinese firms.

Second, directors' busyness has been studied as a possible cause for directors not fulfilling adequately their obligations. The intuition is clear: as a director increases her number of board seats, she necessarily dedicates less time and effort to each position, which might lead to worse advising and monitoring, resulting in lower firm performance. Initial results were mixed. For example, Ferris et al. (2003) do not find adverse effects due to busy directors; meanwhile, Fich and Shivsadani (2006) observe negative results when most of the outside directors in a board are busy. However, not all firms are affected the same way by directors' busyness. Field et al. (2013) show that busy directors are beneficial for IPO firms because they are better advisors due to experience. A possible cause of these conflicting results could be an endogeneity problem, as it is challenging to separate the harmful effects of busyness and director's quality. A director can only increase her number of directorships if she is offered them, and if firms are trying to maximize their value, higher quality directors are more likely to obtain more directorships. Adams et al. (2010) reviews this problem.

Scholars have used different strategies to address this endogeneity problem. Among them, Falato et al. (2014) use deaths of directors and CEOs as an exogenous shock that increases busyness for directors who worked for the affected firms. They find that busyness hurts firm performance. Hauser (2018) and Brown et al. (2019) both examine a reduction in busyness caused by M&A and find a negative association between busyness and firm's performance.

The present paper adds to this literature by studying how changes in firm performance are different depending on director's incentives; in particular, as a director is closer to retirement, she has fewer incentives to put sufficient effort into her directorships. Therefore, the number of directorships cannot explain predict? whether a director would benefit a firm or not. Different incentives can lead to a different optimal number of directorships a director can hold while still be beneficial for a firm.

The above literature belongs to a more general one on attention that has revealed how distractions can harm monitoring and, therefore, firm performance. For example, Kempf et al. (2017) analyze a series of shocks to investors' attention on separate parts of the portfolio. When a firm has more distracted shareholders, it has worse monitoring. Masulis and Zhang (2018) analyze directors' distractions and the effect on firm performance on having them on the board. They find that ROA and the logarithm of Tobin's Q decrease as the number of distracted directors increases. Finally, Stein and Zhao (2019) use attention shocks caused by performance drops on the director's primary employer. They find that, in these cases, firms suffer from lower firm performance, excessive CEO compensation, and lower CEO turnover-performance sensitivity.

Finally, my paper adds to the literature on how directors' characteristics affect firm performance. Researchers, for example, have been working to determine if having a diverse board is beneficial. Bernile et al. (2018) create a diversity index that includes age and finds that greater board diversity leads to less firm-risk. I show how older directors are valuable for a firm but do not allocate enough time to their directorships because their incentives are not high enough. I also study how tenure can affect firm performance. I show that directors with lower tenure increase firm performance more as they need more time to do a proper job in a directorship than directors with higher tenure.

As mentioned before, the paper most similar to mine is Masulis et al. (2019), who study the effect of having board directors at least 65 years old. They conclude that having more old directors on a board worsens firm performance. Therefore, their focus and approach are different from mine. They concentrate on the effects based on the proportion of old directors on a board, whereas I study the effects of a single old director when she can allocate extra time in her directorships. The two results can fit together. A firm may generally be better with younger directors, as older ones put in less effort, but, with appropriate incentives or a lower number of directorships, older directors can be beneficial. One crucial point is that Masulis et al. (2019) acknowledge how incentives are lower for an older director but how they are also likely to have retired from their full-time jobs, being less time-constrained. This paper shows how the incentives effect is so significant – that, even without their full-time job, they are not allocating enough time to their directorships, leading to improvements in firm performance when they are forced to lose a directorship.

The remainder of the paper is as follows. Section 2 describes the model and states the hypothesis. In section 3, I explain the methodology used to test these hypotheses and describe all the data sources. Section 4 provides the empirical results. Section 5 concludes.

2 Model and Hypotheses

This section develops a simple model based on Adams et al. (2010) to find how directors allocate their available time among all of their directorships, and how they respond after losing one directorship. As directors can affect firm performance through their monitoring and advising roles, I study if the optimal time they allocate to each firm is also optimal for the firm themselves, and if not, how an exogenous change in a director's number of directorships can affect firm performance, and whether age affects these results.

2.1 Model

Consider a director who has M directorships on different firms. Allocating time is costly, but she obtains positive utility from each directorship depending on the time allocated, More generally, the maximization problem for director i can be stated as:

$$\max_{a_{i,m}} \sum_{m=1}^{M} \gamma_{i,m} b(\alpha_{i,m} f(a_{i,m})) - c(\sum_{m=1}^{M} a_{i,m})$$

where $a_{i,m}$ represents the time allocated by director i in directorship m, $f()$ is a function that determines increments in firm performance due to the director allocating time to the board, while $b()$ is a function that determines how a director benefits from firm performance. $c()$ accounts for the cost of allocating time in her directorships. $\gamma_{i,m}$ is a measure of the degree a director i benefits from firm performance m, while $\alpha_{i,m}$ is the degree director i affects firm m performance.

So, all directors increase firm performance by spending time in the board and they benefit from these increments, but not all directors modify performance the same way or benefit equally from these modifications. The benefits from allocating more time are twofold. First, it increases the likelihood of maintaining the position in the firm. Second, it increases the chances of getting additional directorships. Both benefits derive from reputation, as more effort should lead to better firm performance, so the director builds a reputation as a diligent director. How they affect firm performance differently is measured by $\alpha_{i,m}$, different values can come from different director or firm characteristics. How they benefit differently from firm performance is measured by $\gamma_{i,m}$, and again different firm and director characteristics determine this value.

The main assumptions from this model, based on economic reasoning, are that both $f()$ and $b()$ are strictly increasing and concave, while $c()$ is strictly increasing but convex. A director benefits from improved firm performance by enhancing her reputation as a valuable director, but, as reputation improves, further boosts in firm performance are needed to upgrade reputation. Also, by the law of diminishing returns, we should expect that firm performance benefits marginally less as a director increases his time On the other hand, marginal costs increase as the total time a director allocates more time among their directorships.

First, I concentrate on the study of different incentives on allocating time for different directors. Therefore, for now I assume that each director has the same incentives for all their directorship $\gamma_{i,m}$. And also, I am going to assume that all directors affect each directorships equally, α.

Based on this simplification a state a series of theorems, their proofs are in the appendix.

Theorem 1 *A director allocates the same amount of time in each board.*

This is due to assuming that the benefits and costs are the same for each directorship.

Theorem 2 *Ceteris paribus, a director allocate more time to each directorship, when she has fewer directorships.*

Therefore, when a director loses a directorship she will allocate extra time to the remaining positions.

Theorem 3 *Ceteris paribus, a director with higher benefits from firm performance, γ_i, will allocate more time in a directorship that a director with lower benefits.*

This means that firms benefit more from directors that are highly incentivized as they are going to allocate more time in a directorship which leads to a higher firm performance.

As proved, a director will increase their allocation of time in a directorship when she loses a different one. But what is the effect on firm performance of this extra time? Mathematically, this increment depends on the functional form of their utility function. Intuitively, if a director is properly incentivized, she will allocate time in a directorship to a point where further increments of her time will not increase firm performance significantly. Therefore, losing a directorship will not affect firm performance in her remaining directorships. Here I am going to study if this is the case for all directors, specifically concentrating in a parameter that has a great effect in directors' incentives, age.

2.2 Hypotheses

Based on the model, I test some of its consequences empirically.

Age is an important determinant of director's incentives. Older directors benefit less than younger directors as they are less career concerned. As a director is closer to retirement, the marginal benefits from the effort in each directorship decrease. First, the present value of each position is lower than for a younger director as retirement approaches. Second, an older director is less likely to be appointed in new firms, and even if she does, its present value is small. Third, an older director has on average a longer career record of accomplishment so that current performance would modify less her perceived quality. This means that $\gamma_{old} < \gamma_{young}$.

A director's optimal allocation depends on the number of directorships she holds. But a director's number of directorships is endogenous. To get an exogenous change in this number, I use the loss of a position because of an acquisition. When this happens, the marginal cost of time allocated diminishes so that the director can increase the amount of time spent in the remaining directorships.

Hypothesis 1

Hypothesis 1a *After a reduction in busyness, when the shocked director is older, then the firm performance would increase more than when the shocked director is younger.*

Hypothesis 1b *After a reduction in busyness, when the shocked director is older, then the firm performance would increase similarly than when the shocked director is younger.*

In the case of hypothesis 1a, for the same amount of directorships, an older director allocates less time to each directorship, because the marginal benefits are lower, while the marginal costs are the same. Figure 1 shows this difference in optimal efforts due to age, assuming both cost functions are the same. This means that they were allocating less time than the optimal for the firm, so the extra time now allocated is more valuable for the firm as its effect is higher due to the function's concavity. Figure 2 shows this hypothesis in action.

In the case of hypothesis 1b, all directors are not allocating enough time to their directorships, so losing a directorship increases similarly the firm performance.

The next hypothesis rely on relaxing an assumption from the model. What happens if directors benefit differently from different directorships? Masulis and Mobbs (2014) argue that more visible and prominent firms should matter more than smaller firms, as a directors reputation is affected more for the former than for the latter. They find this to be the case, as directors allocate more time to a firm the relatively more important it is for them. I test this assumption empirically with the following hypothesis.

Hypothesis 2

Hypothesis 2a *Firm performance increases more in bigger firms because the director allocates most of their extra time in them.*

Hypothesis 2b *Firm performance increases more in smaller firms because the extra time allocated to them improves firm performance more because the director was allocating less time to them before.*

If a director spends more time in bigger directorships, when she loses one and has to allocate her extra time among the remainder, two conflicting effects can happen. First, as in hypothesis 3a, she allocates most of her extra time on her relatively more prominent firms, so increments in performance concentrate in them. Second, as in hypothesis 3b, the director was allocating little time on the relatively smaller firms, so allocating more time in them increases performance more as any extra hour is more valuable the less time the director allocates.

The following section explains the data I employ to test these hypotheses and the shock to a director's busyness that I use to address the endogeneity of the number of directorships.

3 Data and Methodology

I begin with all board and directors data from ISS between 1996 and 2018. This dataset contains information from all the firms in the S&P 1500. As this dataset is divided into two periods, I use Coles et al. (2014) directors' ID to identify all directors in the sample uniquely until 2014, and I follow their methodology to create IDs for the remainder of the sample. Firms' accounting data comes from Compustat, while return data comes from CRSP. M&A data required to find shocks in the director's number of seats comes from SDC Platinum; to calculate effects I need data from both years around a M&A, so I only keep M&As from 1997 to 2017. As is standard in the literature, I exclude repurchases, recapitalizations, exchange offers, and privatizations. I am only interested when both acquirer and target are in the S&P 1500, so controlling for size is not required. I also employ this dataset to determine acquisitions done by sample firms. CEO's and director's compensation comes from Execucomp.

