CHANGES IN CORPORATE GOVERNANCE: EXTERNALLY DICTATED VS VOLUNTARILY DETERMINED

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ABSTRACT

Using the 2003 SEC regulations (following the Sarbanes–Oxley Act) on board independence as an identification for externally imposed governance changes, I compare its influence on firm performance to the effect of voluntarily conducted adjustments. I use publicly listed US firms between 1998 and 2009. In a triple-difference (dif-in-dif-in-dif) analysis setting, I explicitly interact the dictated change in board independence with the identifiers of the shock and non-compliant firms. Controlling for companies with voluntary changes, firms forced to modify their governance by increasing board independence experience a decrease in ROA, asset turnover, and sales growth. Testing the joint influence of dictated and voluntary adjustments in board independence on performance through a cross-sectional logistic-regression model, and controlling further for potential endogeneity through an instrumental variable (IV) regression model, I obtain consistent results. The findings are robust for other mandated provisions and stronger for bigger changes; small, single-segment firms operating in wholesale, retail, and high-tech industries; and constrained companies with financial distress, high leverage, low cash, high volatility, high growth and R&D expenses.

JEL Classification: G32, G38, C33

Keywords: Imposed regulations, voluntary governance changes, firm performance, board independence, identification

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1. INTRODUCTION AND LITERATURE REVIEW

Several major corporate scandals in the United States during the early 2000s brought attention to corporate governance of large US companies. In reaction to the corporate governance issues highlighted through the scandals, the US Congress passed the Sarbanes–Oxley Act (SOX hereafter) and the Securities and Exchange Commission (SEC hereafter) announced several corporate governance regulations to restore public confidence in governance of public corporations. While significant research has been conducted on the relation between corporate governance and firm performance, the literature has not reached an agreement yet on whether changes in governance structure are beneficial for companies and improve firm performance (Finegold, Benson, and Hecht, 2007), especially when the changes are dictated by regulation. One of the possible explanations for that might be the lack of specification of a fitting model which captures the true impact of enforced rules. In this study, a triple-difference (DIDID) approach is used which indeed includes the changes in mandated rules directly in the analysis. Further, in a cross-sectional logistic-regression setup, the effect of dictated and voluntarily determined corporate governance changes on firm performance is observed simultaneously. In the analyses, I compare the influence on performance of externally dictated changes versus voluntary-governance changes. Specifically, the SEC reforms concerning board independence is used as an exogenous shock to clearly identify imposed governance rules, and compare firm performance before and after the mandated change in board structure.

The main research question is whether mandated changes compared to voluntary adjustments in corporate governance concerning board independence have a positive impact on firm performance. SOX instituted new requirements for public company boards, and, in 2003, SEC approved and adopted governance-related reforms suggested by the three major US stock exchanges: NYSE, NASDAQ, and NYSE American (formerly, AMEX). The most prominent reform requirement is that "… A majority of the board of directors must be comprised of Independent Directors …". Before the regulatory changes, companies applied necessary board structure adjustments voluntarily, in line with their needs to improve efficiency and performance. Starting from 2003, however, all US-listed firms have been forced to comply with the requirement of having a majority of independent directors. This natural experiment provides an opportunity to investigate the effect of

externally enforced governance rules on firm performance in comparison to voluntary changes before 2003.[1]

In this study, I hypothesize that dictating one type of governance structure uniformly across firms has a negative effect on firm performance, on average. As stated by Linck, Netter, and Yang (2008), regulations which force firms away from their preferred board structure presume that the prevailing board structures are not at their optimum. If, however, voluntarily determined governance structures are indeed the internal optimum for some firms, then after these dictated changes those companies become worse off. Furthermore, imposing new board structures may cause internal firm conflicts that potentially destroy harmony in the organization and damage efficiently working systems within firms. Moreover, new independent directors hired just to comply with the imposed rule, may not be a good fit and lower advisory functions of the board. Loss of important advisory functions, additional costs, and potential internal conflicts due to mandatory governance adjustments may lead to poor management decisions and a decrease in firm performance.

To test the hypothesis, I examine how board independence for firms that did not comply with SEC regulations prior to 2003 affected their performance after they had to change their board structure in accordance with the legislation. This shock provides clear identification and mitigates related endogeneity issues. Controlling for voluntary changes in board independence before the regulatory change, a triple difference (DIDID) approach is used, and industry-adjusted performance measures (return on asset (ROA), asset turnover, and sales growth) of these non-compliant (treatment) companies are compared before versus after the legislation. I then observe how dictated board independence in the post-period impacts non-compliant firms' performance in comparison to compliant (control) firms with voluntary board adjustments. This is the average treatment effect

[1] Before the SEC regulations in 2003, there have been other rules to reform corporate governance in firms. However, this paper considers 2003 SEC rules as the representative of enforced governance changes because not only scholars used them in literature for identification repeatedly, but also those rules explicitly codify board-wide regulatory changes which are sufficient enough to represent the corporate governance overall. Contrary to this, 1999 SEC regulation on Audit Committee Disclosure has a narrow scope on audit committee only, and 2002 Sarbanes-Oxley Act does not explicitly enforce board independence on firms.

examined in this study.

The findings indicate that performance decreases for firms that have to increase board independence through externally mandated rules after 2003. Evidence [2] suggests that compared to compliant firms, business risk increases for the non-compliant firms after the SEC reforms, presumably because they are forced to adopt a "window dressing" strategy (Romano, 2005) by selecting outside directors who would not object to the excess risk taking. Subsequently, such unmonitored and high business risk can destroy firm performance. The negative impact of imposed rules on firm performance is more significant when firms have to make bigger adjustments to comply with new regulation. The negative results are also stronger for single-segment and smaller firms. Building on the results by Wintoki (2007), I reveal that companies in concentrated industries, and operating specifically in high-tech, wholesale, and retail sectors, are affected severely by this dictated change in board structure. The findings additionally show that constrained firms with financial distress, high leverage, high stock return volatility, low cash holdings, high growth, and high research and development (R&D) expenses suffer major performance loss from the externally enforced rule of increased board independence. Further analyses with other SEC mandated rules including full independence of compensation and nominating committees have findings consistent with the previous results. Although enforced rules might be beneficial for some companies, which were off their optimal board independence path prior to these regulatory changes, these findings support the idea that imposing changes in board structure uniformly across firms is not suitable for some companies and destroys firm performance, on average.

Previous literature concentrates on various characteristics of corporate governance in relation to firm performance, and provides mixed results. Daily and Dalton (1993) conduct analyses on the board composition and find a positive effect on accounting performance measures. Brown and Caylor (2006) explore key governance committee characteristics, such as independence of audit, nominating, and compensation committees, and show that they are positively related to firm performance. Dey (2008) investigates whether there is a relation between corporate governance and the level of agency conflict in companies. Using principal component analysis on 22 individual governance variables,

[2] Results are tabulated in Table OA.I of Online Appendix.

Dey (2008) shows that when the agency conflict is high, there is a positive association between governance and performance. Knyazeva, Knyazeva, and Masulis (2013) focus on board structure. They find that board independence has a positive impact on performance and firm value. Examining Chinese firms during the 2003–2008 period, Li, Lu, Mittoo and Zhang (2015) show that the impact of board independence on firm performance increases as ownership concentration declines for private–controlled firms. Hu, Lin, and Tosun (2020) suggest that board independence improves firm performance when firms face a negative down-stream demand shock. Conversely, Bhagat and Bolton (2008) consider the interrelations between corporate governance, performance, capital structure, and ownership structure. They show that board independence is negatively correlated with operating performance. Houmes and Chira (2015) focus on firms with high insider ownership and find that "value firms" perform poorly due to inability of board of directors. The extensive review of studies by Finegold, Benson, and Hecht (2007) reveals that although there is no consensus in the literature, there are more empirical studies providing evidence for the negative effect of changes in board independence on firm performance. Interestingly, some of the academic research indicates that there is no significant relation between corporate governance and firm performance: Daily and Johnson (1997), Bhagat and Black (1999, 2002), Peng (2004), Adjoud, Zeghal, and Andaleeb (2007).

This paper is closely related to a few other studies. Wintoki (2007) examines costs and benefits of outside director monitoring for firms through SOX regulations. Consistent with Holmstrom and Kaplan (2003) and Chhaochharia and Grinstein (2007), Wintoki (2007) suggests that the board independence requirement through SOX decreases the value of small and young firms. Switzer (2007) studies the effects of SOX on the performance of Canadian small-cap firms and finds that firms subject to SOX provisions experience an increase in market valuation. Dahya, Garcia, and Bommel (2009) examine enforced regulations in the UK and show that mandated rules in corporate governance do not improve firm performance. Using international data, Brown and Caylor (2009), and Baulkaran (2014) find that firm performance increases with voluntary changes in board structure. Kim (2014) examines firms that voluntarily decide to increase transparency, and its effect on firm value. The study shows positive valuation effects for those firms. However, when similar market regulations are imposed on all listed firms, firm value

decreases.

This study differs from previous research in that one can directly observe the effect of mandated changes on firm performance. Explaining firm performance only through the shock and non-compliant firm identifiers might not accurately analyze the relationship because such a model would also include other factors than governance changes in those firms. Hence, in a triple-difference analysis setting, dictated board structure changes are explicitly interacted with the identifiers of the shock and non-compliant firms. Moreover, an instrumental variable (IV) regression model is used, similar to the one suggested by Duchin, Matsusaka, and Ozbas (2010), to control for potential endogeneity in governance changes. Different from past studies, I test the joint influence of dictated and voluntary adjustments in board independence on performance, using a cross-sectional logistic-regression model. This model can show the competing effects on firm performance more clearly. Along with market performance, excess firm performance is studied using the method by Faleye, Hoitash, and Hoitash (2011). Although, the reform on board independence is used as the main representative of mandated corporate governance changes, focusing on full independence of nominating and compensation committees enriches the study and provides additional robustness of the results concerning corporate governance changes. The paper also investigates, through placebo analysis, whether there are other confounding effects, such as firm-related endogenous shocks or independent exogenous shocks around SEC regulations that interfere with those mandated rules.

One of the challenges in this study is to clearly separate firms with voluntary governance changes from those that have to adjust board independence in accordance with externally dictated regulations. I classify the firms that are not compliant with SEC rules on board independence prior to 2003 as non-compliant firms. However, after the shock, for some of those non-compliant firms, the increase in board independence might also be in line with firm policy that is determined voluntarily. However, this is not the majority of non-compliant firms in the sample, otherwise findings from the cross-sectional logistic-regression model should be similar for pre-shock (voluntary changes) and post-shock (dictated adjustments) periods – yet the results are the opposite. Moreover, even if some of the changes in board independence are determined voluntarily after SEC reforms, the negative impact on firm performance for non-compliant firms is still there. The negative

influence of mandated rules on performance should be so severe that even possible inclusion of some non-compliant firms with voluntary changes cannot reverse that negative effect. Hence, having those non-compliant firms after the shock in the analysis would only cause underestimation of the real magnitude of the performance-damaging effect of externally imposed board structure changes.

Although the 2003 governance reforms have been used as a shock to governance in some studies, it is important to recognize its potential empirical limitations in a DIDID analysis setup. The shock followed a string of governance trends, scandals and built upon momentum in the governance area to move corporate governance in the direction of greater board scrutiny. Hence, the shock might be at least partly anticipated. However, it is not a significant issue in this paper. Figure 1 indicates that there is a steady and slow increase in board independence for non-compliant firms prior 2003, yet, the big change in board independence happens after SEC announcements, not before. Further, if firms have anticipated the change in regulations and acted accordingly before the shock, placebo tests in this study should catch that response. However, they provide insignificant results.

It can be argued that comparing forced and voluntary governance changes is problematic because companies that adjust their governance voluntarily may have a different set of performance factors, such as an upward performance trajectory, and hence, they can focus their attention on an independent board. However, this is not a valid issue in this study. Figure 1 explicitly shows that both non-compliant and compliant firms have similar patterns and trajectories for firm performance before SEC reforms. Also, the trend in performance for compliant firms remains mainly unchanged after the shock.

This paper contributes to the literature by providing a clear identification of externally dictated regulations on board structure and the impact on firm performance using various different models. The novel methods in this paper bring clarity to the mixed results in the literature by offering correct specification of a fitting model which captures the true impact of enforced rules. As a contribution to the literature, this study examines the severity of firm performance destruction explicitly for different industry sectors, organizational structures, and firm characteristics. As potential implications of this study, the findings may provide guidance for companies on their internal policies. Moreover, the results will assist policy makers in formulating regulations on corporate governance, so that they may

consider firm-specific dynamics when deciding on new legislation to help firms to perform better.

The remainder of the paper proceeds as follows. Section 2 introduces theoretical background and hypotheses. Section 3 describes the data and the variables, and it explains the empirical methodology. Section 4 provides the main findings, robustness tests and supplementary analyses. In Section 5, I conclude.