Table 1 reports summary statistics from the whole sample and a series of subsamples. Panel A reports the full sample of 20,663 total firm/years. Panel B shows characteristics from shocked and control firm/years. I define a firm/year as shocked if one of the directors loses a directorship that year due to a M&A, and as a control firm/year otherwise. Firm performance measures are economically similar but statistically different between both groups, as shocked firm/years are more productive than control firm/years. Shocked firm/years occur in bigger firms that invest less in R&D and have more stable returns than control firm/years. In addition, shocked firm/years have larger and more independent boards. All these differences derive from the fact that a firm is more likely to be affected when its board has a higher number of independent directors with multiple positions, as is the case with bigger firms with sizable independent boards. In the appendix, I employ Propensity Score Matching to address concerns about the differences between both groups affecting the results. Panel C classifies shocked firm/years based on the shocked director's age. Firms where the shocked director is 65 years or older are bigger and less volatile than when the shocked director is younger, and they are less profitable as measured by ROA and Tobin's Q. As expected, the average age of the board is higher when the shocked director is older, and when that board is more independent. Panel D shows shocked directors' characteristics in the year of the shock, including their committee membership, while panel E distinguishes these characteristics based on their age. Older shocked directors have a higher tenure and are more likely to be male, consequent with the only recent push to address gender diversity. They are less likely to miss more than 75% of firm annual meetings, while they are more likely to chair of compensation committee and be a member of the nomination committee. Finally, they are busier, having an average of 2.5 board seats against 2.2 for younger directors.

Studying director busyness is complicated because of endogeneity concerns. Directors decide whether to accept or reject new positions. To address these concerns, I use the same identification strategy as Hauser (2018) and Brown et al. (2019), using M&A as a proxy of shocks to director busyness. When a firm is acquired, its board is usually eliminated. Therefore, directors on the board of an acquired firm lose one directorship, having more time to allocate to their remaining directorships. The effect of an acquisition in an interlocked firm should only come from the reduction on busyness.

From all M&A target firms in the sample, I find the directors that were working on them at the time of the acquisition. I denote these directors shocked directors if they also had another directorship at the time of the event. The timeline is as follows: a firm on ISS database is acquired in year t. Therefore, the last year that appears in Compustat and ISS is year t-1. Firms that have a director on their board from year t-1 to t+1, and who was also on an acquired firm at year t, are considered shocked and form the treatment group, while the rest of firm-years observations are considered the control group. Hence, I create an indicator variable named shocked that equals 1 for firm-years where the firm has a shocked director and 0 otherwise. As the primary goal of the paper is to identify how age affects directors incentives, which may influence firm performance, I drop all firm-year observations where more than one director was shocked by an acquisition, as in these cases there would be confounding effects of multiple directors.

Changes in firm performance are calculated using differences-in-differences. Because during year t, directors were employed during part of the year in the acquired firm, the dependent variables are measured as the difference between the year after the acquisition, t+1, and the year before the acquisition, t-1, for the treatment and control samples on average and multiplied for 100 to get the percent yearly change. I use the standard measures of firm performance used in the literature, return on assets, and the logarithm of Tobin's Q. The regressions for the main results are therefore from the form:

$$\Delta \text{Firm Performance}_i = \text{Shocked}_i + \Delta \text{Controls}_i + \epsilon_i$$

As controls, I employ variables that the literature has shown to affect firm performance. These variables are be divided into firms' characteristics (size, leverage, R&D, and volatility) and board characteristics (board size and board independence) I also employ the average age of a firm's directors to undermine the possibility that the results are merely driven by age and not by the effect of age on a director's incentives. All regressions include year-and-industry fixed effects using Fama and French 49 industry classification. Standard errors are clustered by firm.

In this paper, I want to study if directors incentives drive these main results, which may mean that older directors allocate less time than optimal to their directorships. Therefore, the loss of a directorship would only improve firm performance when the director is old, as the extra time at their disposal would approximate them to the optimal allocation of time required by the firm, while younger directors are already allocating that amount of time, so the extra time has no benefit for the firm. Therefore, for the main specification, the regression is:

$$\Delta \text{Firm Performance}_i = \text{Old}_i + \text{Young}_i + \Delta \text{Controls}_i + \epsilon_i$$

Where old is a dummy that equals one if the shocked director is 65 years or older and young is also a dummy, which equals 1 when the shocked director was less than 65 years old when the acquisition happened. I employ a similar methodology for two other characteristics: tenure and relative firm size. For tenure, I separate shocked directors on whether they were with a firm at least seven years. For the relative size, I compare a firms size with a director remaining positions, classifying firms depending on whether they are below or above the median size, or whether they are the only remaining firm for that director.

4 Results

The first hypothesis, H1, tests if the effects on firm performance after a director loses a directorship in an acquisition are different depending on the affected director's age. In table 2, I use two proxies for firm performance as dependent variables, ROA in panel A and the logarithm of Tobin's Q in panel B. In columns (1), (3) and (5), I replicate Hauser (2018) by showing how firms benefit with an increment in performance, when a director in their board loses a directorship on an acquisition and therefore becomes less busy, although this effect is only statistically significant for ROA in all the specifications. In columns (2), (4) and (6), I test the hypothesis by dividing all shocked firms depending on the shocked director's age. As stated in the model, an older director has fewer incentives to allocate time to each directorship. Therefore, she will spend less time on her directorships and hence is more likely to spend less than optimal time on each directorship. Therefore, losing a directorship and distributing this extra time to her remaining seats should lead to an increase in firm performance higher than when the director was younger, as then she was is already allocating more time to each directorship. These results confirm the hypothesis. Performance only increases when an older director loses a directorship, leading to annual increments on average close to 0.4% in ROA and more than 1.2% in the logarithm of Tobin's Q. On the other hand, when a younger director loses a directorship, increments in ROA are small and not statistically significant and are even negative for the logarithm of Tobin's Q, although non-significant.

One possible explanation for these results is that older directors are simply more knowledgeable; according to this logic, even if age does not affect how directors allocate their time, the extra time an older director allocates after losing a directorship is more valuable to the corresponding firm. To address this concern, I include the average board age in columns (5) and (6). If older directors were more knowledgeable and allocated time the same way as younger directors, then an older firm should lead to improved performance. The results are inconsistent with this hypothesis, giving strength to the hypothesis that incentives affecting the allocation of time are what drive the results.

Another possible explanation for my results might be that older directors have a longer tenure in their directorships, so it could be that the gains in firm performance are due to directors' experience firm-specific knowledge. To rule out this possibility, table 3 uses a similar approach to the previous table, but now divides the sample of shocked directors on whether they have been with the firm for seven or more years, or fewer than seven years. Column (1) includes the overall results again for comparison, while column (2) show the results by tenure. For both ROA and Tobin's Q, low-tenured shocked directors drive the improvement on firm performance, although this is only statistically significant in the case of changes in ROA. These results suggest that, because a director who has spent less time with a firm needs more time to advise and monitor, this firm benefits the most from the extra time after losing a directorship. As director's age correlates positively with tenure, the improvement in firm performance attributed to older directors is not explained by tenure. In column (3), I show the interaction between age and tenure and show that old directors improve firm performance no matter their tenure in the firm, unlike the case for younger directors.

Until now, I have assumed that directors allocate the same amount of time to each directorship, as so I assumed that the benefits of each directorship are the same, but this may not be the case. For example, Masulis and Mobbs (2014) show that, when allocating time among directorships, directors spend more time on the ones that they consider more valuable – most often big firms, because these are more visible and thus more important for reputations. Therefore, table 4 differentiates shocked directors on whether the interlocked firm is bigger or smaller than the average firm for which the director works. As I need at least two remaining directorships to be able to classify directors based on the median firm, I add a third category for directors who only have one firm remaining after losing a position due to an acquisition. Following Masulis and Mobbs's (2014) conclusion, before the shock, directors allocate more time to more prominent firms, and they do the same with the extra time after losing a directorship. However, smaller firms could benefit more from this extra time, if, as I assumed, benefits to firm performance on the director's time is a concave function. Table 4 provides more evidence for Masulis and Mobbs's (2014) result, although weakly, as only for Tobin's Q is the improvement significant for bigger firms and not for smaller ones. For directors that only have one position remaining, the results are mixed, as performance increases in ROA but not in Tobin's Q. Either way, the market is not valuing the benefit from having a less busy director, or at least this improvement is not considered long-term valuable. In column (3), I again check the interactions between age and firm's size; as in the previous table, old directors increase performance in all cases, although only significantly in four of the six cases, whereas young directors never do significantly.

Next, I study if other director characteristics or the positions they hold in the shocked firms can explain the changes in firm performance. To do this, I concentrate only on shocked firms. This way, I also address concerns about shocked firms being different from control firms. Table 5, columns (1) to (3) use the same independent variables as table 2. They show that a shock to an older director leads to an increase in ROA of 0.4% and almost 2% on the logarithm of Tobin's Q higher than when the shocks occur to a younger director. This data establishes that the effect on firm performance after losing a directorship is determined by age. Column (4) includes director-level data from the shocked directors. Positive gains in performance are still present for older directors, although only significant for ROA at the lower power of this test because of the smaller sample. From the director-level characteristics, tenure is not statistically significant. This result is particularly crucial given that age positively correlates with tenure, so the main results could have been caused by tenure and not age. In robustness checks, I further study the effect of tenure. Committee participation does not show significance in any case, and the number of positions a director holds affects firm performance negatively, but not in a statistically significant way. Finally, in column (5), instead of using a dummy variable, I use age as the primary explanatory variable. I find that an extra year of age leads to a gain of 0.03% for ROA and 0.14% on the logarithm of Tobin's Q. These values are 10% the values of the dummy variables, which seems appropriate considering that older directors are on average ten years older than younger directors.

After establishing the relationship between age and firm performance after a director gets less busy, I study how directors change their behavior, and how this shapes their advising and monitoring roles.

First, I study directors' attendance at board meetings. Unfortunately, data limitations do not allow testing changes in the percentage of meetings attended after a busyness shock. Firms are only required to report if a director misses at least 75% of annual meetings. Therefore, I use a dummy variable as the dependent variable in table 6 that equals 1 if a director did miss at least 75% of the meetings. In columns (1) and (2) I use the whole sample, using shocked director in column (1) and decomposing it based on age on column (2). These columns show that the shock does not affect the likelihood of a director attending board meetings. One possibility is that the likelihood of a director missing 75% of the meetings is rather small; based on table 1, only 2.25% of shocked directors had an attendance problem in the year of the event. To address this difficulty, in columns (3) and (4) I only consider directors that did miss 75% of the meetings in year t and check if they have solved this problem by year $t+1$. Column (3) shows that this is in fact the case, as shocked directors reduce the likelihood of their attendance problem by 10%. This effect is more concentrated among older directors, 12% vs. 8.2%, although neither of these effects is significant at the 10% level, which might result from the low power of the test. Finally, columns (5) and (6) consider firms that reported at least one attendance problem during the sample period. In this case, although the results are still non-significant, a similar trend appears, as older directors mitigate their attendance problem more than younger directors do. So, although the results are not strong enough, they all point in the same direction – older directors increase their allocation of time to their remaining firms by reducing the likelihood of missing most of the board meetings.

Another way to check if directors increase their time on a firm after a reduction in busyness is by studying whether they accept further responsibilities as committee members or chairs. Table 7 tests this possibility by studying changes in the number of committee memberships and chairs a director holds in a firm between year $t-1$ and $t+1$. Columns (1) and (2) show the effect on the number of memberships for shocked directors. Without considering age, shocked directors increase their number of committees by 2.3% more than non-shocked directors do, but this effect is concentrated in young directors as oppose to old ones. This effect is equivalently present for the number of chairs they hold, as shown in columns (3) and (4). Columns (5)-(8) repeat this analysis but consider only the audit and compensation committee, as these committees are more time-consuming. Results follow the same direction, but the effect is small; young directors accept more positions as chairs and members, but only the former is a statistically significant change. In the internet appendix, I study whether directors join a committee or keep a committee position they already have and find that young directors are more likely to join a committee but that older directors are more likely to keep a position. In all, these results indicate that younger directors are the ones more likely to allocate their extra time to new committee positions. Older directors are more likely to have these positions already, as shown in table 1, and are more likely to keep them despite a shock to their busyness.

As a director is responsible for advising and monitoring executives, especially a firm's

CEO, changes to firm performance can come from any of these activities. To study their advising, I test short-time market reaction to an acquisition, while for monitoring I check changes in the probability of CEO turnover.

An acquisition is a crucial financial decision that the board must approve. Therefore, it is an ideal test for a director's advising ability. To test the market reaction, I use cumulative abnormal returns from days -2 to +2 of the acquisition date, where the expected returns are calculated using the market model estimated from days -210 to -11. Table 8 shows the results. When considering deal and firm characteristics, column (1) shows that, on average, firms with a shocked director the previous year obtain a 0.5% improvement during the five days around an acquisition compared to firms with no shocked director. This improvement comes solely from older directors; as seen in column (2), firms with an older shocked director increase their returns around the acquisition by nearly 1% with respected compared to the unaffected firms. Although a 1% percent increment seems unimportant, it translates into $250 million for the median firm in our sub-sample of firms shocked by an old director. For younger directors, this effect accounts for only one-sixth of that of the older directors, and it is not statistically significant.

One of the board's most essential monitoring activities is to decide whether to continue with the current CEO or hire a new one. Therefore, I study changes in the likelihood of the firm changing CEO. Table 9 considers any change in CEO as a turnover, and tries to determine if firms are more likely to change their CEO when performance is low. To proxy firm performance, I use industry-adjusted ROA during the year of the succession. Columns (1) and (2) check whether having a director shocked the previous year affects the likelihood of turnover. The interaction between industry-adjusted ROA and shocked shows that CEO turnover is more likely to occur during periods of lower performance. When considering the age of the directors that lost a directorship, column (2) shows how mainly older directors drive this inverse relationship between performance and likelihood of CEO turnover. As changes CEOs reflects a crucial decision that directors are not likely to take any single year, in columns (3) and (4), I checked the effect on a director losing a directorship in any of the previous three years. In this scenario, firms where an old director lost a directorship after an acquisition are more likely to change CEOs after negative performance. In the internet appendix, I check the results for two definitions of forced turnover, where a turnover is classified as forced if the CEO is 65 years or younger for one case, and 60 years or younger for the other, with results consistent with classifying CEOs as fired if they were 60 or younger.

All in all, it seems that directors, especially older directors, can improve firm performance primarily through their advising role, as seen in short-term returns around an acquisition. Their role as monitors seems more reliant on other factors, such as (perhaps) their familiarity with the CEO. Further research might shed light on this lack of improvement in most monitoring settings.

Finally, table 10 introduces a significant and explicit incentive for directors – compensation – and tests whether changes in directors' pay are responsible for different shifts in their time allocation, and, therefore, firm performance. Again, two opposing effects might drive the results. First, higher compensation could lead to a director to allocate most of the extra time at her disposal after losing a directorship for firms where the compensation is high, leading to gains in performance mainly for these firms. Second, she could allocate the extra time mainly on firms were compensation is low, if she considers no more time is needed on firms were compensation is high. If this is the case, the improvement is going to be concentrated in firms were compensation is low. Alternatively, even if she increases her time where compensation is high, this extra time may be less valuable as her allocated time is already close to the optimum. Table 10 still uses changes in ROA and Tobin's Q as proxies for firm performance but include interaction terms to classify shocked directors on age and compensation. These compensation interactions depend on whether a director receives above or below median compensation and the percentage of pay that they received in cash.

Columns (1) and (2) address total compensation and show that older directors increase performance after losing a directorship in any case, but that the effect is more prominent when the compensation and therefore incentives are higher for ROA. The opposite holds true for Tobin's Q. For young directors, losing a directorship lead to a worsening of firm performance when their compensation is high. In columns (3) and (4), I use cash intensity, defined as the % of the compensation that is cash, again dividing the sample based on whether this compensation is above or below the median director. In this case, the improvement in performance concentrates on older directors who are less intensively paid in cash.

Based on table 10 results, it seems that older directors allocate less time than optimal time to their directorships, but, when able to allocate extra time, they do so on firms where the compensation is mainly on equity, and therefore their incentives are more aligned with firm performance. Young directors, conversely, can lead to negative performance when their compensation is high. This result shows how performance can decrease when a young director has extra available time. These results will apply if younger directors expend the extra time trying to find a new directorship to substitute the one they just lost.

5 Conclusion and future research

Directors decide how much effort to put into their directorships by maximizing the cost and benefits of allocating their time among them. Benefits come from improving their reputation, while costs come from their limited available time. When directors are closer to retirement, their reputation is less important – they have already built their reputation through their whole career – and the value of directorships is lower. These lower marginal benefits mean that, for the same number of directorships, older directors allocate less time to each than younger ones. Empirically, when a director loses a directorship due to an acquisition, shocked firms increase performance only when the affected director is older, as they were not allocating enough effort in the directorship before the event. This effect is present whether classifying directors using a cut-off of 65 years, or by just using their age as the main independent variable.

I have showed that these results are not driven by tenure and firm size, although director compensation does affect a director's allocation of time. Older directors account for improvements in performance when they lose a directorship in all cases, but this improvement is significantly higher, when most of their compensation is paid with equity; in this case, their incentives are correlated more with firm performance.

I have analysed several possible sources for these improvements. I have tested whether they come from older directors being more involved with their remaining firms, missing fewer board meetings, or accepting more committee appointments than before the shock. Unfortunately, data limitations do not allow for a clearer view of attendance, as the only cases reported are when a director misses more than 75% of annual board meetings, an already rare occurrence. In any case, when a directors loses a directorship in an acquisition, he or she is less likely to repeat their attendance problems in the year after the shock. Moreover, regarding committee participation, younger directors are the ones that accept new board positions. Both of these results, therefore, do not shed light on how performance increases, but they could be a consequence on older directors already being less likely to miss board meetings and more likely to be members or chair of some committees.

A directors role on a board belongs two main areas: advising and monitoring. Therefore, I have tested changes in both areas after a director loses a directorship in an acquisition. In their advising role, firms make better acquisitions in the year after an older director loses a directorship, whereas this effect is not present when it is a younger director who loses a position. On the monitoring role, I also checked CEO turnover. Firms are more like to change their CEO following underperformance when a director in their board was shocked in any of the last three years, while they are not more likely to do so when a younger director was affected.

Overall, the gateway that determines where firms' performance improvements come from is still not clear. This lack of results can be a consequence of the heterogeneous characteristics of the directors involved and how they contribute to different areas of a board's responsibilities. A director can only help if she is involved in that decision, and only when those decisions take place. For example, I can only calculate CARs around an acquisition for firms that decide to go through and not for the ones that considered it and did not complete the process, or firms that did not even consider it in that year.

Another avenue to improvement can come from adding an additional shock to a directors busyness. A branch of the literature has studied the effects of attention shocks on firm performance. For example, Falato et al. (2014) consider the impact of a director death on interlocked firms. In this situation, a director is busier during that period that she was before. Are the results from this event comparable to mine but in the opposite direction?

Finally, another possible improvement can come from employing a sample that includes smaller firms. The ISS database is comprised only of the S&P 1500 firms, so I can only establish shocks when one of those firms is acquired and only for directors that happen to work in a different S&P 1500 firm. Do directors allocate similar time to smaller and bigger firms? Do these results herefore hold when including smaller firms? All of these avenues seem like exciting paths for future research to establish additional facts around the relationships among directors age, their incentives, and firm performance.

Appendix A: Variables definition

Variable	Definition (COMPUSTAT notation)
% Deal to Firm Size	(Acquisition price divided by acquiror size) * 100
% Paid in Cash	Percentage of the acquisition paid in cash
Age	Shocked director's age
Attend less 75% Meetings	=1 if shocked director attended less than 75% of board meeting in that year, =0 otherwise
Audit Chair	=1 if shocked director is the chair of the audit committee in that year, =0 otherwise
Audit Member	=1 if shocked director is a member of the audit committee in that year, =0 otherwise
Board Age	Average directors' age on firm's board
Board Independence	Percentage of independent directors on the board
Board Size	Number of board members in a firm
Compensation Chair	=1 if shocked director is the chair of the compensation committee in that year, =0 otherwise
Compensation Member	=1 if shocked director is a member of the compensation committee in that year, =0 otherwise

Diversified	=1 if the target of the acquisition belongs to a different industry that the acquirer, industry defined using Fama and French 49, =0 otherwise
Experinced Shocked	=1 if the firm was shocked by a director who has been on the firm for 7 years or more, =0 otherwise
Female	=1 if shocked director is female and =0 if is male
High Cash	=1 if the shocked director's percentage of cash compensation is above the median, =0 otherwise
High Compensation	=1 if the shocked director's total compensation is above the median, =0 otherwise
High Equity	=1 if the shocked director's percentage of equity compensation is below the median, =0 otherwise
High Shocked	=1 if the firm's total assets are higher than the mean total assets of all firm's of the shocked director, =0 otherwise
Hostile	=1 if the acquisition was considered hostile, =0 otherwise
Ind-Adj ROA	ROA-Average ROA industry, industry defined using FF 49
Inexperienced Shocked	=1 if firm was shocked by a director who has been on the firm for less than 7 years, =0 otherwise
Leverage	Book leverage ((dlc+dltt)/at)
Low Cash	=1 if the shocked director's percentage of cash compensation is below the median, =0 otherwise