2. THEORETICAL BACKGROUND AND HYPOTHESES

2.1 The Impact of Mandated versus Voluntary Governance Changes

Fama and Jensen (1983) claims that strong internal monitoring through an effective board of directors can mitigate the general agency problem in firms. Adjustments in firms' board structures might be necessary in order to monitor their management, which would then increase firm value and protect shareholders' interests. Regarding institutional theory, professions can enforce uniform changes in governance structure across firms to ensure legitimacy and improve efficiency in firms' operations. However, as suggested by Coles, Daniel, and Naveen (2008), one size might not fit all: different firms with different characteristics, internal dynamics, and needs might require boards of directors with different structures. Some board structure changes might increase firm performance for some firms but destroy performance for others. Imposing such structural changes on all firms disregarding their organizational differences can lower efficiency for some companies (Meyer and Rowan, 1977; DiMaggio and Powell, 1983; Tolbert and Zucker, 1983). The degree of optimal board independence may differ across firms. Wintoki (2007) argues that a "one size fits all" style of governance regulation may not be optimal for some firms. Adams and Ferreira (2007) explain that friendlier and less independent boards may be optimal for firms that need advice rather than monitoring from the board. Barka and Legendre (2017) promote soft law in corporate governance and suggest that the composition of the board of directors should be moderated based on the firms' context. Aguilera and Cuervo-Cazurra (2009) show that despite the criticism, soft regulations, such as codes of good governance, improve the governance in companies that have adopted them. Romano (2005) claims that mandatory governance changes that disregard firm-specific dynamics can hardly improve performance and, therefore, such regulations should

be optional for companies. Engel, Hayes, and Wang (2007) and Iliev (2010) suggest that the additional costs of SOX might exceed the benefits of the legislation. Therefore:

> **Hypothesis 1.** Under mandatory requirement of the SEC, an increase in board independence has a negative effect on firm performance, when the increase is enforced rather than when it is voluntary.

2.2 Bigger Governance Changes

As discussed, previous studies imply that externally dictated adjustments in board structure may actually damage firms by lowering efficiency for those companies. Fama and Jensen (1983), and Baysinger and Hoskisson (1990) state that removing inside and affiliated directors extensively may harm firm performance by depriving boards of the valuable firm and industry-specific knowledge they provide. If this is true, firms that have to drastically change board independence in the post-period should experience more severe performance destruction. Therefore:

> **Hypothesis 2.** Under mandatory requirement of the SEC, the impact of imposed change is more profound for firms that have to increase board independence in a greater extend compared to companies implementing the adjustments voluntarily.

2.3 Constrained Firms

If enforced structural changes to increase homogeneity across firms may lead to reduction in efficiency in those firms (Meyer and Rowan, 1977), such an effect should be more severe for companies that already struggle due to various constraints. Considering adjustment costs, board restructuring should be more difficult for firms with low cash holdings and high leverage due to lack of sufficient funding (Wintoki, 2007; Engel, Hayes, and Wang, 2007). Similarly, it should be harder for firms that are already financially distressed and at risk. These firms can be better off when they decide their board structure internally, according to their firm-specific needs. The same argument also applies to single-segment firms. Due to their limited resources, single-segment firms may not cope with additional costs associated with mandated changes in governance (Iliev, 2010). When high-growth and highly innovative companies are forced to alter board independence, this external

pressure may conflict with their internal firm dynamics and how they run their business. In an environment of racing for innovation, such conflicts may slow firms down and reduce firm performance. Considering firms with high blockholder ownership, intervention in board structure may be challenged by large shareholders who believe the existing governance mechanism is in their best interests. Hence, such intervention may create internal conflicts and lead to performance destruction for those companies. Therefore:

> **Hypothesis 3.** Under mandatory requirement of the SEC, the effect of dictated changes in board independence is greater for constrained firms that are forced to increase board independence compared to similar companies but implementing the adjustments voluntarily.

2.4 Industry Sectors

Different industry settings can influence operations and the structure of firms. Considering concentrated industries, there may not be a disciplinary mechanism on firm management coming externally from the market because product market competition is low and the market is dominated by a few large firms. Consequently, those firms might have developed their own governance structure suitable to their firm specifics and needs. Once they are forced to change board independence in accordance with externally imposed regulations, this may create internal disputes, lower advisory functions of the board, and negatively affect firm dynamics. This is consistent with the view that forcing firms to adopt structural changes does not necessarily improve efficiency in those companies (Tolbert and Zucker 1983). Therefore:

> **Hypothesis 4.** Under mandatory requirement of the SEC, the impact of enforced adjustments in board independence is greater for firms in concentrated industries that are dictated to increase board independence compared to similar companies in such industries but implementing the changes voluntarily.

3. EMPIRICAL RESEARCH: DATA, VARIABLES, AND METHODOLOGY

3.1 Data Selection and Variable Construction

The data sample comes from Compustat, CRSP, Execucomp, FactSet, and ISS (formerly

RiskMetrics) databases from 1998 to 2009. To balance the period leading to the subprime crisis, a six-year period is selected for either side of SEC announcements. Financial firms and the utilities are excluded and I restrict the variables to have observations on before and after the shock. The variables are winsorized at 1% and 99% levels. In the sample, total assets are greater than capital expenditures, and both have positive values. I restrict the variables to have observations both in the pre-period and post-period. However, some firms in Compustat fail to have observations for each year. The sample consists of 6,023 observations across 972 firms.

In the analyses, the externally dictated rule on corporate governance is represented by *Board Independence*. It is the percentage of independent members of the board of directors. This measure reflects the imposed regulation on increasing board independence to 50% or above for firms listed in NYSE, NASDAQ, and NYSE American. Following Peng (2004), Dahya, Garcia, and Bommel (2009), Brown and Caylor (2009), and Duchin, Matsusaka, and Ozbas (2010), firm performance is evaluated with three measures in order to examine different aspects, such as earnings, sales, and sales growth. These performance measures are adjusted by industry mean values to mitigate any industry effects. *Adj. ROA* is earnings before interest and taxes over total assets divided by the industry average of this measure for that firm. *Adj. Asset Turnover* is net sales over total assets divided by the industry average of this measure for that firm. *Adj. Sales Growth* is the difference between net sales of the current year and the preceding year over net sales of the preceding year, which is divided by industry average of this measure for that firm.

Considering the previous studies on firm performance, this paper includes several control variables. *Firm Size* is the natural logarithm of total assets. *Cash* is cash and short-term investments over total assets. *R&D* is R&D expenses over net sales. *M/B* represents market-to-book ratio and is common shares outstanding multiplied by the closing price of one share over common equity. *Leverage* is the sum of current liabilities and long-term debt over total assets. *Volatility* is the standard deviation of daily stock returns. *HHI* is the Herfindahl measure for industry concentration and is computed using the text-based network industry classification method, as suggested by Hoberg and Phillips (2010). *Segments* is the total number of business segments. *Board Size* is the total number of directors on the board. *CEO Incentive Pay* is the dollar sum of restricted stock grants and

long-term incentives in CEO pay. *CEO Age* is the natural logarithm of CEO age. *CEO Tenure* is the natural logarithm of CEO tenure. *CEO Ownership* is the percentage of total shares owned by CEO. *BH Ownership* is the percentage of total shares owned by blockholders. *Sales Growth* is the difference between net sales of the current year and the preceding year over net sales of the preceding year. *Return Growth* is the difference between annual stock return of the current year and the preceding year over annual stock return of the preceding year.

3.2 Empirical Methodology

This paper examines the mandated changes in board independence for firms that did not comply with SEC regulations before 2003 and compares the effect of these adjustments on firm performance to the impact of such changes that are implemented voluntarily in compliant firms. Hence, it is essential to accurately determine the non-compliant and compliant groups in the sample. They are constructed using propensity score matching for the random assignment of firms. Non-compliant firms are propensity-matched with at least two nearest compliant neighbor firms in the sample using characteristics known to affect firm performance, which are the control variables in the model. After the matching, those companies complying with the SEC requirement of majority of board independence will be the compliant firms. I check whether these non-compliant and compliant groups are similar in those firm and CEO characteristics and differ only in the imposed rule on board independence through SEC rules. Descriptive statistics imply that both groups have similar mean values for firm, board, and CEO characteristics but differ in board independence. Further comparison of these variables in terms of mean and mean differences can be found in Table OA.II, Online Appendix. It shows that compliant and non-compliant firms are similar to each other considering the matching variables in the pre-period and post-period. At the end, there are 301 non-compliant and 671 compliant firms in all analyses.

I study the distribution of the board independence and performance measures separately for firms that did (control firms) and did not (treatment firms) comply with SEC regulations prior to 2003. I can therefore examine whether performance for those firms is affected by the externally mandated rules after 2003. Figure 1 presents the mean values of *Board Independence* and *Adj. ROA*. For compliant firms, there is a trend towards a slight

increase in board independence. It rises from 70% to 79% by 2009. As expected for non-compliant firms, *Board Independence* jumps from 48% to 62% after the shock, and reaches 75% by 2009. Considering firm performance before the dictated governance change in 2003, non-compliant firms have higher ROA than compliant firms. The ROA trend lines for both groups indicate that non-compliant and compliant firms have a similar trend on average. However, after the shock, both types of firms experience a decrease in *Adj. ROA.* The drop in ROA is more severe for non-compliant firms – that is, from 1.1 to 0. Moreover, non-compliant firms have lower *Adj. ROA* than compliant firms on average after 2003. This figure implies that there is a trend towards a decrease in *Adj. ROA* shown by compliant firms after the shock. More importantly, after non-compliant firms are externally forced to adjust board independence, they perform significantly worse than compliant firms. [3]

For non-compliant and compliant firms, I compare the pre-period measures to the post-period measures for board independence and changes in firm performance to examine any significant differences in means. Considering non-compliant firms, *Board Independence* increases from 49% to 68% after the shock while *Adj. ROA, Adj. Asset Turnover* and *Adj. Sales Growth* decline by 0.30, 0.23, and 0.19, respectively. These differences are statistically significant. Contrary to that, the differences for compliant firms regarding board independence and firm performance are either weak or insignificant.[4]

The period for the main analysis is 1998–2009. The sample has two six-year periods around SEC announcements. The multivariate analysis is conducted using a triple-difference analysis similar to Tosun (2016). Dummy variables are used for the post-period and non-compliant firms, along with the interactions of these variables with the level of board independence. I can therefore evaluate the possible influence of externally dictated adjustments in board independence on firm performance. This paper tries to demonstrate that firm performance changes occur because of the mandated rule changes on board structure. It examines whether, after the shock, imposed board independence has a greater and possibly negative effect on performance for non-compliant firms than the same governance change does for compliant firms that are not externally forced to adjust board independence. This claim is represented by the interaction of *Board Independence* with the

[3] Similar associations are observed using *Adj. Asset Turnover* and *Adj. Sales Growth*.
[4] The table presenting these results is available upon request.

Post and *Non-Compliant* dummies. The sample includes a long period of changing macroeconomic conditions. Hence, similar to Guo and Masulis (2015), I allow the baseline effect of mandated changes in board independence on firm performance to vary by year. This is achieved by multiplying *Board Independence* by year fixed effects. *Non-Compliant*Board Independence* and *Non-Compliant*Post*Board Independence* are the interaction variables of *Post*, *Non-Compliant*, and *Board Independence*. Year and firm fixed effects, along with controls (*Cash, R&D, M/B, Leverage, Volatility, HHI, Segments, Board Size, CEO Incentive Pay, CEO Age, CEO Tenure, CEO Ownership, BH Ownership, Sales Growth*, and *Return Growth),* are added to the model. *Return Growth* is used as the control variable instead of *Sales Growth* in the model where the performance measure is *Adj. Sales Growth.* All control variables are lagged by one year. The model does not have indicators for the non-compliant firms or the post-period because they are subsumed in the firm and year fixed effects. Standard errors are clustered at the firm level. The model is specified as follows:

$$Y_{i,t} = \alpha + \beta * X_{i,t} + \lambda * NonCompliant_{i,t} * X_{i,t} + \gamma * NonCompliant_{i,t} * Post_{i,t} + \varphi * NonCompliant_{i,t} * Post_{i,t} * X_{i,t} + \sum_{t=1}^{12} \theta_t * X_{i,t} * YearDummies_{i,t} + \sum_{k=1}^{14} \delta_k * Controls_{i,t-1,k} + \mu_{i,t} \quad (1)$$

where the industry-adjusted firm performance measure is *Y*; the board independence measure is *X*; the firm observation is $i = 1, \dots, N$; the entire period is $t = 1998, \dots, 2009$; the number of control variables is $k = 1, \dots, 14$; and the constant term and the coefficients of board independence, non-compliant firms' board independence, non-compliant firms in the post-period, non-compliant firms' board independence in the post-period, board independence year dummy interaction, controls, and error term are α, β, λ, γ, φ, θ, δ, μ, respectively.