Low Compensation	=1 if the shocked director's total compensation is below the median, =0 otherwise
Low Equity	=1 if the shocked director's percentage of equity compensation is below the median, =0 otherwise
Low Shocked	=1 if the firm's total assets are lower than the mean total assets of all firm's of the shocked director, =0 otherwise
Nomination Chair	=1 if shocked director is the chair of the nomination committee in that year, =0 otherwise
Nomination Member	=1 if shocked director is a member of the nomination committee in that year, =0 otherwise
Number of Boards	Total number of boards where shocked director seats
Old Shocked	=1 if the firm was shocked by a director whose age is 65 or more, =0 otherwise
Old Shocked with >2 Other Dir	=1 if the firm was shocked by a director whose age is 65 or more and that director still holds at least two directorships, =0 otherwise
Only Firm	=1 if the shocked director only holds a single directorship after the shock, =0 otherwise
Private Target	=1 if the target of the acquisition was a private firm, =0 otherwise
Public Target	=1 if the target of the acquisition was a public firm, =0 otherwise
ROA	Return on assets (oibdp/at)
R&D	Research and Development, where missing values are substituted by the industry mean R&D in that year (xrd/at)

Shocked	=1 if firm has one director that lost a job on an acquisition, =0 otherwise
Size	Total assets (*at*)
Tender Offer	=1 if the acquisition was a tender offer, =0 otherwise
Tenure	Number of years since the shocked director joined the boars as director
Tobin's Q	Logarithm of tobin's Q ((at-ceq+prcc_f*csho)/at)
Volatility	Annualized standard deviation of stock returns (from CRSP) calculated with daily returns for each trading day in the fiscal year
Young Shocked	=1 if the firm was shocked by a director whose age is less than 65, =0 otherwise
Young Shocked with >2 Other Dir	=1 if the firm was shocked by a director whose age is less than 65 and that director still holds at least two directorships, =0

Appendix B: Proofs

Proof Theorem 1:

Consider the $M-1$ and M board seats first order conditions for a firm:

$$\gamma_i b'(\alpha f(a^*_{i,M-1}))\alpha f'(a^*_{i,M-1}) - c'(\sum_{m=1}^{M-1} a^*_{i,m}) = 0$$

$$\gamma_i b'(\alpha f(a^*_{i,M}))\alpha f'(a^*_{i,M}) - c'(\sum_{m=1}^{M} a^*_{i,m}) = 0$$

Therefore in the optimum:

$$\gamma_i b'(\alpha f(a^*_{i,M-1}))\alpha f'(a^*_{i,M-1}) - c'(\sum_{m=1}^{M-1} a^*_{i,m}) = \gamma_i b'(\alpha f(a^*_{i,M}))\alpha f'(a^*_{i,M}) - c'(\sum_{m=1}^{M} a^*_{i,m})$$

$$\gamma_i b'(\alpha f(a^*_{i,M-1}))\alpha f'(a^*_{i,M-1}) - \gamma_i b'(\alpha f(a^*_{i,M}))\alpha f'(a^*_{i,M}) = c'(\sum_{m=1}^{M-1} a^*_{i,m}) - c'(\sum_{m=1}^{M} a^*_{i,m})$$

$$\gamma_i \alpha[b'(\alpha f(a^*_{i,M-1}))f'(a^*_{i,M-1}) - b'(\alpha f(a^*_{i,M}))f'(a^*_{i,M})] = c'(\sum_{m=1}^{M-1} a^*_{i,m}) - c'(\sum_{m=1}^{M} a^*_{i,m})$$

Assume that $a^*_{i,M} \geq a^*_{i,M-1}$. Then:

$$c'(\sum_{m=1}^{M-1} a^*_{i,m}) - c'(\sum_{m=1}^{M} a^*_{i,m}) < 0 \text{ because c is strictly convex}$$

$$\gamma_i \alpha > 0 \text{ by definition}$$

$$f(a^*_{i,M-1}) \leq f(a^*_{i,M}) \text{ because f is strictly increasing}$$

$$f'(a^*_{i,M-1}) \geq f'(a^*_{i,M}) \text{ because f is strictly concave}$$

$$b'(\alpha f(a^*_{i,M-1})) \geq b'(\alpha f(a^*_{i,M})) \text{ because b is strictly concave}$$

So,

$$\gamma_i \alpha[b'(\alpha f(a^*_{i,M-1}))f'(a^*_{i,M-1}) - b'(\alpha f(a^*_{i,M}))f'(a^*_{i,M})] > 0$$

This is a contradiction so $a^*_{i,M-1} > a^*_{i,M}$.

Proof Theorem 2:

Consider the $M-1$ and M board seats first order conditions for a firm:

$$\gamma_i b'(\alpha f(a^*_{i,M-1}))\alpha f'(a^*_{i,M-1}) - c'(\sum_{m=1}^{M-1} a^*_{i,m}) = 0$$

$$\gamma_i b'(\alpha f(a^*_{i,M}))\alpha f'(a^*_{i,M}) - c'(\sum_{m=1}^{M} a^*_{i,m}) = 0$$

Therefore in the optimum:

$$\gamma_i b'(\alpha f(a^*_{i,M-1}))\alpha f'(a^*_{i,M-1}) - c'(\sum_{m=1}^{M-1} a^*_{i,m}) = \gamma_i b'(\alpha f(a^*_{i,M}))\alpha f'(a^*_{i,M}) - c'(\sum_{m=1}^{M} a^*_{i,m})$$

$$\gamma_i b'(\alpha f(a^*_{i,M-1}))\alpha f'(a^*_{i,M-1}) - \gamma_i b'(\alpha f(a^*_{i,M}))\alpha f'(a^*_{i,M}) = c'(\sum_{m=1}^{M-1} a^*_{i,m}) - c'(\sum_{m=1}^{M} a^*_{i,m})$$

$$\gamma_i \alpha[b'(\alpha f(a^*_{i,M-1}))f'(a^*_{i,M-1}) - b'(\alpha f(a^*_{i,M}))f'(a^*_{i,M})] = c'(\sum_{m=1}^{M-1} a^*_{i,m}) - c'(\sum_{m=1}^{M} a^*_{i,m})$$

Assume that $a^*_{i,M} \geq a^*_{i,M-1}$. Then:

$$c'(\sum_{m=1}^{M-1} a^*_{i,m}) - c'(\sum_{m=1}^{M} a^*_{i,m}) < 0 \text{ because c is strictly convex}$$

$$\gamma_i \alpha > 0 \text{ by definition}$$

$$f(a^*_{i,M-1}) \leq f(a^*_{i,M}) \text{ because f is strictly increasing}$$

$$f'(a^*_{i,M-1}) \geq f'(a^*_{i,M}) \text{ because f is strictly concave}$$

$$b'(\alpha f(a^*_{i,M-1})) \geq b'(\alpha f(a^*_{i,M})) \text{ because b is strictly concave}$$

So,

$$\gamma_i \alpha[b'(\alpha f(a^*_{i,M-1}))f'(a^*_{i,M-1}) - b'(\alpha f(a^*_{i,M}))f'(a^*_{i,M})] > 0$$

This is a contradiction so $a^*_{i,M-1} > a^*_{i,M}$.

Proof Theorem 3:

For simplicity, I consider the case with only two firms:

$$\max \gamma_i b(\alpha f(a_{i,1})) + \gamma_i b(\alpha f(a_{i,2})) - c(a_{i,1} + a_{i,2})$$

FOC:

$$\gamma_i b'(\alpha f(a^*_{i,1}))\alpha f'(a^*_{i,1}) - c'(a^*_{i,1} + a^*_{i,2}) = 0$$

$$\gamma_i b'(\alpha f(a^*_{i,2}))\alpha f'(a^*_{i,2}) - c'(a^*_{i,1} + a^*_{i,2}) = 0$$

Total differentiation FOCs assuming α is constant:

$$[\gamma_i b''(\alpha f(a^*_{i,1}))\alpha^2 f'(a^*_{i,1})^2 + \gamma_i b'(\alpha f(a^*_{i,1}))\alpha f''(a^*_{i,1}) - c''(a^*_{i,1}+a^*_{i,2})]da^*_{i,1} - [c''(a^*_{i,1}+a^*_{i,2})]da^*_{i,2} + [b'(\alpha f(a^*_{i,1}))\alpha f'(a^*_{i,1})]d\gamma_i = 0$$

$$-[c''(a^*_{i,1}+a^*_{i,2})]da^*_{i,1} + [\gamma_i b''(\alpha f(a^*_{i,2}))\alpha^2 f'(a^*_{i,2})^2 + \gamma_i b'(\alpha f(a^*_{i,2}))\alpha f''(a^*_{i,2}) - c''(a^*_{i,1}+a^*_{i,2})]da^*_{i,2} + [b'(\alpha f(a^*_{i,2}))\alpha f'(a^*_{i,2})]d\gamma_i = 0$$

Denoting:

$$B = -\gamma_i b''(\alpha f(a^*_{i,1}))\alpha^2 f'(a^*_{i,1})^2 - \gamma_i b'(\alpha f(a^*_{i,1}))\alpha f''(a^*_{i,1}) + c''(a^*_{i,1} + a^*_{i,2}) =$$
$$- \gamma_i b''(\alpha f(a^*_{i,2}))\alpha^2 f'(a^*_{i,2})^2 - \gamma_i b'(\alpha f(a^*_{i,2}))\alpha f''(a^*_{i,2}) + c''(a^*_{i,1} + a^*_{i,2}) > 0$$

$$C = c''(a^*_{i,1} + a^*_{i,2}) > 0$$

$$D = b'(\alpha f(a^*_{i,1}))\alpha f'(a^*_{i,1}) = b'(\alpha f(a^*_{i,2}))\alpha f'(a^*_{i,2}) > 0$$

Because $a^*_{i,1} = a^*_{i,2}$ then the total differentiation is equivalent to:

$$Bda^*_{i,1} + Cda^*_{i,2} = Dd\gamma_i$$

$$Cda^*_{i,1} + Bda^*_{i,2} = Dd\gamma_i$$

In matrix notation:

$$\begin{pmatrix} B & C \\ C & B \end{pmatrix} \begin{pmatrix} da^*_{i,1} \\ da^*_{i,2} \end{pmatrix} = \begin{pmatrix} D \\ D \end{pmatrix} d\gamma_i$$

Operating:

$$\begin{pmatrix} da^*_{i,1} \\ da^*_{i,2} \end{pmatrix} = \begin{pmatrix} B & C \\ C & B \end{pmatrix}^{-1} \begin{pmatrix} D \\ D \end{pmatrix} d\gamma_i$$

$$\begin{pmatrix} da^*_{i,1} \\ da^*_{i,2} \end{pmatrix} = \frac{1}{B^2 - C^2} \begin{pmatrix} B & -C \\ -C & B \end{pmatrix} \begin{pmatrix} D \\ D \end{pmatrix} d\gamma_i$$

$$\begin{pmatrix} da^*_{i,1} \\ da^*_{i,2} \end{pmatrix} = \frac{D}{B^2 - C^2} \begin{pmatrix} B & -C \\ -C & B \end{pmatrix} d\gamma_i$$

$$\begin{pmatrix} da^*_{i,1} \\ da^*_{i,2} \end{pmatrix} = \frac{D}{(B - C)(B + C)} \begin{pmatrix} B & -C \\ -C & B \end{pmatrix} d\gamma_i$$

$$\begin{pmatrix} da^*_{i,1} \\ da^*_{i,2} \end{pmatrix} = \frac{D}{B + C} d\gamma_i$$

$$\frac{da^*_{i1}}{d\gamma_i} = \frac{da^*_{i2}}{d\gamma_i} = \frac{D}{B + C} > 0$$

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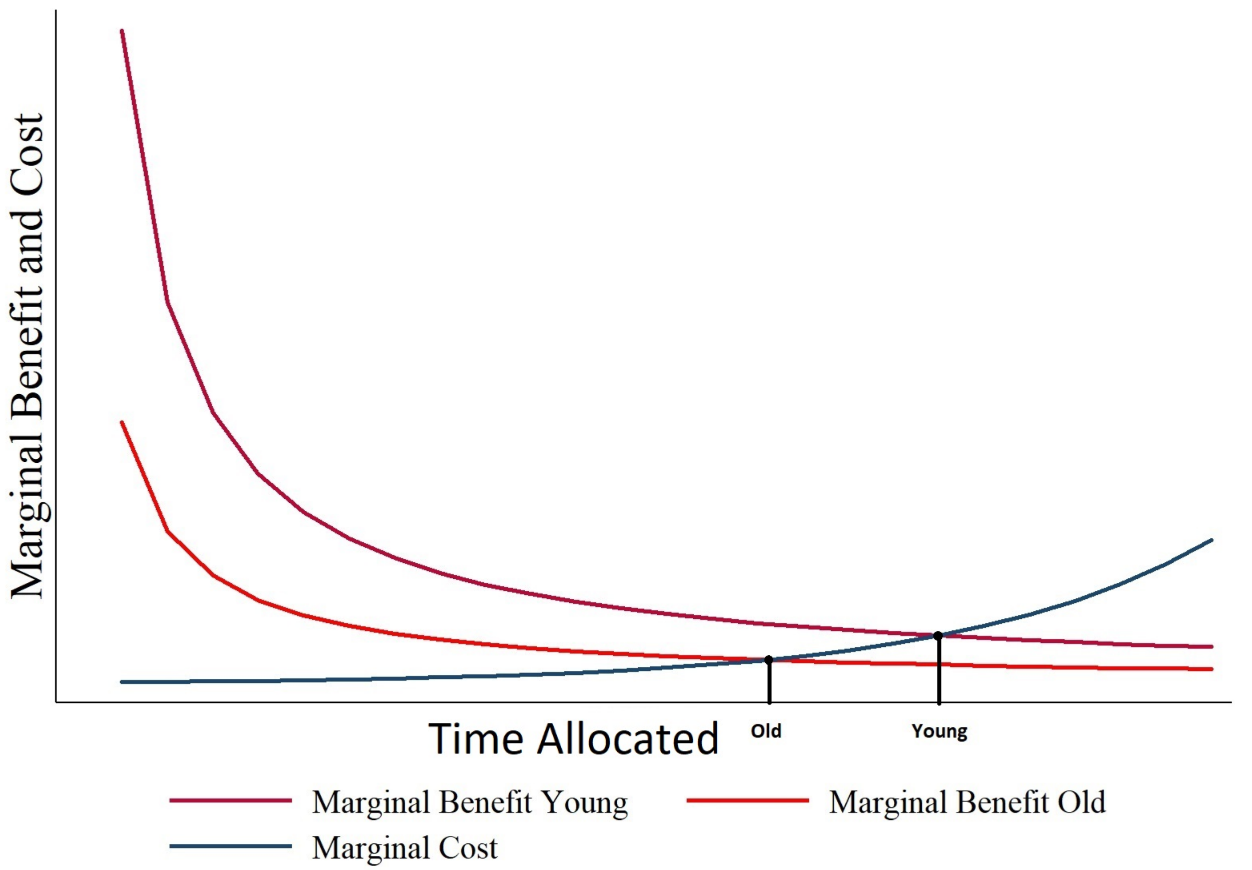

Figure 1: Optional directors' effort by age

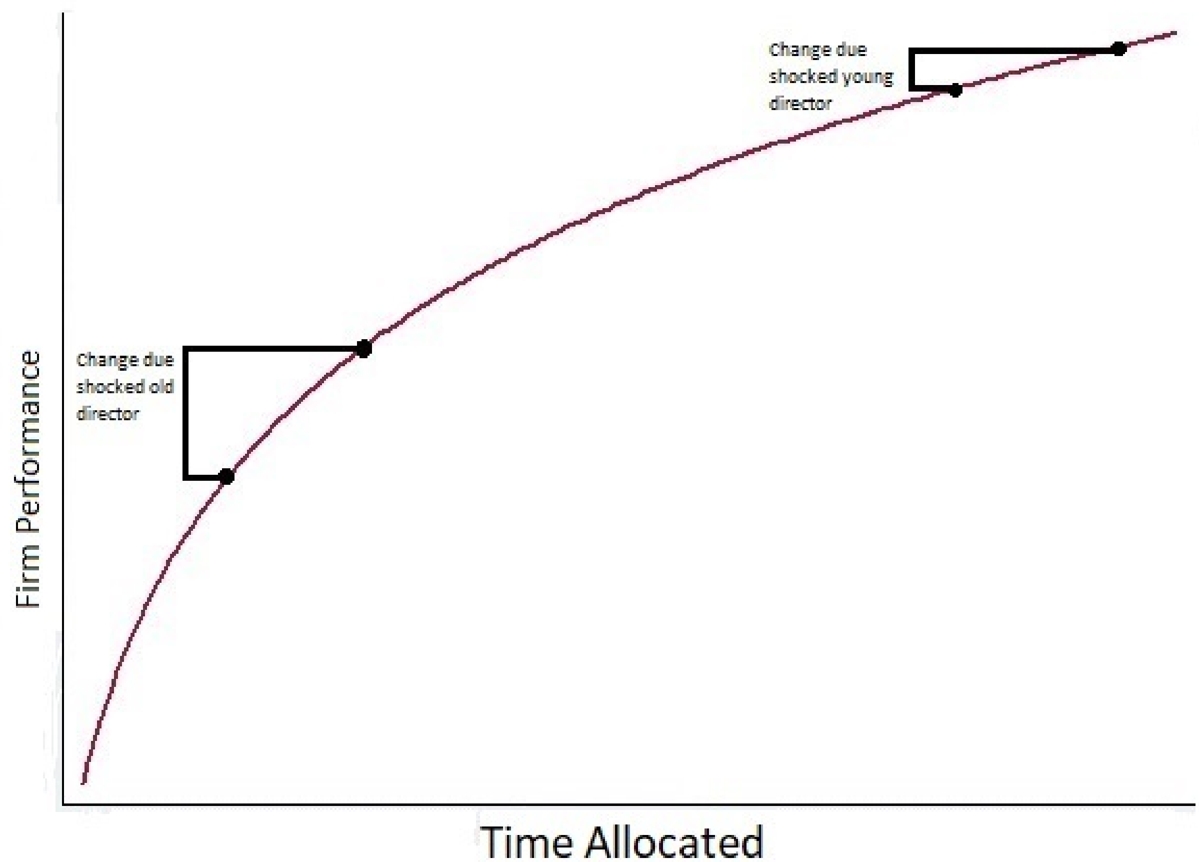

Figure 2: Changes in firm performance by shocked director's age

Tables

Table 1: Summary statistics

This table presents summary statistics for the full sample and different subsamples. Panel A includes firm characteristics for the full sample. Panel B shows statistics comparing shocked and control firms. Panel C divides the shocked firms on whether the shocked director was at least 65 years or not. Panel D includes shocked directors characteristics. Panel E compares shocked directors characteristics on whether the shocked director was at least 65 years or not. Variable descriptions are on the appendix.

Panel A: Full Sample

	Mean	SD	Median	N
ROA	0.127	0.088	0.122	20,663
Tobin's Q	1.852	1.170	1.460	20,663
Shocked	7.95%			20,663
Old Shocked	3.69%			20,663
Young Shocked	4.26%			20,663
Log(Size)	8.007	1.691	7.841	20,663
Leverage	0.230	0.185	0.217	20,663
R&D	4.890	14.969	0.954	20,663
Volatility	0.374	0.197	0.329	20,663
Board Size	9.439	2.637	9	20,663
Board Independence	72.8%	0.163	75.0%	20,663
Board Age	61.17	4.11	61.33	20,663

Panel B: Shocked and Control subsamples

	Shocked Firms		Control Firms			
	Mean	N	Mean	N	Difference	t
ROA	0.137	1,643	0.126	19,020	0.010***	4.49
Tobin's Q	1.930	1,643	1.846	19,020	0.084***	2.80
Log(Size)	8.465	1,643	7.967	19,020	0.498***	11.50
Leverage	0.251	1,643	0.228	19,020	0.024***	4.94
R&D	3.397	1,643	5.019	19,020	-1.622***	-4.22
Volatility	0.355	1,643	0.376	19,020	-0.021***	-4.05
Board Size	10.37	1,643	9.36	19,020	1.01***	14.91
Board Independence	75.4%	1,643	72.6%	19,020	2.81%***	6.71
Board Age	60.9	1,643	61.2	19,020	-0.25**	-2.41

Panel C: Shocked subsample by age						
	Old Shocked		Young Shocked			
	Mean	N	Mean	N	Difference	t
ROA	0.133	763	0.140	880	-0.007*	-1.70
Tobin's Q	1.841	763	2.006	880	-0.165**	-2.50
Log(Size)	8.630	763	8.322	880	0.308***	3.66
Leverage	0.256	763	0.247	880	0.010	1.11
R&D	3.146	763	3.614	880	-0.468	-1.04
Volatility	0.343	763	0.366	880	-0.023***	-2.71
Board Size	10.40	763	10.33	880	0.069	0.52
Board Independence	77.1%	763	73.9%	880	3.12%***	4.42
Board Age	62.1	763	59.9	880	2.23***	13.61

Panel D: Shocked directors		
	Mean	N
Age	62.98	1,643
Tenure	8.02	1,643
Female	15.4%	1,643
Attend less 75% meetings	2.25%	1,643
Audit chair	12.2%	1,643
Audit member	38.8%	1,643
Compensation chair	12.1%	1,643
Compensation member	45.3%	1,643
Nomination chair	8.0%	1,643
Nomination member	40.0%	1,643
Number of boards	2.37	1,546

Panel E: Shocked directors by age						
	Old Shocked		Young Shocked			
	Mean	N	Mean	N	Difference	t
Age	68.63	763	58.07	880	10.56***	50.41
Tenure	9.87	763	6.41	880	3.46***	13.10
Female	8.7%	763	21.3%	880	-12.6%***	-7.16
Attend less 75% meetings	1.57%	763	2.84%	880	-1.27%*	1.73
Audit chair	11.4%	763	13.0%	880	-1.6%	-0.96
Audit member	36.8%	763	40.5%	880	-3.6%	-1.50
Compensation chair	14.5%	763	9.9%	880	4.7%***	2.90
Compensation member	46.3%	763	44.4%	880	1.8%	0.74
Nomination chair	9.2%	763	7.0%	880	2.1%	1.58
Nomination member	42.2%	763	38.2%	880	4.0%*	1.66
Number of boards	2.52	721	2.23	825	0.29***	3.78

Table 2: Firm performance after busyness shock based on shocked director's age The dependent variable on panel A is changes on ROA while on panel B it is changes on the logarithm of Tobin's Q. Shocked is an indicator variable that equals 1 if the firm has one director that lost a directorship due to an acquisition on year t. Old Shocked is an indicator variable that equals 1 if the firm was shocked by a director whose age is 65 or older. While Young Shocked is an indicator that equals 1 if the firm was shocked by a director whose age is less than 65. Control variables definitions are on the appendix. All regressions include year and industry fixed effects, where industry is determined by Fama and French 49 industry classification. Standard errors are clustered by firm.