In order to further address any endogeneity issues associated with firm performance and dictated changes in board independence, additional analyses are conducted using the instrumental variable (IV) approach similar to the one that was used by Duchin, Matsusaka, and Ozbas (2010). It is worth mentioning that this study and their research examine different effects on firm performance. While they focus on the cost of information gathering, this paper investigates the condition of change in board structure being mandatory. Hence, I borrow only the method from Duchin, Matsusaka, and Ozbas (2010)

to deal with endogeneity problems in this particular setup of the study. *Non-Compliant Dummy* is equal to one if the firm did not comply with the SOX requirement of a fully independent audit committee prior to 2000, and zero otherwise. The requirement of a fully independent audit committee is one of the first regulations approved by the NYSE and NASDAQ. Hence, firms that did not comply with this regulation are more likely to be non-compliant with the rule on board independence. Thus, *Non-Compliant Dummy* represents the non-compliant group in this IV model setup. Further, this regulatory change in audit committee would influence firms to change their board structure but shall not affect firm performance directly. Thus, *Non-Compliant Dummy* is a well-fit instrument for this analysis. In the first stage, *Board Independence* is regressed on *Non-Compliant Dummy*. In the second stage, *Board Independence (fitted)* is used as the fitted board independence values from first stage regression, and *Adj. ROA, Adj. Asset Turnover,* and *Adj. Sales Growth* are regressed on that main explanatory variable. Year fixed effects are included. Standard errors are clustered by firms. In unreported tests, I check for validity of the instrument through Cragg-Donald's Wald *F* weak-instrument test and Anderson's canonical correlations likelihood-ratio under-identification test. *F* statistics of 88.70 and Chi-square of 88.22, respectively, imply that the instrument is not weak, canonical correlations are different from zero, and under-identification is not issue in the analyses.

4. RESULTS

4.1 Descriptive Statistics

Table I provides the summary statistics for all variables. Industry-adjusted ROA values for the total sample, non-compliant firms and compliant firms are 0.533, 0.690, and 0.461, respectively. The left-skewed feature of *Adj. ROA* for all three samples indicates that there are some very poorly performing firms in each of those samples. *Adj. Asset Turnover* is 0.992 for the total sample, 0.947 for non-compliant firms, and 1.013 for compliant firms. The mean of *Adj. Sales Growth* for the total sample, non-compliant firms and compliant firms are 0.691, 0.726, and 0.675, respectively. The statistics for firm, board, and CEO characteristics are similar to those documented in previous studies. The mean *HHI* value of 0.218 implies that the companies in the sample operate in concentrated industries.

Considering the descriptive statistics, both non-compliant and compliant firms have similar mean values for industry concentration, as well as for firm, board, and CEO characteristics.

4.2 Regression Results

Table II presents the main results for the impact of the enforced board independence rule on firm performance. Consistent with the literature, baseline model findings for *Adj. ROA* suggest that highly innovative firms with high levels of cash and blockholder ownership perform better. Those firms also have low leverage and smaller boards.

Column II of Table II shows the results from a double-difference (DID) analysis where the main explanatory variable is *Non-Compliant*Post* and the possible effect by *Board Independence* is excluded. *Non-Compliant*Post* alone does not have a significant impact on industry adjusted ROA. This is not surprising because *Non-Compliant*Post* considers not only governance but also all other possible factors associated with non-compliant firms, and hence, it represents only the trend among non-compliant firms after SEC reforms. The impact by board independence is included in the analyses from Column III to V. As shown in Column III, *Board Independence* alone does not have a significant impact on ROA. This measure cannot provide a clear interpretation because it includes periods both before and after the shock, as well as both non-compliant and compliant firms. *Non-Compliant*Board Independence* has statistically significant and positive estimates. It indicates that an increase in board independence improves performance for non-compliant firms when both pre- and post-periods are considered together where those firms voluntarily adjust board independence first, and then they are forced to change it. Significant and positive results for *Non-Compliant*Post* suggests that there is a trend of increase in firm performance for non-compliant firms after SEC rules. *Non-Compliant*Post*Board Independence* is the main variable of interest and represents the enforced changes in board independence for non-compliant firms in the post-period. Its negative and statistically significant estimates imply that industry adjusted ROA decreases for non-compliant firms after SEC reforms when those firms are forced to increase board independence. Particularly, *Adj. ROA* drops by 3.3% with 1% imposed increase in board independence after the shock. I consider the coefficients on other interaction terms, as well. In terms of the total magnitude of change, the sensitivity of adjusted ROA to externally

forced board independence changes is still negative, at −0.664 (= −1.195 + 3.844 −3.313), for non-compliant firms after the shock. When those adjustments are done voluntarily by non-compliant firms in the pre-period, the sensitivity of *Adj. ROA* to board independence is positive, at 2.649 (= −1.195 + 3.844). Overall, the findings support H1 and suggest that firms not complying with SEC requirements prior to 2003 experience decreases in adjusted ROA due to mandated changes in board membership after the rule, while companies which decide those changes voluntarily perform better. It is interesting to compare this result to the general trend in *Adj. ROA*. After the shock, ROA values seem to increase for non-compliant firms according to *Non-Compliant*Post*. However, the coefficient on *Non-Compliant*Post*Board Independence* is still greater than the one on *Non-Compliant*Post* in absolute terms. This finding shows that when the influence of dictated changes in board independence is considered the increasing trend in firm performance is reversed and *Adj. ROA* declines by 3.3%. This shows the performance-destroying impact of mandated regulation on board independence.[5]

The findings for *Adj. Asset Turnover* are given in Column IV, Table II. *Board Independence* and *Non-Compliant*Board Independence* cannot provide any statistically significant outcomes. Positive and significant estimates for *Non-Compliant*Post* indicate that there is a trend of increase in asset turnover for non-compliant firms after SEC regulations. Statistically significant and negative results for *Non-Compliant*Post*Board Independence* suggest that non-compliant firms perform worse in terms of asset turnover after board independence has to be externally adjusted through SEC. *Adj. Asset Turnover* decreases by 3.8% (= 0.230 * 0.163) when board independence rises by one-standard-deviation (about 16%) for non-compliant firms in the post-period. Considering the total magnitude of change through other interaction terms, the sensitivity of adjusted asset turnover to externally imposed board independence changes is still negative, at −0.216 (=

[5] Some may argue that reverse causality can be an issue here. However, it would be unrealistic to believe that all non-compliant firms suddenly start to make poor business decisions due to some other reason, and that happened to overlap with SEC regulation; and then those firms hire independent directors to improve performance. It is clear that the increase in board independence is due to SEC rules, and successful non-compliant firms start to perform poorly *after* the regulatory change. Hence, the story of reverse causality is not plausible.

−0.007 + 0.021 −0.230), for non-compliant firms after the regulation. It is 0.014 (= −0.007 + 0.021) and positive when non-compliant firms make those adjustments voluntarily and according to internal firm dynamics in the pre-period. Overall, the results support H1 and imply that non-compliant firms have a lower industry-adjusted asset turnover due to SEC dictated changes in board independence, while companies that conduct those changes voluntarily have higher firm performance. A comparison between the estimates of *Non-Compliant*Post*Board Independence* and *Non-Compliant*Post* reveals an interesting finding. The increasing trend of 2.1% in *Adj. Asset Turnover* is reversed to a 3.8% decline when the impact of externally mandated increase in board independence is considered. This suggests how performance-damaging dictated board structure changes can be.

The findings for *Adj. Sales Growth* are given in Column V, Table II. *Board Independence* and *Non-Compliant*Board Independence* do not have any statistically significant effect on sales growth. Conversely, *Non-Compliant*Post* has positive and significant outcomes which suggest that for non-compliant firms after the shock there is a trend toward an increase in *Adj. Sales Growth*. Statistically significant and negative results for *Non-Compliant*Post*Board Independence* indicate that non-compliant firms experience losses in sales revenues after they are forced to increase board independence through SEC. Specifically, *Adj. Sales Growth* decreases by 3.5% for non-compliant firms after the legislation, when the board becomes one per cent more independent. In terms of the total magnitude of change, the sensitivity of *Adj. Sales Growth* to externally enforced board independence changes is still negative, at −1.644 (= −0.374 + 2.261 −3.531), for non-compliant firms after the shock. When non-compliant firms adjust board independence voluntarily according to firm-specific dynamics in the pre-period, the sensitivity of *Adj. Sales Growth* to those governance changes is positive, at 1.887 (= −0.374 + 2.261). Overall, the findings support H1 and suggest that non-compliant firms experience a decline in sales growth through externally mandated changes in board independence in the post-period, while firms with voluntarily decided adjustments in governance perform better. Comparing between the results for *Non-Compliant*Post*Board Independence* and *Non-Compliant*Post* reveals a significant finding. For non-compliant firms in the post-period, *Adj. Sales Growth* seems to increase according to *Non-Compliant*Post.* However, its coefficient is still smaller than the one on *Non-Compliant*Post*Board Independence* in

absolute terms. This finding shows that the increasing trend in firm performance is reversed and *Adj. Sales Growth* drops by 3.5% when the influence of externally imposed changes in board independence is considered.[6]

One of the plausible explanations for performance reduction in non-compliant firms is that firms lose important advisory functions after they are forced to restructure the board. The pressure of finding new independent directors results in adding members on the board who may not be the best fit due to several reasons, such as too busy to contribute effectively in meetings, not enough experience as a director, and not familiar with the firm's operations. If adding independent directors lowers advisory functions of the board, then the board may not operate optimally and decisions will be poor or suboptimal at best. I further examine this channel of reasoning and consider investments, return on investment (ROI), and R&D decisions to represent the advisory functions of the board in non-compliant and compliant firms. Figure OA.1, Online Appendix shows that non-compliant firms have lower ROI compared to compliant firms starting 2004 when those non-compliant firms are dictated to increase board independence. Even though ROI for non-compliant firms decrease after 2003, they still invest more compared to compliant firms. Furthermore, less (more) non-compliant (compliant) firms engage in R&D related acquisitions each year starting 2004. These findings suggest that mandated changes in board independence lower advisory functions of the board for non-compliant firms, and they invest more yet in low ROI projects and do not involve in many R&D focused activities that could potentially lead to high performance and growth.

One can argue that firms are mandated to increase the proportion of outside directors to only above 50 percent and hence, any increase beyond this mandatory requirement could be considered voluntary than mandatory. To address this concern and have a more refined analysis, a restricted sample is constructed with non-compliant firms

[6] By using industry-adjusted dependent variables, industry effects are incorporated in the models that also have firm fixed effects. The analyses are repeated with unadjusted dependent variables and industry fixed effects as controls, as well as, only with firm fixed effects. I also use adjusted dependent variables and drop firm fixed effects. The original results remain robust. In further analyses, I control for several time-varying macroeconomic conditions, i.e. unemployment rate, inflation rate, and GDP. These factors do not have any significant association with firm performance, and the results are virtually similar to the original findings.

that increase board independence only just above 50% after 2003. Given that one standard deviation for board independence is about 16% in the sample, suitable cut-off intervals can be 8% and 16% above the 50% board independence threshold. The main analysis is replicated with these new subsamples that have maximum board independence of 58% and 66% for non-compliant firms, respectively. The results in Table OA.III, Online Appendix are similar to the original findings in Table II and support the validity of those findings.

The models in Table II mitigate potential endogeneity concerns in decision of board independence changes because they use SEC regulations in a natural experiment setting. Nevertheless, the IV models in Table III address this endogeneity issue even further. The significant first stage estimate for *Non-Compliant Dummy* in Column I implies that non-compliant firms have a lower level of board independence. This is expected because these are non-compliant firms with board independence level less than 50%, and they are forced to increase board independence after SEC regulation. The results in Columns II, III, and IV support H1 and the original findings from the main model. In particular, *Adj. ROA* in Column II drops by 9.9% when non-compliant firms are externally forced to increase board independence by 1% in accordance with SEC rules. Similarly, firms perform worse by 1.7% and 7.8% in terms of *Adj. Asset Turnover* and *Adj. Sales Growth*, respectively, when they increase board independence by 1% through imposed regulations by SEC.

I test H2 by 1) focusing on firms with the biggest changes in board independence after SEC rules and 2) examining firms whose proportion of outside directors was the lowest before SEC regulations. For the first approach, I use companies in the top decile of board independence changes due to mandated rules while for the second method, I use firms that were in the bottom decile of board independence level before the SEC rule as the non–compliant firms. Then, I repeat the main DIDID analysis.