Panel A: ΔROA

	(1)	(2)	(3)	(4)	(5)	(6)
Shocked	0.230***		0.214***		0.212***	
	(2.97)		(2.82)		(2.81)	
Old Shocked		0.388***		0.379***		0.377***
		(3.85)		(3.88)		(3.87)
Young Shocked		0.094		0.072		0.071
		(0.88)		(0.69)		(0.68)
ΔSize			-0.584***	-0.583***	-0.579***	-0.578***
			(-3.74)	(-3.73)	(-3.69)	(-3.69)
ΔLeverage			-5.258***	-5.259***	-5.262***	-5.264***
			(-9.54)	(-9.55)	(-9.54)	(-9.54)
ΔR&D			-0.003	-0.003	-0.003	-0.003
			(-1.19)	(-1.18)	(-1.19)	(-1.18)
ΔVolatility			-2.073***	-2.074***	-2.072***	-2.074***
			(-8.89)	(-8.90)	(-8.89)	(-8.90)
ΔBoard Size					-0.002***	-0.002***
					(-9.07)	(-9.05)
ΔBoard Independence					0.009	0.005
					(0.03)	(0.02)
ΔBoard Age					-0.011	-0.011
					(-0.87)	(-0.86)
N	20663	20663	20663	20663	20663	20663
R^2	0.208	0.208	0.247	0.247	0.247	0.247

Panel B: ΔlogQ						
	(1)	(2)	(3)	(4)	(5)	(6)
Shocked	0.693**		0.481		0.464	
	(1.96)		(1.41)		(1.36)	
Old Shocked		1.517***		1.292***		1.252***
		(3.07)		(2.67)		(2.60)
Young Shocked		-0.016		-0.218		-0.215
		(-0.03)		(-0.47)		(-0.47)
ΔSize			-10.256***	-10.251***	-10.185***	-10.181***
			(-17.45)	(-17.45)	(-17.30)	(-17.30)
ΔLeverage			-11.803***	-11.810***	-11.827***	-11.834***
			(-6.11)	(-6.12)	(-6.12)	(-6.13)
ΔR&D			-0.002	-0.002	-0.002	-0.001
			(-0.17)	(-0.14)	(-0.13)	(-0.11)
ΔVolatility			-8.130***	-8.137***	-8.120***	-8.127***
			(-8.70)	(-8.71)	(-8.70)	(-8.71)
ΔBoard Size					-0.004***	-0.004***
					(-3.78)	(-3.78)
ΔBoard Independence					1.249	1.230
					(1.03)	(1.02)
ΔBoard Age					-0.244***	-0.243***
					(-4.10)	(-4.08)
N	20663	20663	20663	20663	20663	20663
R^2	0.280	0.280	0.330	0.330	0.331	0.331

t statistics in parentheses

* $p < .1$, ** $p < .05$, *** $p < .01$

Table 3: Changes in firm performance after busyness shock based on shocked director's tenure

The dependent variable on panel A is changes on ROA while on panel B it is changes on the logarithm of Tobin's Q. Shocked is an indicator variable that equals 1 if the firm has one director that lost a directorship due to an acquisition on year t. Experienced Shocked is an indicator variable that equals 1 if the firm was shocked by a director who has been on the firm for 7 years or more, while Inexperienced Shocked is also an indicator variable that equals 1 if the firm was shocked by a director who has been on the firm for less than 7 years. Control variables definitions are on the appendix. All regressions include year and industry fixed effects, where industry is determined by Fama and French 49 industry classification. Standard errors are clustered by firm.

Panel A: ΔROA

	(1)	(2)	(3)
Shocked	0.212***		
	(2.81)		
Experienced Shocked		0.150	
		(1.53)	
Inexperienced Shocked		0.277**	
		(2.52)	
Old and Experienced Shocked			0.325***
			(2.78)
Old and Inexperienced Shocked			0.472***
			(2.94)
Young and Experienced Shocked			-0.100
			(-0.64)
Young and Inexperienced Shocked			0.180
			(1.28)
ΔSize	-0.579***	-0.579***	-0.578***
	(-3.69)	(-3.69)	(-3.69)
ΔLeverage	-5.262***	-5.261***	-5.262***
	(-9.54)	(-9.54)	(-9.54)
ΔR&D	-0.003	-0.003	-0.003
	(-1.19)	(-1.19)	(-1.18)
ΔVolatility	-2.072***	-2.072***	-2.073***
	(-8.89)	(-8.89)	(-8.90)
ΔBoard Size	-0.002***	-0.002***	-0.002***
	(-9.07)	(-9.06)	(-9.03)

ΔBoard Independence	0.009	0.008	0.003
	(0.03)	(0.03)	(0.01)
ΔBoard Age	-0.011	-0.012	-0.011
	(-0.87)	(-0.88)	(-0.87)
N	20663	20663	20663
R^2	0.247	0.247	0.247

Panel B: ΔlogQ			
	(1)	(2)	(3)
Shocked	0.464		
	(1.36)		
Experienced Shocked		0.153	
		(0.34)	
Inexperienced Shocked		0.786	
		(1.55)	
Old and Experienced Shocked			1.153**
			(2.09)
Old and Inexperienced Shocked			1.436
			(1.57)
Young and Experienced Shocked			-1.277*
			(-1.77)
Young and Inexperienced Shocked			0.462
			(0.77)
ΔSize	-10.185***	-10.186***	-10.181***
	(-17.30)	(-17.31)	(-17.30)
ΔLeverage	-11.827***	-11.822***	-11.827***
	(-6.12)	(-6.12)	(-6.12)
ΔR&D	-0.002	-0.002	-0.002
	(-0.13)	(-0.14)	(-0.13)
ΔVolatility	-8.120***	-8.119***	-8.124***
	(-8.70)	(-8.70)	(-8.71)
ΔBoard Size	-0.004***	-0.004***	-0.004***
	(-3.78)	(-3.78)	(-3.77)
ΔBoard Independence	1.249	1.248	1.223
	(1.03)	(1.03)	(1.01)
ΔBoard Age	-0.244***	-0.244***	-0.243***
	(-4.10)	(-4.11)	(-4.09)
N	20663	20663	20663
R^2	0.331	0.331	0.331

t statistics in parentheses

* $p < .1$, ** $p < .05$, *** $p < .01$

Table 4: Changes in firm performance after busyness shock based on shocked directors firm's size

The dependent variable on panel A is changes on ROA while on panel B it is changes on the logarithm of Tobin's Q. Shocked is an indicator variable that equals 1 if the firm has one director that has lost a directorship due to an acquisition. High Shocked is an indicator variable that equals 1 if the firm's total assets are higher than the mean total assets of all firms of the shocked director, while Low Shocked equals 1 if the firm's total assets are lower than the mean total assets of all firms of the shocked director. Only Firm is 1 if the shocked directors only has one directorship. Control variables definitions are on the appendix. All regressions include year and industry fixed effects, where industry is determined by Fama and French 49 industry classification. Standard errors are clustered by firm.

Panel A: ΔROA

	(1)	(2)	(3)
Shocked	0.212***		
	(2.81)		
High Shocked		0.170	
		(1.50)	
Low Shocked		0.167	
		(1.33)	
Only Firm		0.274**	
		(2.30)	
Old and High Shocked			0.138
			(0.97)
Old and Low Shocked			0.333**
			(1.97)
Old and Only Firm			0.596***
			(3.68)
Young and High Shocked			0.203
			(1.10)
Young and Low Shocked			0.028
			(0.15)
Young and Only Firm			0.029
			(0.18)
ΔSize	-0.579***	-0.579***	-0.579***
	(-3.69)	(-3.70)	(-3.70)

ΔLeverage	-5.262***	-5.264***	-5.262***
	(-9.54)	(-9.54)	(-9.54)
ΔR&D	-0.003	-0.003	-0.003
	(-1.19)	(-1.19)	(-1.17)
ΔVolatility	-2.072***	-2.072***	-2.075***
	(-8.89)	(-8.90)	(-8.91)
ΔBoard Size	-0.002***	-0.002***	-0.002***
	(-9.07)	(-9.06)	(-9.05)
ΔBoard Independence	0.009	0.008	0.005
	(0.03)	(0.03)	(0.02)
ΔBoard Age	-0.011	-0.011	-0.011
	(-0.87)	(-0.87)	(-0.86)
N	20663	20663	20663
R^2	0.247	0.247	0.247

Panel B: ΔlogQ			
	(1)	(2)	(3)
Shocked	0.464		
	(1.36)		
High Shocked		1.067*	
		(1.75)	
Low Shocked		0.664	
		(1.11)	
Only Firm		-0.075	
		(-0.14)	
Old and High Shocked			1.387*
			(1.78)
Old and Low Shocked			0.815
			(0.89)
Old and Only Firm			1.504*
			(1.91)
Young and High Shocked			0.718
			(0.79)
Young and Low Shocked			0.538
			(0.68)
Young and Only Firm			-1.280*
			(-1.84)
ΔSize	-10.185***	-10.182***	-10.182***
	(-17.30)	(-17.30)	(-17.31)
ΔLeverage	-11.827***	-11.818***	-11.811***
	(-6.12)	(-6.12)	(-6.12)
ΔR&D	-0.002	-0.001	-0.001
	(-0.13)	(-0.12)	(-0.09)
ΔVolatility	-8.120***	-8.117***	-8.121***
	(-8.70)	(-8.70)	(-8.70)
ΔBoard Size	-0.004***	-0.004***	-0.004***
	(-3.78)	(-3.79)	(-3.78)
ΔBoard Independence	1.249	1.257	1.236
	(1.03)	(1.04)	(1.02)

ΔBoard Age	-0.244***	-0.244***	-0.243***
	(-4.10)	(-4.11)	(-4.09)
N	20663	20663	20663
R^2	0.331	0.331	0.331

t statistics in parentheses

* $p < .1$, ** $p < .05$, *** $p < .01$

Table 5: Changes in firm performance after busyness shock based on shocked director's age

This table present results only for shocked firms. The dependent variable on panel A is changes on ROA while on panel B it is changes on the logarithm of Tobin's Q. Old is an indicator variable that equals 1 if the firm was shocked by a director whose age is 65 or older. Age is the age of the shocked director's age when the event occurs. Control variables definitions are on the appendix. All regressions include year and industry fixed effects, where industry is determined by Fama and French 49 industry classification. Standard errors are clustered by firm.