In Panel A of Table IV, the estimates for *Non-Compliant*Post*Board Independence* support H2. Specifically, *Adj. ROA* drops by 4.66% for non-compliant firms with top decile changes in board independence after SEC regulations. Firm performance deteriorates by about 0.84% and 13.29% in terms of *Adj. Asset Turnover* and *Adj. Sales Growth*, respectively, for those non-compliant firms with greater board adjustments. These findings are economically more significant than the original results of 3.31%, 0.23%, and 3.53% for *Adj. ROA, Adj. Asset Turnover* and *Adj. Sales Growth*, respectively. The findings

in Panel B give further support to H2. In particular, the statistically significant (at 5% and 10% levels) and negative estimates for *Non-Compliant*Post*Board Independence* imply that firms need to increase the proportion of outside directors to a greater extent so as to reach above the mandated 50 percent and these higher levels of enforced changes in board independence decrease firm performance for such non-compliant firms even more.

Further analyses examine the influence of imposed SEC changes in board independence on firm performance for particularly constrained firms. Specifically, I study firms with high leverage (top quartile), low cash holdings (bottom quartile), high stock return volatility (top quartile), and financial distress. Following Altman (1968), firms with less than 1.81 in Altman Z-Score are categorized as financially distressed. Other firms with different characteristics are also analyzed. High-growth (top-quartile) companies that focus more on innovation have their own fast-pace business dynamics. Single-segment firms may have only limited resources to run their business compared to big conglomerates. Companies with high blockholder ownership (top quartile) have established ongoing governance, and any external interference in these firms may face resistance. Main DIDID analysis is conducted using these particular firms.

In Panel A of Table V, the estimates for *Non-Compliant*Post*Board Independence* are statistically significant and negative. They are more pronounced than original findings. These results support H3 and imply that dictated board independence changes decrease firm performance more when firms are constrained, with low cash and high leverage. Similarly, in Panel B, negative and stronger findings suggest that firm performance decreases more for high-growth and highly innovative companies when they are forced to alter board independence. More distinct and negative results in Panel C indicate that forcing firms that are financially distressed and at risk to adjust their board structure decreases firm performance even more. According to Panel D, single-segment firms and companies with high blockholder ownership suffer from deteriorated firm performance after they adjust board independence in accordance with SEC regulations. Considering the stronger findings for firms with low cash, high leverage and high blockholder ownership, another plausible explanation suggests that managerial entrenchment in these firms is already controlled through the low level of cash, the lack of free cashflow, and, externally, by large shareholders, respectively. This implies that these firms may already have a good

governance structure. Enforcing additional pressure to change their optimum may damage that well-functioning system and internal firm dynamics. Subsequently, firm performance deteriorates substantially.

To investigate whether there is any effect of different industry settings on the original findings, the main DIDID analysis is repeated for concentrated (HHI > 0.250) and competitive (HHI < 0.100) industries separately.[7] Further analyses are conducted for manufacturing, high-tech, construction, wholesale & retail, and service industries individually. The study cannot be expanded for more than five Fama–French industries due to the small number of observations.

Table VI presents the results. Statistically significant and negative findings for *Non-Compliant*Post*Board Independence* in Panels A, B, and C suggest that firm performance drops after the forced increase in board independence by SEC for non-compliant firms operating in concentrated industries. H4 is supported. Due to lack of external disciplinary mechanism on management, firms in concentrated industries might have their own governance structure suitable to their firm specifics. Once this balance in corporate governance is tilted through imposed regulations, negatively affected firm dynamics result in performance destruction.[8]

Further findings in Panels A, B, and C imply that high-tech firms' performance suffers from dictated changes in board independence. These results are consistent with previous findings for high-growth and highly innovative companies in Table V. Furthermore, wholesale and retail firms also experience a decline in ROA and sales growth after they are made to comply with external rules and increase board independence. The results hold only for *Adj. ROA* considering firms operating in service industries. Conversely, manufacturing and construction firms' performance seems to be unaffected by mandated changes in board independence.

[7] Industry concentration definitions using HHI are available at https://www.justice.gov/atr/ horizontal-merger-guidelines-08192010#5c

[8] Chhaochharia, Grinstein, Grullon, and Michaely (2017) suggest a positive relation between industry concentration and firm performance after SOX. Their study covers a 6-year period (2000-2006) and they do not examine on individual provisions of SOX or the rule of majority of board independence. Different focuses between this study and theirs might explain the differing results.

4.3 Supplementary Analyses

The regulation on board independence by SEC is the main provision for companies listed in NYSE, NASDAQ, and NYSE American. It was the intention of lawmakers when SOX was introduced in 2002. In 2003, SEC additionally approved that all firms listed in NYSE have to comply with provisions on compensation and nominating committees. For companies listed in NYSE, all directors in compensation and nominating committees must be independent. I further investigate the impact of mandated rules on firm performance through these provisions on governance structure, i.e. full independence of compensation and nominating committees, testing the robustness of the original findings. In Table OA.IV of Online Appendix, the statistically significant and negative results imply that changes in those committees externally imposed by SEC damage firm performance for non-compliant firms.

In this study, the total sample period is 12 years, covering 6-year periods before and after SEC rules. Some may argue that this period is long and may contain other factors that influence firm performance and create noise in the estimates. It may also create survival bias because some firms in Compustat do not survive more than 10 years. After the main DIDID analysis is repeated for a shorter time interval: that is, ± four years around SEC announcements, the performance-damaging impact of externally dictated changes in board independence for non-compliant firms remains robust in Table OA.V of Online Appendix.

In further analyses, I examine whether there are other firm-related endogenous shocks or independent exogenous shocks that affect firm performance during the sample period. Placebo tests are conducted in which the time range of the study is shifted by ± two years, keeping the main structure of the model the same. Statistically insignificant results in Table OA.V of Online Appendix indicate that there are not any other trends or shocks than SEC reforms that influence firm performance through board independence. This signifies validity of SEC regulations as the only exogenous shock in that period.

It can be argued that other governance related factors may change simultaneously with the shock. Shareholder activism increased during that period after several governance scandals. Moreover, Linck, Netter, and Yang (2009) show that board size, CEO duality, and frequency of board meetings also changed around SEC reforms. Hence, these

additional factors of corporate governance must be examined to explore whether SEC legislations are still the only valid shock in the sample. After the original DIDID analysis is repeated while replacing *Board Independence* with these governance variables, i.e. the number of proposals by activist shareholders, CEO duality, board size, and attendance in board meetings, the results are statistically insignificant in Table OA.VI of Online Appendix. These findings support validity of the shock for this study.

To examine the influence of both voluntarily determined and externally imposed governance adjustments on firm performance in a comparison, a cross-sectional logistic-regression analysis is conducted in which average values of board independence in non-compliant firms for periods before and after regulations are constructed. Dummy variables are formed to represent an increase in average performance from pre-period to post-period. The results in Table OA.VII of Online Appendix indicate that when non-compliant firms are externally forced to increase board independence, this reduces the odds of those firms having improved ROA. Conversely, when these firms increase board independence voluntarily, before enforced regulations while taking into account firm-specific needs, the odds of them having better ROA increase in the post-period. The results for asset turnover and sales growth also support these findings.

The paper shows that externally imposed governance adjustments measured through board independence are detrimental for firms. Another method to analyze this impact is to examine excess firm performance. If the original findings are true, then dictated changes in board independence should also reduce excess performance of non-compliant firms after those regulations. Following the method by Faleye, Hoitash, and Hoitash (2011), firm performance measures are regressed on determinants in the baseline model. The residuals are calculated from those regressions. The second stage mimics Equation (1) using these residuals as excess firm performance. Statistically significant and negative results in Table OA.VIII of Online Appendix are consistent with the original results. Particularly, Excess Adj. ROA drops by 2.5% for treatment firms with 1% imposed increase in board independence after the shock. The decrease in excess firm performance are 0.2% and 3.8% considering adjusted asset turnover and adjusted sales growth, respectively. These findings suggest that mandated changes in board membership also destroy excess performance of firms.

In addition to real performance, market performance is examined, too. *Adj. Stock Return* is the annual stock return for a firm for a given year. *Adj. Tobins Q* is common shares outstanding multiplied by the closing price of one share over common equity. *Adj. Cash Flow per Share* is cash from operating activities over the number of ordinary shares issued. *Adj. P/E Ratio* (Price-to-Earnings Ratio) is the price of one share of stock divided by the company's earnings per share. All these measures are adjusted by industry mean values. The main analysis is repeated using these measures for market performance. The results in Table OA.IX of Online Appendix support the original findings. *Adj. Stock Return* decreases by 3.1% for non-compliant firms after the legislation, when the board becomes one per cent more independent. Similarly, *Adj. Tobins Q* drops by 0.58 for those firms. *Adj. Cash Flow per Share* and *Adj. P/E Ratio* decrease by 0.72 and 1.96, respectively.

Holmstrom and Kaplan (2003), Chhaochharia and Grinstein (2007), and Wintoki (2007) discuss that small-cap firms bear higher costs relative to their size when they have to adjust their board structure in accordance with rules imposed by SEC. If that is true, externally mandated rules should decrease firm performance for smaller non-compliant firms even more. After analyzing the companies in the bottom quartile of firm size, I obtain results that are negative and stronger than the original findings. Meanwhile, I need to ensure that the main channel for the performance-decreasing effect is the mandated rules and not the firm size itself. In the analyses, the potential impact of firm size is already controlled using the *Firm Size* variable. Additionally, *Small Firm* is constructed as a dummy variable that is equal to one for firms in the bottom quartile of firm size, and is zero for firms in the top quartile of firm size. After replacing *Board Independence* with *Small Firm* in the main DIDID analysis, I obtain statistically insignificant outcomes that suggest the decrease in performance for non-compliant firms after regulations is not caused by small firm size. All these results are given in Table OA.X of Online Appendix.

5. CONCLUDING REMARKS

This paper examines the influence of SEC regulations on firm performance. In particular, the main research question is whether imposed changes compared to voluntary adjustments in corporate governance concerning board independence have a positive impact on firm performance. Controlling for other channels of potential effects on firm performance, SEC

rules on a majority of board independence are used as an exogenous shock between 1998 and 2009. In a triple-difference analysis framework, the findings show firms that did not comply with SEC regulations prior to 2003 experience a decrease in ROA, asset turnover, and sales growth when they are forced to adjust board independence in the post-period.

The results indicate that the negative impact of imposed rules on firm performance is more pronounced for single-segment and smaller firms, as well as, constrained firms with financial distress, high leverage, high stock return volatility, and low cash holdings. Considering their limited resources and high adjustment costs of board restructuring, the effect of such mandated rules are more severe for these constrained companies. The results are more significant for high-growth and highly innovative companies because conflicts due to altered internal firm dynamics may slow these firms down and reduce their performance. As expected, firm performance drops even further for companies that have to drastically change board independence to comply with the new regulation. Companies with the board that has adapted to weak external-control mechanism in concentrated industries are affected more by this mandated legislation because they are forced to move away from their optimal board structure. This negative effect is also evident for firms operating particularly in high-tech, wholesale, and retail sectors. Even though some firms, which were off their optimal board independence path prior to these regulatory changes, may benefit from these mandated rules, these findings support the idea that imposing changes in corporate governance uniformly across firms is not suitable for some companies and destroys firm performance, on average.

This study contributes to the corporate governance and firm performance literature by providing insight into the effect of dictated board structure adjustments on performance. It provides a clear identification for mandated regulations through a triple-difference analysis and an instrumental regression model. It also demonstrates the influence of voluntary adjustments and imposed changes individually, comparing them using a cross-sectional logistic model. A battery of novel tests and methods in this study clarifies the ambiguity in the literature by offering accurate specification of mandated rules' true effects. I further examine this relation for different characteristics of firms, organizational structure, financial stability, and industry sectors. The new findings may offer guidance for firms on their management and governance decisions. More importantly, the results will

assist policy makers in formulating legislations on governance structure, so that they may consider firm-specific dynamics while deciding on new legislation to help companies to perform better.

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Tables and Figures

Table I: Descriptive Statistics of Variables

This table gives descriptive statistics for mean, standard deviation and 50th percentile of variables regarding the entire sample and the subsamples of non-compliant and compliant firms separately. There are 972 firms with 6,023 firm-year observations. Variable definitions are available in Table A.I, Appendix.

	Total Sample			Non-Compliant Firms			Compliant Firms		
Variables	Mean	Stdev	P50	Mean	Stdev	P50	Mean	Stdev	P50
Adj. ROA	0.533	2.499	0.895	0.690	2.438	1.001	0.461	2.523	0.833
Adj.Asset Turnover	0.992	0.364	0.945	0.947	0.348	0.912	1.013	0.369	0.962
Adj.Sales Growth	0.691	3.661	0.459	0.726	3.616	0.474	0.675	3.681	0.452
B. Independence	0.700	0.163	0.727	0.582	0.182	0.571	0.755	0.119	0.778
Firm Size	7.429	1.514	7.267	7.405	1.475	7.240	7.440	1.531	7.279
Cash	0.149	0.164	0.085	0.136	0.156	0.075	0.155	0.167	0.091
R&D	0.075	0.123	0.027	0.076	0.136	0.022	0.075	0.118	0.029
M/B	1.494	1.281	1.113	1.455	1.242	1.101	1.512	1.298	1.120
Leverage	0.215	0.174	0.205	0.220	0.180	0.204	0.213	0.171	0.205
Volatility	0.115	0.064	0.099	0.119	0.067	0.102	0.114	0.062	0.098
HHI	0.218	0.182	0.155	0.213	0.183	0.149	0.220	0.182	0.158
Segments	2.868	1.908	3.000	2.800	1.928	3.000	2.899	1.899	3.000
Board Size	8.868	2.366	9.000	8.849	2.471	9.000	8.877	2.317	9.000
CEO Incentive Pay	4.042	5.339	2.165	3.818	5.763	1.664	4.139	5.140	2.336
CEO Age	4.014	0.130	4.025	4.026	0.137	4.025	4.009	0.126	4.025
CEO Tenure	1.788	0.887	1.792	1.873	0.938	1.946	1.751	0.861	1.792
CEO Ownership	0.022	0.052	0.003	0.034	0.067	0.004	0.017	0.042	0.003
BH Ownership	0.223	0.126	0.203	0.205	0.121	0.185	0.231	0.127	0.211
Sales Growth	0.099	0.223	0.073	0.107	0.231	0.076	0.095	0.220	0.072
Return Growth	-1.13	5.979	-1.06	-1.00	6.100	-1.06	-1.18	5.924	-1.06

Table II: DIDID Analysis of Firm Performance on Board Independence

This table reports analysis estimates for *Board Independence* and its interaction with *Post* and *Non-Compliant* along with *Firm Size, Cash, R&D, M/B, Leverage, Volatility, HHI, Segments, Board Size, CEO Incentive Pay, CEO Age, CEO Tenure, CEO Ownership, BH Ownership, Sales Growth*, and *Return Growth* as control variables. The analysis is conducted using three different performance measures: *Adj. ROA*, *Adj. Asset Turnover*, and *Adj. Sales Growth*. *Non-Compliant*Post, Non-Compliant*Board Independence, Non-Compliant*Post*Board Independence* are the interaction variables of *Post, Non-Compliant,* and *Board Independence. Board Independence* and year fixed effects interactions are included. Firm and governance controls are lagged by one year. Variable definitions are available in Table A.I, Appendix. Baseline regression estimates are provided in Column I. Year and firm fixed effects are included. Standard errors are clustered by firms and given in parentheses. The *** indicates statistical significance at the 1% level.

Variables	**Baseline Model**	**Adj. ROA**	**Adj. ROA**	**Adj. Asset Turnover**	**Adj. Sales Growth**
	I	**II**	**III**	**IV**	**V**
Board Independence			-1.195	-0.007	-0.374
			(0.807)	(0.057)	(1.035)
Non-Compliant*Board			3.844***	0.021	2.261
Independence			(1.215)	(0.080)	(1.759)
Non-Compliant*Post		0.036	2.050**	0.210***	2.182**
		(0.195)	(0.945)	(0.059)	(1.104)
Non-Compliant*Post*			-3.313***	-0.230***	-3.531**
Board Independence			(1.277)	(0.088)	(1.740)
Firm Size	0.155	0.153	0.158	-0.115***	0.022
	(0.160)	(0.160)	(0.157)	(0.012)	(0.247)
Cash	1.131**	1.130**	1.108**	-0.293***	-0.256
	(0.531)	(0.531)	(0.537)	(0.041)	(0.594)
R&D	1.941***	1.936***	2.042***	-0.263***	0.578
	(0.570)	(0.571)	(0.569)	(0.084)	(0.705)
M/B	0.045	0.045	0.045	0.014***	0.108*
	(0.059)	(0.059)	(0.059)	(0.004)	(0.060)
Leverage	-1.179**	-1.175**	-1.124**	0.050	0.004
	(0.478)	(0.478)	(0.476)	(0.041)	(0.713)
Volatility	0.884	0.885	0.764	-0.018	0.659
	(0.968)	(0.969)	(0.963)	(0.074)	(1.544)
HHI	-0.045	-0.044	-0.061	-0.065***	0.652
	(0.329)	(0.329)	(0.326)	(0.024)	(0.574)
Segments	-0.031	-0.030	-0.036	0.003	0.021
	(0.052)	(0.0515)	(0.052)	(0.003)	(0.073)

Table II: DIDID Analysis of Firm Performance on Board Independence (Continued)

Variables	Baseline Model	Adj. ROA	Adj. ROA	Adj. Asset Turnover	Adj. Sales Growth
	I	II	III	IV	V
Board Size	-0.106***	-0.106***	-0.108***	0.001	-0.175***
	(0.036)	(0.035)	(0.036)	(0.003)	(0.053)
CEO Incentive Pay	0.007	0.006	0.007	0.001	0.018
	(0.009)	(0.009)	(0.010)	(0.001)	(0.017)
CEO Age	0.424	0.430	0.343	-0.069*	0.436
	(0.618)	(0.619)	(0.621)	(0.039)	(0.814)
CEO tenure	-0.097	-0.098	-0.087	-0.001	-0.109
	(0.073)	(0.071)	(0.072)	(0.005)	(0.117)
CEO Ownership	0.007	0.034	0.192	0.184	-3.911
	(1.846)	(1.840)	(1.902)	(0.125)	(3.018)
BH Ownership	1.050**	1.048**	1.104**	0.017	0.721
	(0.480)	(0.480)	(0.482)	(0.033)	(0.730)
Sales Growth	0.021	0.021	0.017	0.032*	
	(0.201)	(0.201)	(0.202)	(0.017)	
Return Growth					0.001
					(0.009)
Constant	-1.618	-1.627	0.067	2.007***	0.030
	(2.625)	(2.629)	(2.766)	(0.181)	(3.901)
Board Independence*Year FE Interactions	No	No	Yes	Yes	Yes
Year & Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	0.204	0.240	0.286	0.226	0.228
Observation	6,023	6,023	6,023	6,023	5,957

Table III: Instrumental Variable Regression of Performance on Board Independence
This table reports instrumental variable regression analysis estimates for *Board Independence-(fitted)* and control variables. Column I presents the first-stage regression of *Board Independence* on *Non-Compliant Dummy*. *Non-Compliant Dummy* is a dummy equal to one if firm didn't comply with SOX requirement of a fully independent audit committee prior to 2000. Columns II, III, and IV present the second-stage regression of *Adj. ROA*, *Adj. Asset Turnover*, and *Adj. Sales Growth* on *Board Independence-(fitted)* values from the first-stage regression. Variable definitions are available in Table A.I, Appendix. Year fixed effects are included. Standard errors are clustered by firms and given in parentheses. The *** indicates significance at the 1% level.

Variables	**First Stage (I)**	**Adj. ROA (II)**	**Adj. Asset Turnover(III)**	**Adj. Sales Growth (IV)**
Non-Compliant Dummy	-0.033***			
	(0.009)			
Board Independence-(fitted)		-9.917**	-1.707***	-7.788*
		(4.783)	(0.186)	(4.524)
Firm Size	0.011***	0.549	-0.076***	0.541
	(0.004)	(0.335)	(0.013)	(0.339)
Cash	0.006	-0.499	-0.270***	-0.786
	(0.023)	(1.062)	(0.042)	(0.689)
R&D	0.037	2.404**	-0.245**	-0.140
	(0.031)	(1.106)	(0.097)	(0.904)
M/B	-0.003	0.049	0.011***	0.064
	(0.003)	(0.123)	(0.005)	(0.074)
Leverage	0.047**	-2.033*	0.046	-0.399
	(0.024)	(1.076)	(0.042)	(0.961)
Volatility	-0.094**	3.779*	0.017	1.836
	(0.045)	(2.029)	(0.078)	(1.904)
HHI	0.016	-0.144	-0.071***	1.160
	(0.018)	(0.696)	(0.025)	(0.724)
Segments	0.006***	-0.010	0.007*	0.087
	(0.002)	(0.102)	(0.004)	(0.092)
Board Size	0.001	-0.180**	0.002	-0.213***
	(0.002)	(0.077)	(0.003)	(0.073)
CEO Incentive Pay	0.001	0.003	0.001	0.025
	(0.001)	(0.024)	(0.001)	(0.020)
CEO Age	-0.045	0.040	-0.074*	0.204
	(0.029)	(0.033)	(0.039)	(1.056)
CEO tenure	0.003	0.466	-0.116***	-0.151
	(0.004)	(1.192)	(0.043)	(0.160)
CEO Ownership	-0.725***	-0.167	-0.001	-2.395
	(0.084)	(0.152)	(0.006)	(3.439)
BH Ownership	0.044*	-5.780*	-0.276*	-1.511
	(0.025)	(3.329)	(0.142)	(0.969)
Sales Growth	-0.040***	0.136	0.054	
	(0.010)	(0.886)	(0.034)	
Return Growth				0.008
				(0.010)
Fixed Effects	Yes	Yes	Yes	Yes
Adjusted R^2	0.238	0.251	0.232	0.255
Observation	6,816	6,023	6,023	5,957

Table IV: DIDID Analysis for Major Board Independence Adjustments

This table reports analysis estimates for *Board Independence* and its interaction with *Post* and *Non-Compliant*. In Panel A, the analysis is conducted using firms in the top decile of board independence changes after SEC rules. In Panel B, firms in the bottom decile of board independence level before SEC regulations are chosen as the non–compliant firms. *Adj. ROA, Adj. Asset Turnover,* and *Adj. Sales Growth* are the dependent variables. *Non-Compliant*Post, Non-Compliant*Board Independence, Non-Compliant*Post*Board Independence* are the interaction variables of *Post, Non-Compliant,* and *Board Independence*. *Board Independence* and year fixed effects interactions are included. Firm and governance controls are included in the analysis and lagged by one year. Variable definitions are available in Table A.I, Appendix. Year dummies and firm fixed effects are incorporated. Standard errors are clustered by firms and given in parentheses. The *** indicates statistical significance at the 1% level.

Panel A: Firms in the Top Decile of Board Independence Changes After SEC Rules			
Variables	**Adj. ROA**	**Adj. Asset Turnover**	**Adj. Sales Growth**
	I	**II**	**III**
Board Independence	-2.073	-0.200	-4.967
	(2.506)	(0.601)	(10.820)
Non-Compliant*Board Independence	4.147	0.0909	17.420
	(3.402)	(0.581)	(13.700)
Non-Compliant*Post	3.187	0.746*	7.112
	(2.159)	(0.409)	(5.583)
Non-Compliant*Post*Board Independence	-4.656*	-0.838*	-13.290*
	(2.813)	(0.509)	(8.066)
Board Independence-Year Fixed Effects Interactions	Yes	Yes	Yes
Firm & Governance Controls	Yes	Yes	Yes
Year & Firm Fixed Effects	Yes	Yes	Yes
Adjusted R^2	0.731	0.951	0.783
Observation	1,048	1,048	984
Panel B: Firms in the Bottom Decile of Board Independence Level Before SEC Rules			
Variables	**Adj. ROA**	**Adj. Asset Turnover**	**Adj. Sales Growth**
	I	**II**	**III**
Board Independence	-0.077	0.056	-1.168
	(0.807)	(0.058)	(1.097)
Non-Compliant*Board Independence	1.311	-0.141	3.860
	(1.329)	(0.113)	(2.399)
Non-Compliant*Post	2.533**	0.255***	2.689*
	(1.082)	(0.089)	(1.614)
Non-Compliant*Post*Board Independence	-3.383**	-0.289**	-4.658*
	(1.576)	(0.145)	(2.760)
Board Independence-Year Fixed Effects Interactions	Yes	Yes	Yes
Firm & Governance Controls	Yes	Yes	Yes
Year & Firm Fixed Effects	Yes	Yes	Yes
Adjusted R^2	0.300	0.829	0.226
Observation	920	920	936

Table V: Difference-in-Difference-in-Difference Analysis with Constrained Firms

This table reports analysis estimates for the triple interaction term for the constrained firms. In Panel A, the analysis is repeated for the firms with *Cash* in bottom quartile, as well as, the companies with leverage value in top quartile. In Panel B, the test is conducted separately for the firms with R&D ratio and M/B ratio values in top quartile. In Panel C, the test is repeated for the firms with stock return volatility in top quartile and for the financially distressed companies with the Altman Z-Score less than 1.81. In Panel D, the analysis is conducted for single segment firms and the firms with blockholder ownership value in top quartile. *Adj. ROA, Adj. Asset Turnover,* and *Adj. Sales Growth* are the dependent variables. *Non-Compliant*Post*Board Independence* is the triple interaction term. Variable definitions are available in Table A.I, Appendix. Year dummies, control variables, interaction terms, and firm fixed effects are included. Standard errors are clustered at the firm level and given in parentheses. The *** indicates statistical significance at the 1% level.