Panel A: ΔROA

	(1)	(2)	(3)	(4)	(5)
Old	0.409**	0.408**	0.416**	0.406**	
	(2.12)	(2.26)	(2.30)	(1.98)	
Age					0.038**
					(2.28)
ΔSize		-0.046	-0.115	-0.145	-0.131
		(-0.08)	(-0.21)	(-0.25)	(-0.23)
ΔLeverage		-6.651***	-6.566***	-6.429***	-6.357***
		(-3.29)	(-3.23)	(-2.98)	(-2.94)
ΔR&D		-0.001	-0.001	-0.001	-0.002
		(-0.41)	(-0.53)	(-0.97)	(-1.06)
ΔVolatility		-2.183***	-2.187***	-2.279***	-2.245***
		(-2.78)	(-2.79)	(-2.90)	(-2.87)
ΔBoard Size			0.072	0.074	0.075
			(1.22)	(1.23)	(1.26)
ΔBoard Independence			-0.116	0.258	0.294
			(-0.12)	(0.24)	(0.28)
ΔBoard Age			-0.000	0.013	0.017
			(-0.00)	(0.27)	(0.34)
Tenure				0.005	0.001
				(0.26)	(0.08)
Female				0.084	0.122
				(0.36)	(0.53)
Audit Chair				0.056	0.045
				(0.21)	(0.17)
Audit Member				0.127	0.136
				(0.59)	(0.64)

Compensation Chair				0.126	0.102
				(0.42)	(0.34)
Compensation Member				0.120	0.148
				(0.60)	(0.73)
Nomination Chair				-0.404	-0.422
				(-1.19)	(-1.25)
Nomination Member				-0.138	-0.141
				(-0.66)	(-0.67)
Other Directorships				-0.087	-0.088
				(-1.33)	(-1.33)
N	1643	1643	1643	1546	1546
R^2	0.442	0.482	0.483	0.500	0.501

Panel B: ΔlogQ					
	(1)	(2)	(3)	(4)	(5)
Old	1.902**	1.957**	1.994**	1.380	
	(2.15)	(2.29)	(2.32)	(1.38)	
Age					0.140*
					(1.84)
ΔSize		-5.945***	-6.208***	-6.533***	-6.481***
		(-3.06)	(-3.16)	(-3.29)	(-3.26)
ΔLeverage		-27.802***	-27.889***	-27.297***	-27.022***
		(-4.28)	(-4.24)	(-3.93)	(-3.94)
ΔR&D		0.016*	0.016*	0.015*	0.015*
		(1.91)	(1.89)	(1.75)	(1.71)
ΔVolatility		-7.703**	-7.754**	-7.541**	-7.417**
		(-2.07)	(-2.07)	(-2.03)	(-1.99)
ΔBoard Size			0.212	0.167	0.172
			(0.77)	(0.58)	(0.60)
ΔBoard Independence			-4.667	-3.833	-3.721
			(-0.87)	(-0.68)	(-0.66)
ΔBoard Age			-0.248	-0.119	-0.104
			(-1.01)	(-0.46)	(-0.41)
Tenure				0.067	0.051
				(0.86)	(0.64)
Female				0.667	0.838
				(0.60)	(0.75)
Audit Chair				-0.804	-0.833
				(-0.63)	(-0.66)
Audit Member				-1.473	-1.442
				(-1.48)	(-1.46)
Compensation Chair				1.633	1.544
				(1.03)	(0.97)
Compensation Member				1.114	1.211
				(1.09)	(1.19)
Nomination Chair				-1.187	-1.246
				(-0.78)	(-0.83)

Nomination Member				0.363	0.349
				(0.39)	(0.38)
Other Directorships				0.059	0.050
				(0.15)	(0.13)
N	1643	1643	1643	1546	1546
R^2	0.507	0.544	0.546	0.546	0.547

t statistics in parentheses

* $p < .1$, ** $p < .05$, *** $p < .01$

Table 6: Director attends less than 75% meetings
The dependent variable is director attends less than 75% of meetings next year. On columns (1) and (2) all observations are considered, on columns (3) and (4) only directors that had an attendance problem in year t are considered. Finally, on columns (5) and (6) only includes firms where at least a director has had an attendance problem in the sample. Shocked Director is an indicator variable that equals 1 if the director was shocked. Old Shocked is an indicator variable that equals 1 if the director was shocked when she was 65 or older. Young Shocked is an indicator variable that equals 1 if the director was shocked when she was 65 or older. Control variables definitions are on the appendix. All regressions include year and industry fixed effects, where industry is determined by Fama and French 49 industry classification. Standard errors are clustered by firm.

Attendance Less 75%$_{t+1}$						
	All observations		Attendance Problem		Firm Attendance Problem	
Shocked Director	-0.000		-0.097*		-0.004	
	(-0.06)		(-1.83)		(-0.38)	
Old Shocked		-0.001		-0.120		-0.011
		(-0.28)		(-1.29)		(-0.79)
Young Shocked		0.001		-0.082		0.002
		(0.14)		(-1.26)		(0.12)
# Other Boards	0.002***	0.002***	0.018**	0.018**	0.005***	0.005***
	(6.25)	(6.24)	(2.16)	(2.16)	(2.71)	(2.71)
Audit Chair	-0.007***	-0.007***	-0.085*	-0.086*	-0.021***	-0.021***
	(-11.62)	(-11.61)	(-1.92)	(-1.93)	(-4.08)	(-4.08)
Audit Member	-0.002***	-0.002***	-0.092***	-0.093***	-0.007***	-0.007***
	(-2.65)	(-2.65)	(-4.10)	(-4.10)	(-2.86)	(-2.86)
Compensation Chair	-0.006***	-0.006***	-0.098**	-0.098**	-0.011***	-0.011***
	(-8.54)	(-8.54)	(-2.51)	(-2.52)	(-2.63)	(-2.63)
Compensation Member	0.000	0.000	-0.070***	-0.070***	-0.001	-0.001
	(0.51)	(0.51)	(-2.74)	(-2.73)	(-0.26)	(-0.25)
Nomination Chair	-0.004***	-0.004***	0.035	0.034	-0.006	-0.006
	(-4.17)	(-4.17)	(0.54)	(0.53)	(-1.35)	(-1.35)
Nomination Member	-0.001	-0.001	-0.033	-0.032	-0.005**	-0.005**
	(-1.08)	(-1.08)	(-1.46)	(-1.45)	(-2.02)	(-2.03)
Board Size	0.000**	0.000**	0.003	0.003	0.000	0.000
	(2.00)	(2.00)	(0.73)	(0.73)	(0.48)	(0.49)
Board Independence	-0.009***	-0.009***	-0.107	-0.106	-0.017	-0.017
	(-2.80)	(-2.80)	(-1.42)	(-1.42)	(-1.22)	(-1.22)

Log(Size)	-0.001***	-0.001***	-0.027**	-0.027**	-0.006***	-0.006***
	(-2.73)	(-2.73)	(-2.57)	(-2.57)	(-3.40)	(-3.40)
Leverage	0.003	0.003	0.047	0.047	0.026*	0.026*
	(1.13)	(1.13)	(0.66)	(0.66)	(1.80)	(1.81)
R&D	0.000	0.000	-0.002**	-0.002**	-0.000**	-0.000**
	(0.57)	(0.57)	(-2.22)	(-2.23)	(-2.38)	(-2.39)
Volatility	0.003	0.003	0.073	0.073	0.001	0.001
	(1.06)	(1.06)	(0.95)	(0.95)	(0.05)	(0.05)
N	200565	200565	2009	2009	28381	28381
R^2	0.015	0.015	0.236	0.236	0.047	0.047

t statistics in parentheses

* $p < .1$, ** $p < .05$, *** $p < .01$

Table 7: Committee participation

The dependent variable on columns (1) and (2) is changes in the number of memberships a director sits on. On columns (3) and (4) it is changes in the number of chairs a director holds. For columns (5) and (6) it is changes in the number of busy memberships (audit and compensation) a director sits on. While similarly on columns (7) and (8) the dependent variable is changes in the number of chairs in busy committees a director holds. Old Shocked is an indicator variable that equals 1 if the director was shocked when she was 65 or older. Young Shocked is an indicator variable that equals 1 if the director was shocked when she was 65 or older. Control variables definitions are on the appendix.