Panel A: Firms with Low Cash Holdings and High Leverage

Variables	**Cash Ratio (Bottom Quartile)**			**Leverage (Top Quartile)**		
	Adj. ROA	**Adj. Asset Turnover**	**Adj. Sales Growth**	**Adj. ROA**	**Adj. Asset Turnover**	**Adj. Sales Growth**
	I	**II**	**III**	**IV**	**V**	**VI**
Non-Compliant*Post	-4.825*	-0.404*	-10.824*	-4.617*	-0.304*	-11.126*
*Board Independence	(2.859)	(0.243)	(6.240)	(2.788)	(0.182)	(6.651)
Constant	5.985	2.728***	-16.584	2.535	1.785***	-6.477
	(7.272)	(0.533)	(13.810)	(7.134)	(0.435)	(8.864)
Interaction Terms	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Year & Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	0.096	0.241	0.360	0.094	0.298	0.430
Observation	1,199	1,199	1,079	1,545	1,545	1,441

Panel B: Firms with High Innovation and High Growth

Variables	**R&D Ratio (Top Quartile)**			**M/B Ratio (Top Quartile)**		
	Adj. ROA	**Adj. Asset Turnover**	**Adj. Sales Growth**	**Adj. ROA**	**Adj. Asset Turnover**	**Adj. Sales Growth**
	I	**II**	**III**	**IV**	**V**	**VI**
Non-Compliant*Post	-3.945*	-0.515***	-5.739***	-3.836*	-0.611***	-2.915*
*Board Independence	(2.380)	(0.189)	(2.165)	(2.274)	(0.187)	(1.723)
Constant	-8.287	1.842***	3.746	2.986	1.807***	-2.490
	(5.773)	(0.423)	(5.921)	(5.031)	(0.452)	(4.575)
Interaction Terms	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Year & Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	0.183	0.232	0.333	0.070	0.224	0.363
Observation	1,358	1,358	1,357	1,667	1,667	1,468

Table V: DIDID Analysis with Constrained Firms (Continued)

Panel C: Firms with High Volatility and Financial Distress						
Variables	**Return Volatility (Top Quartile)**			**Altman Z-Score < 1.81**		
	Adj. ROA	**Adj. Asset Turnover**	**Adj. Sales Growth**	**Adj. ROA**	**Adj. Asset Turnover**	**Adj. Sales Growth**
	I	**II**	**III**	**IV**	**V**	**VI**
Non-Compliant*Post	-7.390*	-0.271*	-8.010**	-8.747**	-0.680*	-6.395*
*Board Independence	(4.044)	(0.155)	(4.004)	(3.950)	(0.377)	(3.809)
Constant	4.242	2.047***	-14.284	-0.463	1.464**	-10.563
	(5.583)	(0.298)	(21.385)	(7.990)	(0.572)	(10.323)
Interaction Terms	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Year & Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	0.110	0.257	0.468	0.133	0.230	0.292
Observation	1,523	1,523	1,481	888	888	795
Panel D: Firms with Single Segment and High Blockholder Ownership						
Variables	**Single Segment Firms**			**BH Ownership (Top Quartile)**		
	Adj. ROA	**Adj. Asset Turnover**	**Adj. Sales Growth**	**Adj. ROA**	**Adj. Asset Turnover**	**Adj. Sales Growth**
	I	**II**	**III**	**IV**	**V**	**VI**
Non-Compliant*Post	-4.072**	-0.316***	-3.780**	-5.783*	-0.566***	-16.623*
*Board Independence	(1.830)	(0.103)	(1.780)	(3.310)	(0.190)	(10.049)
Constant	6.105	1.564***	-1.985	0.809	2.651***	9.775
	(5.467)	(0.368)	(4.191)	(6.105)	(0.415)	(13.954)
Interaction Terms	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Year & Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	0.581	0.294	0.235	0.561	0.223	0.501
Observation	1,805	1,805	1,741	1,505	1,505	1,452

Table VI: Difference-in-Difference-in-Difference Model for Industry Analysis

This table presents difference-in-difference analysis estimates for the triple interaction term. The analysis is conducted for different industry concentration levels and also for different industry groups separately. Firms with HHI less than 0.100 belong to highly competitive industries while companies with HHI greater than 0.250 are in highly concentrated industries. In Panels A, B, and C, the analysis is repeated for *Adj. ROA, Adj. Asset Turnover,* and *Adj. Sales Growth* as the dependent variables, respectively. *Non-Compliant*Post*Board Independence* is the triple interaction term. Variable definitions are available in Table A.I, Appendix. Year dummies, control variables, interaction terms, and firm fixed effects are included. Standard errors are clustered at the firm level and given in parentheses. The *** indicates statistical significance at the 1% level.

Panel A: Analysis with Adj. ROA

	Industry Concentration		**Industry Groups**				
	Con centrated	**Com petitive**	**Manu facturing**	**High-Tech**	**Con struction**	**Wholesale &Retail**	**Service**
Non-Compliant *Post*Board Independence	-6.475** (2.740)	-0.485 (2.688)	-2.091 (2.102)	-3.014* (1.809)	-2.565 (4.273)	-5.783* (3.446)	-10.708** (4.884)
Interaction & Control Terms	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year&Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	0.072	0.153	0.066	0.132	0.100	0.168	0.188
Observation	1,378	1,315	2,285	1,180	618	587	378

Panel B: Analysis with Adj. Asset Turnover

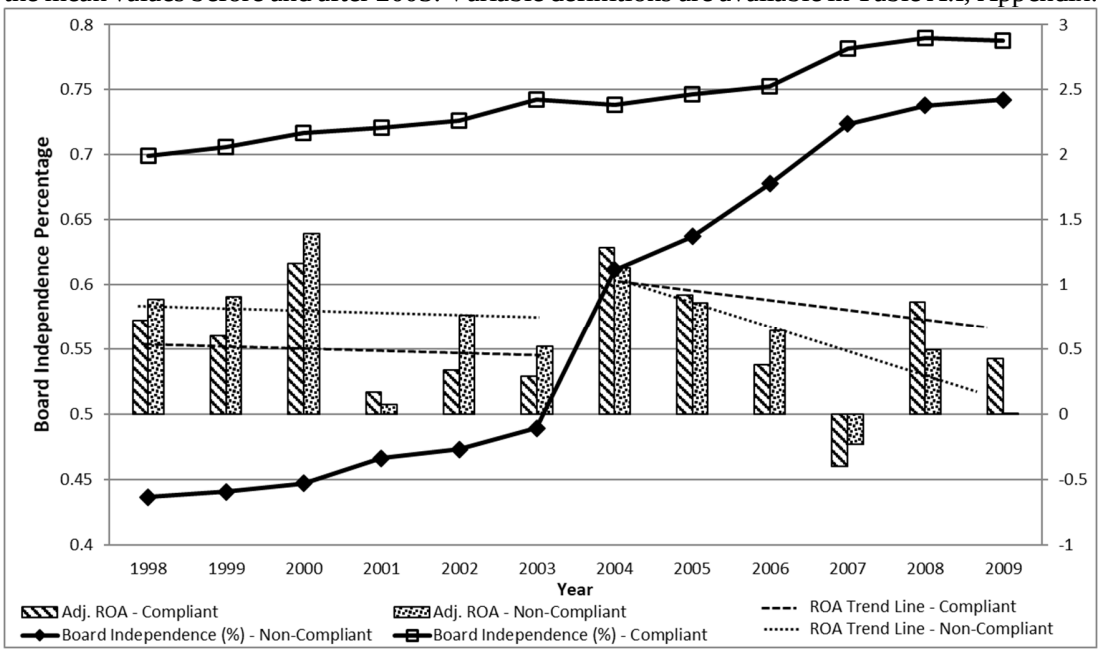
	Industry Concentration		**Industry Groups**				
	Con centrated	**Com petitive**	**Manu facturing**	**High-Tech**	**Con struction**	**Wholesale &Retail**	**Service**
Non-Compliant *Post*Board Independence	-0.246* (0.144)	-0.074 (0.171)	-0.195 (0.196)	-0.659** (0.334)	0.177 (0.318)	0.109 (0.233)	0.025 (0.321)
Interaction & Control Terms	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year&Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	0.872	0.839	0.601	0.770	0.618	0.615	0.675
Observation	1,378	1,315	2,285	1,180	618	654	378

Panel C: Analysis with Adj. Sales Growth

	Industry Concentration		**Industry Groups**				
	Con centrated	**Com petitive**	**Manu facturing**	**High-Tech**	**Con struction**	**Wholesale &Retail**	**Service**
Non-Compliant *Post*Board Independence	-14.026** (6.620)	1.262 (2.473)	1.176 (2.610)	-3.650* (2.078)	-7.935 (7.218)	-20.708*** (6.939)	-2.575 (4.185)
Interaction & Control Terms	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year&Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	0.335	0.513	0.319	0.310	0.358	0.382	0.397
Observation	1,297	1,137	2,237	1,170	613	640	315

Figure 1: Distribution of Board Independence and Adjusted ROA

This figure displays the distribution of the mean values for *Board Independence* and *Adj. ROA* between 1998 and 2009. The measures are given separately for both *Non-Compliant* and *Compliant* firms. Trend lines for *Adj. ROA* are constructed through linear OLS regression using the mean values before and after 2003. Variable definitions are available in Table A.I, Appendix.



Appendix

Table A.I: Definition of Variables

Variables	Description
Adj. ROA	It is earnings before interest and taxes over total assets divided by the industry average of this measure for that firm.
Adj. Asset Turnover	It is net sales over total assets divided by the industry average of this measure for that firm.
Adj. Sales Growth	It is the difference between net sales of the current and the preceding year over net sales of the preceding year divided by the industry average of this measure for that firm.
Board Independence	It is the percentage of independent members of the board of directors.
Post	It is a dummy equal to one for values in the post-period (2004-2009), and zero otherwise.
Non-Compliant	It is a dummy equal to one for firms that did not comply with SEC reforms prior to 2003, and zero otherwise.
Firm Size	It is the natural logarithm of firm's total assets.
Cash	It is cash and short-term investments over total assets.
R&D	It is R&D expenses over net sales.
M/B	It represents the market-to-book ratio and it is common shares outstanding multiplied by the closing price of one share over common equity.
Leverage	It is the sum of current liabilities and long-term debt over total assets.
Volatility	It is the standard deviation of daily stock returns.
HHI	Network Industry Classification method as suggested by Hoberg and Phillips (2010).
Segments	It is the total number of business segments.
Board Size	It is the total number of directors on board.
CEO Incentive Pay	It is the dollar sum of restricted stock grants and long-term incentives in CEO pay (in thousands).
CEO Age	It is the natural logarithm of age of CEO.
CEO Tenure	It is the natural logarithm of tenure of CEO.
CEO Ownership	It's the percentage of total shares owned by CEO.
BH Ownership	It is the total shares owned by blockholders (in %).
Sales Growth	It is the difference between net sales of the current and the preceding year over net sales of the preceding year.
Return Growth	It is the difference between annual stock return of the current and the preceding year over annual stock return of the preceding year.

Online Appendix

Table OA.I: DIDID Analysis of Business Risk on Board Independence

This table reports analysis estimates for *Board Independence* and its interaction with *Post* and *Non-Compliant* along with control variables. The analysis is conducted using three different business risk measures, i.e $Risk_{ROA}$, $Risk_{Turnover}$, and $Risk_{Growth,}$ by taking the annual standard deviation of *Adj. ROA*, *Adj. Asset Turnover*, and *Adj. Sales Growth*, respectively. *Non-Compliant*Post, Non-Compliant*Board Independence, Non-Compliant*Post*Board Independence* are the interaction variables of *Post, Non-Compliant,* and *Board Independence. Board Independence* and year fixed effects interactions are included. Control variables are lagged by one year. Variable definitions are available in Table A.I, Appendix. Year and firm fixed effects are included. Standard errors are clustered by firms and given in parentheses. The *** indicates statistical significance at the 1% level.