	ΔNumber Memberships		ΔNumber Chairs		ΔNumber Busy Memberships		ΔNumber Busy Chairs	
Shocked Director	0.023		0.025**		0.001		0.020**	
	(1.59)		(2.37)		(0.08)		(2.28)	
Old Shocked		-0.012		0.005		-0.011		-0.001
		(-0.60)		(0.30)		(-0.62)		(-0.06)
Young Shocked		0.053**		0.043***		0.011		0.038***
		(2.54)		(2.90)		(0.63)		(2.97)
ROA	-0.026	-0.026	0.023**	0.023**	-0.003	-0.003	0.008	0.008
	(-1.15)	(-1.15)	(2.27)	(2.26)	(-0.15)	(-0.15)	(0.93)	(0.93)
Log(Tobin's Q)	0.002	0.002	-0.002**	-0.002**	0.001	0.001	-0.001	-0.001
	(1.33)	(1.31)	(-2.37)	(-2.39)	(0.66)	(0.66)	(-1.07)	(-1.09)
# Other Boards	-0.004***	-0.004***	0.008***	0.008***	-0.006***	-0.006***	0.005***	0.005***
	(-2.79)	(-2.75)	(8.48)	(8.51)	(-5.10)	(-5.08)	(6.86)	(6.90)
Board Size	-0.000	-0.000	-0.000*	-0.000*	0.000	0.000	-0.000**	-0.000**
	(-0.93)	(-0.93)	(-1.94)	(-1.94)	(0.22)	(0.22)	(-2.57)	(-2.57)
Board Independence	-0.004	-0.004	0.008	0.008	0.005	0.005	0.003	0.003
	(-0.30)	(-0.30)	(1.25)	(1.25)	(0.47)	(0.47)	(0.71)	(0.71)
Log(Size)	-0.001	-0.001	-0.003***	-0.003***	0.001	0.001	-0.002***	-0.002***
	(-0.71)	(-0.70)	(-5.06)	(-5.06)	(1.55)	(1.55)	(-4.19)	(-4.17)

Leverage	0.005	0.005	0.007	0.007	0.014*	0.014*	0.003	0.003
	(0.46)	(0.46)	(1.48)	(1.48)	(1.90)	(1.90)	(0.73)	(0.72)
R&D	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000	-0.000
	(-0.62)	(-0.63)	(-1.11)	(-1.12)	(-0.08)	(-0.08)	(-1.24)	(-1.25)
Volatility	-0.001	-0.001	0.008	0.008	-0.001	-0.001	-0.002	-0.002
	(-0.05)	(-0.05)	(1.20)	(1.20)	(-0.15)	(-0.15)	(-0.41)	(-0.41)
N	156971	156971	156971	156971	156971	156971	156971	156971
R^2	0.042	0.042	0.025	0.025	0.035	0.035	0.015	0.015

t statistics in parentheses

* $p < .1$, ** $p < .05$, *** $p < .01$

Table 8: CAR Acquisition

The dependent variable is CAR(-2,+2) around an acquisition. Shocked_{t-1} is an indicator variable that equals 1 if the director was shocked last year. Old Shocked_{t-1} is an indicator variable that equals 1 if the director was shocked last year when she was 65 or older. Young Shocked is an indicator variable that equals 1 if the director was shocked last year when she was 65 or older. Control variables definitions are on the appendix. All regressions include year and industry fixed effects, where industry is determined by Fama and French 49 industry classification. Standard errors are clustered by firm.

	(1)	(2)
Shocked_{t-1}	0.529	
	(1.16)	
Old Shocked_{t-1}		0.978*
		(1.77)
Young Shocked_{t-1}		0.134
		(0.20)
% Paid in Cash	0.016**	0.017**
	(2.49)	(2.52)
Hostile	0.933	0.862
	(0.53)	(0.48)
Diversified	-0.133	-0.132
	(-0.52)	(-0.51)
Tender Offer	-0.273	-0.254
	(-0.44)	(-0.41)
Public Target	-1.485***	-1.494***
	(-3.39)	(-3.41)
Private Target	-1.109***	-1.116***
	(-3.67)	(-3.69)
% Deal to Firm Size	-0.000	-0.000
	(-0.02)	(-0.02)
ROA	-3.025	-3.019
	(-1.24)	(-1.24)
Log(Tobin's Q)	0.227	0.228
	(1.25)	(1.25)
Log(Size)	-0.232**	-0.232**
	(-2.00)	(-2.00)
Leverage	2.194**	2.190**
	(2.19)	(2.18)

R&D	0.007	0.007
	(0.60)	(0.61)
Volatility	2.014	2.044
	(1.35)	(1.37)
Board Size	-0.077	-0.077
	(-1.09)	(-1.08)
Board Independence	-0.241	-0.265
	(-0.21)	(-0.23)
Board Age	0.024	0.022
	(0.61)	(0.54)
N	3520	3520
R^2	0.246	0.246

* $p < .1$, ** $p < .05$, *** $p < .01$

Table 9: CEO Turnover
The dependent variable is probability of CEO turnover. Shocked_{t-1} is an indicator variable that equals 1 if the director was shocked last year. Old Shocked_{t-1} is an indicator variable that equals 1 if the director was shocked last year when she was 65 or older. Young Shocked_{t-1} is an indicator variable that equals 1 if the director was shocked last year when she was 65 or older. Shocked in last three years is an indicator variable that equals 1 if the director was shocked any time during the last 3 years. Old Shocked in last three years is an indicator variable that equals 1 if the director was shocked anytime during the last 3 years when she was 65 or older. Young Shocked in last three years is an indicator variable that equals 1 if the director was shocked any time during the last 3 years when she was less than 65 years old. Control variables definitions are on the appendix. All regressions include year and industry fixed effects, where industry is determined by Fama and French 49 industry classification. Standard errors are clustered by firm.

CEO Turnover

	(1)	(2)	(3)	(4)
Shocked_{t-1}	-0.020**			
	(-2.54)			
Shocked_{t-1} * Industry-Adj ROA	-0.223**			
	(-2.04)			
Old Shocked_{t-1}		-0.009		
		(-0.77)		
Old Shocked_{t-1} * Industry-Adj ROA		-0.236		
		(-1.21)		
Young Shocked_{t-1}		-0.030***		
		(-2.87)		
Young Shocked_{t-1} * Industry-Adj ROA		-0.062		
		(-0.45)		
Shocked in last 3 years			-0.005	
			(-0.87)	
Shocked in last 3 years * Industry-Adj ROA			-0.069	
			(-0.81)	
Old Shocked in last 3 years				0.009
				(1.26)
Old Shocked in last 3 years * Industry-Adj ROA				-0.309**
				(-2.46)
Young Shocked in last 3 years				-0.011*
				(-1.70)

Young Shocked in last 3 years * Industry-Adj ROA				0.053
				(0.48)
Industry-Adj ROA	-0.090***	-0.090***	-0.094***	-0.089***
	(-2.88)	(-2.88)	(-3.21)	(-3.03)
Log(Size)	0.001	0.000	-0.000	-0.000
	(0.31)	(0.27)	(-0.05)	(-0.22)
Leverage	0.000	0.000	0.006	0.007
	(0.00)	(0.02)	(0.54)	(0.62)
R&D	-0.000	-0.000	0.000	0.000
	(-0.07)	(-0.08)	(0.59)	(0.57)
Volatility	0.070***	0.069***	0.064***	0.063***
	(3.52)	(3.51)	(3.71)	(3.69)
Board Size	0.006***	0.006***	0.006***	0.006***
	(5.30)	(5.33)	(6.01)	(6.04)
Board Independence	0.029*	0.029*	0.025*	0.024*
	(1.81)	(1.80)	(1.75)	(1.68)
Board Age	-0.001	-0.001	-0.000	-0.001
	(-1.25)	(-1.32)	(-0.86)	(-0.98)
N	17756	17756	20614	20614
R^2	0.055	0.055	0.051	0.051

t statistics in parentheses

* $p < .1$, ** $p < .05$, *** $p < .01$

Table 10: Changes in firm performance after busyness shock based on shocked director's age and compensation The dependent variable on panel A is changes on ROA while on panel B it is changes on the logarithm of Tobin's Q. Firms are classified depending on directors age and whether their compensation is above or below the median. These variables and the remaining control variables definitions are on the appendix. All regressions include year and industry fixed effects, where industry is determined by Fama and French 49 industry classification. Standard errors are clustered by firm.

Panel A: ΔROA

	(1)	(2)	(3)	(4)
Shocked * High Compensation	0.277**			
	(2.43)			
Shocked * Low Compensation	0.149			
	(1.30)			
Old Shocked * High Compensation		0.472***		
		(3.64)		
Old Shocked * Low Compensation		0.293*		
		(1.87)		
Young Shocked * High Compensation		-0.410**		
		(-2.06)		
Young Shocked * Low Compensation		0.050		
		(0.34)		
Shocked * High Cash			0.101	
			(1.04)	
Shocked * Low Cash			0.307**	
			(2.48)	
Old Shocked * High Cash				0.198
				(1.64)

Old Shocked * Low Cash				0.595***
				(3.67)
Young Shocked * High Cash				0.018
				(0.13)
Young Shocked * Low Cash				0.044
				(0.26)
ΔLog(Size)	-0.535***	-0.533***	-0.530***	-0.528***
	(-3.15)	(-3.14)	(-3.10)	(-3.09)
ΔLeverage	-5.299***	-5.302***	-5.338***	-5.344***
	(-8.15)	(-8.15)	(-8.13)	(-8.13)
ΔR&D	-0.001	-0.001	-0.001	-0.001
	(-0.27)	(-0.24)	(-0.38)	(-0.35)
ΔVolatility	-2.098***	-2.100***	-2.106***	-2.104*** -2.107***
	(-8.67)	(-8.68)	(-8.61)	(-8.61)
ΔBoard Size	-0.002***	-0.002***	-0.002***	-0.002***
	(-8.27)	(-8.24)	(-8.21)	(-8.20)
ΔBoard Independence	0.102	0.097	0.080	0.076
	(0.37)	(0.35)	(0.28)	(0.27)
ΔBoard Age	-0.014	-0.014	-0.014	-0.013
	(-0.96)	(-0.94)	(-0.95)	(-0.92)
N	17223	17223	16988	16988
R^2	0.254	0.254	0.256	0.257

Panel B: ΔlogQ

	(1)	(2)	(3)	(4)
Shocked * High Compensation	0.112			
	(0.22)			
Shocked * Low Compensation	0.701			
	(1.33)			
Old Shocked * High Compensation		0.432		
		(0.63)		
Old Shocked * Low Compensation		1.777**		
		(2.11)		
Young Shocked * High Compensation		-0.671		
		(-0.68)		
Young Shocked * Low Compensation		-0.043		
		(-0.07)		
Shocked * High Cash			0.264	
			(0.62)	
Shocked * Low Cash			0.604	
			(0.99)	
Old Shocked * High Cash				0.590
				(0.93)

Old Shocked * Low Cash				1.452*
				(1.71)
Young Shocked * High Cash				-0.014
				(-0.02)
Young Shocked * Low Cash				-0.168
				(-0.21)
ΔSize	-10.034***	-10.033***	-10.125***	-10.119***
	(-15.65)	(-15.65)	(-15.76)	(-15.76)
ΔLeverage	-13.030***	-13.030***	-12.674***	-12.690***
	(-6.08)	(-6.09)	(-5.94)	(-5.96)
ΔR&D	0.006	0.006	0.008	0.009
	(0.51)	(0.52)	(0.69)	(0.71)
ΔVolatility	-7.994***	-8.002***	-7.977***	-7.974***
	(-7.79)	(-7.80)	(-7.68)	(-7.68)
ΔBoard Size	-0.004***	-0.004***	-0.004***	-0.004***
	(-3.12)	(-3.12)	(-3.10)	(-3.10)
ΔBoard Independence	1.675	1.658	1.682	1.670
	(1.28)	(1.27)	(1.27)	(1.26)
ΔBoard Age	-0.230***	-0.228***	-0.223***	-0.222***
	(-3.58)	(-3.55)	(-3.43)	(-3.41)
N	17223	17223	16988	16988
R^2	0.332	0.332	0.333	0.333

t statistics in parentheses

* $p < .1$, ** $p < .05$, *** $p < .01$