	$\mathbf{Risk_{ROA}}$	$\mathbf{Risk_{Turnover}}$	$\mathbf{Risk_{Growth}}$
	I	**II**	**III**
Board Independence	-0.302	-0.010	0.542
	(1.192)	(0.024)	(2.322)
Non-Compliant*Board	-2.691	-0.024	-1.544
Independence	(1.854)	(0.040)	(2.862)
Non-Compliant*Post	-2.087	-0.028	-5.243**
	(1.269)	(0.024)	(2.252)
Non-Compliant*Post*	3.019*	0.066*	7.477**
Board Independence	(1.798)	(0.040)	(3.288)
Constant	7.628*	0.190*	1.362
	(4.309)	(0.115)	(6.569)
Board Independence * Year FE Interactions	Yes	Yes	Yes
Control Variables	Yes	Yes	Yes
Year & Firm Fixed Effects	Yes	Yes	Yes
Adjusted R^2	0.250	0.601	0.329
Observation	6,023	6,023	5,957

Table OA.II: Descriptive Statistics of Variables for Compliant and Non-Compliant Firms
This table gives mean values of control variables for compliant firms and non-compliant firms in the pre- and post-period. The mean differences of variables for compliant and non-compliant firms are also provided in the pre- and post-period. In the sample, there are 301 non-compliant and 671 compliant firms.

	Pre-Period			Post-Period		
	Compliant Firms	Non-Compliant Firms		Compliant Firms	Non-Compliant Firms	
	Mean	Mean	*Difference*	Mean	Mean	*Difference*
Firm Size	7.200	7.100	*0.100*	7.676	7.750	*-0.074*
Cash	0.134	0.128	*0.006*	0.160	0.151	*0.009*
R&D	0.084	0.083	*0.001*	0.069	0.068	*0.001*
M/B	1.536	1.481	*0.055*	1.490	1.445	*0.045*
Leverage	0.235	0.241	*-0.006*	0.200	0.194	*0.006*
Volatility	0.134	0.140	*-0.006*	0.101	0.096	*0.005*
HHI	0.206	0.197	*0.008*	0.231	0.234	*-0.003*
Segments	2.591	2.486	*0.106*	3.114	3.252	*-0.138*
Board Size	9.079	8.914	*0.165*	8.681	8.815	*-0.133*
CEO Incentive Pay	3.265	3.110	*0.155*	4.594	4.701	*-0.107*
CEO Age	4.007	4.016	*-0.009*	4.011	4.036	*-0.025*
CEO Tenure	1.715	1.801	*-0.086*	1.798	1.880	*-0.082*
CEO Ownership	0.025	0.038	*-0.013*	0.016	0.025	*-0.009*
BH Ownership	0.201	0.189	*0.011*	0.242	0.227	*0.015*
Return Growth	-1.303	-1.251	*-0.053*	-1.045	-0.986	*-0.059*

Table OA.III: Analysis with Board Independence Cut-Off Levels for Non-Compliant Firms

This table reports analysis estimates for *Board Independence* and its interaction with *Post* and *Non-Compliant* along with control variables. The analysis is conducted using subsamples including non-compliant firms with cut-off intervals of 8% and 16% above the 50% board independence threshold. *Adj. ROA*, *Adj. Asset Turnover*, and *Adj. Sales Growth* are firm performance measures. *Non-Compliant*Post, Non-Compliant*Board Independence, Non-Compliant*Post*Board Independence* are the interaction variables of *Post, Non-Compliant,* and *Board Independence. Board Independence* and year fixed effects interactions are included along with firm and governance controls. Variable definitions are available in Table A.I, Appendix. Year and firm fixed effects are included. Standard errors are clustered by firms and given in parentheses. The *** indicates statistical significance at the 1% level.

Cut-Off Levels:	**50% + Half STDev = 58%**			**50% + One STDev = 66%**		
	Adj. ROA	**Adj. Asset Turnover**	**Adj. Sales Growth**	**Adj. ROA**	**Adj. Asset Turnover**	**Adj. Sales Growth**
Board Independence	-0.480	0.005	-1.557	-0.147	0.012	1.154
	(0.865)	(0.056)	(1.283)	(0.983)	(0.064)	(0.783)
Non-Compliant*	3.561***	0.006	7.661**	4.020**	-0.004	0.130
Board Independence	(1.341)	(0.090)	(2.988)	(1.783)	(0.089)	(0.387)
Non-Compliant*Post	3.417**	0.311***	3.230	2.999	0.429***	2.317*
	(1.524)	(0.089)	(2.370)	(1.963)	(0.103)	(1.325)
Non-Compliant*Post*	-5.231**	-0.432***	-5.801*	-5.282*	-0.712***	-4.094*
Board Independence	(2.572)	(0.165)	(3.245)	(3.104)	(0.203)	(2.370)
Constant	-1.301	2.133***	5.959	-1.057	2.225***	1.314
	(3.060)	(0.206)	(5.024)	(3.731)	(0.222)	(2.377)
Board Independence* Year FE Interactions	Yes	Yes	Yes	Yes	Yes	Yes
Firm & Governance Controls	Yes	Yes	Yes	Yes	Yes	Yes
Year & Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	0.031	0.083	0.017	0.025	0.084	0.012
Observation	4,591	4,591	3,677	4,243	4,243	3,532

Table OA.IV: DIDID Analysis of Performance on Compensation and Nominating Committees

This table presents analysis estimates for *Compensation Committee Full Independence* and *Nominating Committee Full Independence* along with their interaction with *Post* and *Treatment.* The analysis is conducted using NYSE listed firms only because rules for nominating and compensation committees were enforced by NYSE in 2003. *Adj. ROA, Adj. Asset Turnover,* and *Adj. Sales Growth* are the dependent variables. *Compensation Committee Full Independence* is a dummy equal to one if all members of compensation committee are independent, and zero otherwise. *Nominating Committee Full Independence* is a dummy equal to one if all members of nominating committee are independent, and zero otherwise. *Treatment*Post* Compensation Committee Full Independence* and *Treatment*Post* Nominating Committee Full Independence* are the triple interaction terms. *Compensation Committee Full Independence, Nominating Committee Full Independence*, and year fixed effects interactions are included. Firm and governance controls are included in the analysis and lagged by one year. Variable definitions are available in Table A.I, Appendix. Year and firm fixed effects are included. Standard errors are clustered by firms. The *** indicates statistical significance at the 1% level.

Variables	**Adj. ROA**	**Adj. Asset Turnover**	**Adj. Sales Growth**	**Adj. ROA**	**Adj. Asset Turnover**	**Adj. Sales Growth**
	I	**II**	**III**	**IV**	**V**	**VI**
Compensation Com. Full	-0.051	0.055	0.323			
Independence	(0.314)	(0.055)	(0.440)			
Treatment*Compensation	0.202	0.032	1.553**			
Com. Full Independence	(0.406)	(0.030)	(0.714)			
Treatment*Post	-0.530	0.117***	1.044			
	(0.406)	(0.040)	(0.828)			
Treatment*Post*	0.468	-0.121***	-1.953**			
Compensation Com. Full	(0.476)	(0.046)	(0.964)			
Independence						
Nominating Com. Full				0.331	0.004	0.087
Independence				(0.273)	(0.017)	(0.334)
Treatment*Nominating				0.303	-0.003	1.253
Com. Full Independence				(0.368)	(0.033)	(0.818)
Treatment*Post				0.485	0.038	0.592
				(0.398)	(0.028)	(0.513)
Treatment*Post*				-1.011**	-0.006	-1.506*
Nominating Com. Full				(0.475)	(0.042)	(0.904)
Independence						
Constant	2.724	2.265***	-1.116	2.593	2.289***	1.302
	(2.982)	(0.236)	(5.409)	(3.797)	(0.232)	(4.300)
Committee-Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Interactions						
Firm&Governance Controls	Yes	Yes	Yes	Yes	Yes	Yes
Year & Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	0.253	0.223	0.236	0.323	0.222	0.175
Observation	3,156	3,156	3,156	3,520	3,520	3,520

Table OA.V: Analysis with Different Time Horizon and Placebo Tests

This table reports analysis estimates for the triple interaction term. In Panel A, the time horizon is reduced to eight years for the analysis. The analysis is conducted using *Adj. ROA, Adj. Asset Turnover,* and *Adj. Sales Growth* as the dependent variables. *Treatment*Post*Board Independence* is the triple interaction term. In Panel B and Panel C, placebo test estimates are given. In Panel B, the time frame of the analysis is shifted two years backward, and in Panel C, the time frame is shifted two years forward. *PostB* is a dummy equal to one for values in the shifted post-period (2002-2007), and zero otherwise. *PostF* is a dummy equal to one for values in shifted post-period (2006-2011), and zero otherwise. *Post* dummy is replaced by *PostB* and *PostF* in the placebo tests. Variable definitions are available in Table A.I, Appendix. Year dummies, control variables, and firm fixed effects are included. Standard errors are clustered at the firm level. The *** indicates statistical significance at the 1% level.

Panel A: Analysis with ± Four Years around SEC Reforms			
Variables	**Adj. ROA**	**Adj. Asset Turnover**	**Adj. Sales Growth**
	I	**II**	**III**
Treatment*Post*Board	-3.271**	-0.237***	-3.577*
Independence	(1.365)	(0.091)	(2.158)
Constant	-1.185	1.921***	-5.227
	(3.148)	(0.231)	(4.866)
Controls & Interaction Terms	Yes	Yes	Yes
Year & Firm Fixed Effects	Yes	Yes	Yes
Adjusted R^2	0.345	0.258	0.237
Observation	4,331	4,331	4,302
Panel B: Placebo Test (Two Years Backward)			
Variables	**Adj. ROA**	**Adj. Asset Turnover**	**Adj. Sales Growth**
	I	**II**	**III**
Treatment*PostB*Board	-0.486	-0.041	-0.379
Independence	(1.286)	(0.127)	(2.601)
Constant	-0.416	2.088***	-6.236
	(3.030)	(0.225)	(4.561)
Controls & Interaction Terms	Yes	Yes	Yes
Year & Firm Fixed Effects	Yes	Yes	Yes
Adjusted R^2	0.421	0.245	0.228
Observation	4,218	4,218	3,939
Panel C: Placebo Test (Two Years Forward)			
Variables	**Adj. ROA**	**Adj. Asset Turnover**	**Adj. Sales Growth**
	I	**II**	**III**
Treatment*PostF*Board	-1.700	0.032	-2.068
Independence	(1.291)	(0.096)	(1.968)
Constant	1.555	2.105***	0.888
	(2.381)	(0.182)	(3.610)
Controls & Interaction Terms	Yes	Yes	Yes
Year & Firm Fixed Effects	Yes	Yes	Yes
Adjusted R^2	0.362	0.234	0.203
Observation	5,459	5,459	5,411

Table OA.VI: Tests for Other Governance Related Factors Around the Shock

This table presents analysis estimates for other corporate governance factors that can potentially affect firm performance around SEC announcements. The original DIDID analysis is repeated while *Board Independence* is replaced with other governance variables. *Activism* is the number of shareholder proposals by activist shareholders in a year. *CEO Duality* is a dummy that equals one for firms having the CEO as a member of board, and zero otherwise. *Board Size* is the total number of directors on board. *Less Meetings* is a dummy that equals one for firms with board members attending less than 75% of the meetings, and zero otherwise. *Treatment*Post*Activism, Treatment*Post*CEO Duality, Treatment*Post*Board Size* and *Treatment*Post* Less Meetings* are the triple interaction terms. *Activism, CEO Duality, Board Size, Less Meetings*, and year fixed effects interactions are included. Firm and governance controls are included in the analysis and lagged by one year. Remaining variable definitions are available in Table A.I, Appendix. Year and firm fixed effects are included. Standard errors are clustered by firms. The *** indicates statistical significance at the 1% level.

Panel A: Analysis for the Impact of Activism and CEO Duality on Performance

Variables	**Adj. ROA**	**Adj. Asset Turnover**	**Adj. Sales Growth**	**Adj. ROA**	**Adj. Asset Turnover**	**Adj. Sales Growth**
	I	**II**	**III**	**IV**	**V**	**VI**
Treatment*Post*Activism	-0.206	-0.001	-0.218			
	(0.198)	(0.016)	(0.776)			
Treatment*Post*CEO Duality				-0.015	-0.009	0.861
				(0.450)	(0.029)	(0.576)
Constant	0.409	2.334***	-8.771	-1.948	2.056***	-0.429
	(5.505)	(0.412)	(9.473)	(2.636)	(0.175)	(3.635)
Controls & Interaction Terms	Yes	Yes	Yes	Yes	Yes	Yes
Year & Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	0.281	0.288	0.333	0.311	0.226	0.227
Observation	1,114	1,114	1,090	6,023	6,023	5,957

Panel B: Analysis for the Impact of Board Size and Meetings on Performance

Variables	**Adj. ROA**	**Adj. Asset Turnover**	**Adj. Sales Growth**	**Adj. ROA**	**Adj. Asset Turnover**	**Adj. Sales Growth**
	I	**II**	**III**	**IV**	**V**	**VI**
Treatment*Post*Board Size	-0.044	-0.008	-0.136			
	(0.082)	(0.006)	(0.116)			
Treatment*Post*Less Meetings				-0.792	-0.023	-0.818
				(0.516)	(0.037)	(0.714)
Constant	-1.482	2.140***	-0.802	-0.949	2.016***	-0.111
	(2.652)	(0.184)	(3.912)	(2.369)	(0.174)	(3.610)
Controls & Interaction Terms	Yes	Yes	Yes	Yes	Yes	Yes
Year & Firm Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	0.301	0.227	0.232	0.372	0.227	0.226
Observation	6,023	6,023	5,957	6,017	6,017	5,957

Table OA.VII: Logistic Regression Analysis of Firm Performance on Board Independence

This table reports cross-sectional logistic regression analysis estimates for average *Post Board Independence for Treatment (average)* and *Pre Board Independence for Treatment (average)* along with the average values of *Firm Size*, *Leverage*, *Volatility*, *HHI*, *Segments*, *BH Ownership*, *Sales Growth*, and *Return Growth* as control variables. *Δ Adj. ROA (average) Dummy, Δ Adj. Asset Turnover (average) Dummy,* and *Δ Adj. Sales Growth (average) Dummy* are each a dummy variable equal to one if the change from pre-period to post-period average values of that measure is positive, and zero otherwise. They represent the increase in the average values of those measures in the post-period. *Pre (Post) Board Independence for Treatment (average)* is the pre-period (post-period) average value of board independence for treatment firms. Control variables are given as the entire period averages. Variable definitions are available in Table A.I, Appendix. Standard errors are clustered by firms. Odds Ratios (exponential of betas) and standard errors of betas are reported. The *** indicates statistical significance at the 1% level.

Variables	**Δ Adj. ROA (average) Dummy**	**Δ Adj. Asset Turnover (average) Dummy**	**Δ Adj. Sales Growth (average) Dummy**
	I	**II**	**III**
Post Board Independence for Treatment (average)	0.259*	0.147***	0.238*
	(0.737)	(0.747)	(0.775)
Pre Board Independence for Treatment (average)	3.613*	12.815**	7.572**
	(0.774)	(1.010)	(1.029)
Firm Size (average)	1.096*	1.014	0.908*
	(0.051)	(0.051)	(0.052)
Leverage (average)	0.985	3.253***	1.469
	(0.439)	(0.445)	(0.440)
Volatility (average)	1.654	1.047	1.124
	(1.635)	(1.617)	(1.636)
BH Ownership (average)	1.193	3.552*	0.726
	(0.707)	(0.708)	(0.706)
HHI (average)	1.263	0.597	1.270
	(0.430)	(0.429)	(0.430)
Segments (average)	1.019	1.006	1.118***
	(0.037)	(0.038)	(0.038)
Sales Growth (average)	0.745	4.105**	
	(0.602)	(0.602)	
Return Growth (average)			1.027
			(0.530)
Constant	0.400*	0.610	1.200
	(0.529)	(0.527)	(0.530)
Pseudo R-sq.	0.008	0.016	0.011
Observation	1144	1138	1138

Table OA.VIII: Analysis of Excess Firm Performance on Board Independence

This table reports analysis of excess firm performance on *Board Independence* and its interaction with *Post* and *Treatment*. Panel A presents first-stage baseline regressions predicting firm performance measures as a function of *Firm Size*, *Cash, R&D, M/B, Leverage, Volatility, HHI, Segments, Board Size*, *CEO Incentive Pay*, *CEO Age*, *CEO Tenure*, *CEO Ownership, BH Ownership*, *Sales Growth*, and *Return Growth*. Panel B presents regressions explaining *Excess Adj. ROA, Excess Adj. Asset Turnover*, and *Excess Adj. Sales Growth* defined as residuals from the respective Panel A regressions. *Treatment*Post, Treatment* Board Independence, Treatment*Post*Board Independence* are the interaction variables of *Post, Treatment*, and *Board Independence* in Panel B regressions. *Board Independence* and year fixed effects interactions are included. Variable definitions are available in Table A.I, Appendix. All determinants in the first-stage regressions are lagged by one year. Year and firm fixed effects are included in all models. Standard errors are clustered by firms. The *** indicates statistical significance at the 1% level.

Panel A: First-Stage Baseline Regressions Predicting Firm Performance

	Adj. ROA	**Adj. Asset Turnover**	**Adj. Sales Growth**
	I	**II**	**III**
Firm Size	0.155	-0.113***	0.020
	(0.160)	(0.017)	(0.234)
Cash	1.131**	-0.289***	-0.153
	(0.531)	(0.050)	(0.581)
R&D	1.941***	-0.255**	0.532
	(0.570)	(0.113)	(0.674)
M/B	0.045	0.014***	0.112*
	(0.059)	(0.005)	(0.058)
Leverage	-1.179**	0.043	0.006
	(0.478)	(0.049)	(0.639)
Volatility	0.884	-0.016	0.732
	(0.968)	(0.090)	(1.508)
HHI	-0.045	-0.062**	0.675
	(0.329)	(0.028)	(0.547)
Segments	-0.031	0.003	0.012
	(0.052)	(0.004)	(0.067)
Board Size	-0.106***	0.001	-0.171***
	(0.036)	(0.003)	(0.049)
CEO Incentive Pay	0.007	0.001	0.019
	(0.009)	(0.001)	(0.017)
CEO Age	0.424	-0.066	0.568
	(0.618)	(0.055)	(0.828)
CEO tenure	-0.097	-0.001	-0.119
	(0.073)	(0.006)	(0.119)

Table OA.VIII: Analysis of Excess Firm Performance on Board Independence (continued)

Panel A: First-Stage Baseline Regressions Predicting Firm Performance			
	Adj. ROA	**Adj. Asset Turnover**	**Adj. Sales Growth**
	I	**II**	**III**
CEO Ownership	0.007	0.167	-3.822
	(1.846)	(0.128)	(3.050)
BH Ownership	1.050**	0.019	0.710
	(0.480)	(0.037)	(0.726)
Sales Growth	0.021	0.033*	
	(0.201)	(0.017)	
Return Growth			0.001
			(0.008)
Constant	-1.618	2.026***	-0.158
	(2.625)	(0.237)	(3.600)
Year & Firm Fixed Effects	Yes	Yes	Yes
Adjusted R^2	0.204	0.100	0.090
Observation	6,023	6,023	6,023
Panel B: Analysis for Board Independence on Excess Firm Performance			
	Excess Adj. ROA	**Excess Adj. Asset Turnover**	**Excess Adj. Sales Growth**
	I	**II**	**III**
Board Independence	-0.713	-0.003	-1.208
	(0.769)	(0.086)	(1.195)
Treatment*Board	2.068*	0.007	3.371*
Independence	(1.084)	(0.083)	(1.993)
Treatment*Post	1.597*	0.188***	2.371*
	(0.881)	(0.067)	(1.272)
Treatment*Post*Board	-2.495**	-0.201**	-3.819**
Independence	(1.235)	(0.098)	(1.941)
Constant	0.920	-0.057	0.919
	(0.690)	(0.056)	(1.022)
Board Independence*Year Fixed Effects Interactions	Yes	Yes	Yes
Year & Firm Fixed Effects	Yes	Yes	Yes
Adjusted R^2	0.300	0.243	0.240
Observation	6,023	6,023	6,023

Table OA.IX: DIDID Analysis of Firm Market Performance on Board Independence

This table reports difference-in-difference analysis estimates for *Board Independence* and its interaction with *Post* and *Treatment* along with control variables. The analysis is conducted using four different market performance measures. *Adj. Stock Return* is the annual stock return for a firm for a given year. *Adj. Tobins Q* is common shares outstanding multiplied by the closing price of one share over common equity. *Adj. Cash Flow per Share* is cash from operating activities over the number of ordinary shares issued. *Adj. P/E Ratio* (Price-to-Earnings Ratio) is the price of one share of stock divided by the company's earnings per share. All these measures are adjusted by industry mean values. *Treatment*Post, Treatment* Board Independence, Treatment*Post*Board Independence* are the interaction variables of *Post, Treatment,* and *Board Independence. Board Independence* and year fixed effects interactions are included. Variable definitions are available in Table A.I, Appendix. Year and firm fixed effects are included. Standard errors are clustered by firms. The *** indicates statistical significance at the 1% level.

	Adj. Stock Return	**Adj. Tobins Q**	**Adj. Cash Flow per Share**	**Adj. P/E Ratio**
	I	**II**	**III**	**IV**
Board Independence	-0.697	0.258	0.051	-0.834
	(0.964)	(0.228)	(0.213)	(0.743)
Treatment*Board	0.687	0.520**	0.496	2.056
Independence	(1.242)	(0.250)	(0.329)	(1.423)
Treatment*Post	2.151**	0.366*	0.530**	0.847
	(0.895)	(0.190)	(0.238)	(0.733)
Treatment*Post*Board	-3.071**	-0.579**	-0.715**	-1.960*
Independence	(1.282)	(0.264)	(0.361)	(1.187)
Constant	9.616***	2.285***	1.559**	0.547
	(2.758)	(0.549)	(0.727)	(2.592)
Board Independence*Year Fixed Effects Interactions	Yes	Yes	Yes	Yes
Firm & Governance Controls	Yes	Yes	Yes	Yes
Year & Firm Fixed Effects	Yes	Yes	Yes	Yes
Adjusted R^2	0.103	0.182	0.426	0.130
Observation	6,023	6,023	5,022	5,576

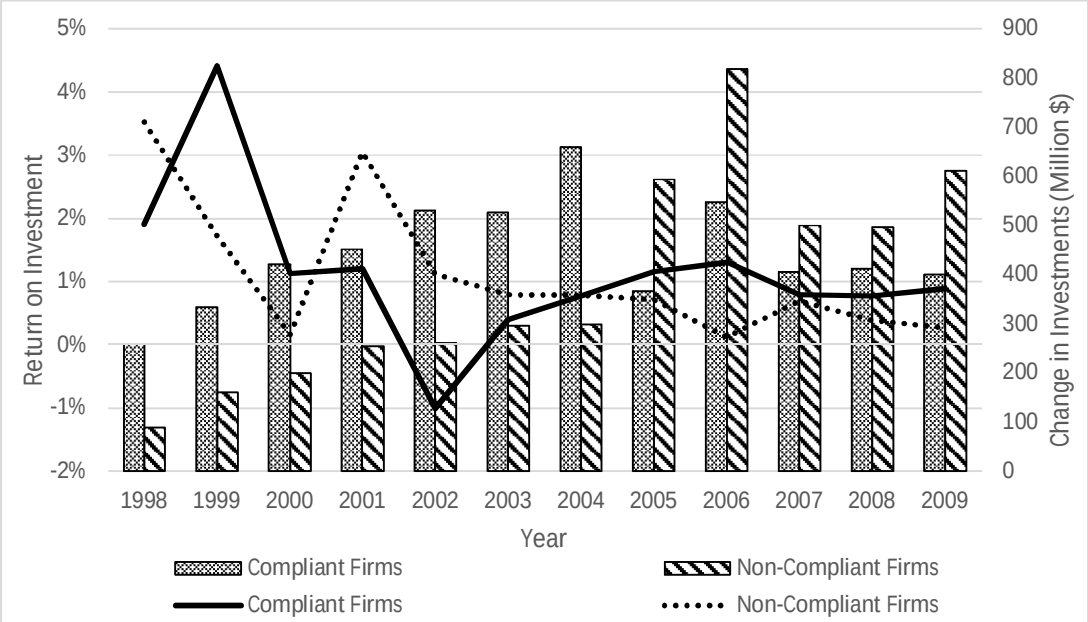
Table OA.X: DIDID Analysis Focusing on Firm Size

This table reports analysis estimates for *Board Independence* and its interaction with *Post* and *Treatment*. In Panel A, the analysis is repeated for small firms in the bottom quartile of firm size. In Panel B, the analysis is conducted using a small firm indicator as the main explanatory variable. *Board Independence* is replaced by *Small Firm* that is a dummy equal to one for firms in the bottom quartile of firm size, and zero for firms in the top quartile of firm size. *Adj. ROA, Adj. Asset Turnover,* and *Adj. Sales Growth* are the dependent variables. *Treatment*Post*Board Independence* and *Treatment*Post*Small Firm* are the triple interaction terms. *Board Independence, Small Firm* and their interactions with year fixed effects are included. Firm and governance controls are included in the analysis and lagged by one year. Variable definitions are available in Table A.I, Appendix. Year dummies and firm fixed effects are incorporated. Standard errors are clustered by firms. The *** indicates statistical significance at the 1% level.

Panel A: Analysis with Small Firms (Bottom Quartile)			
Variables	**Adj. ROA**	**Adj. Asset Turnover**	**Adj. Sales Growth**
	I	**II**	**III**
Board Independence	-1.391	-0.056	-0.721
	(1.459)	(0.101)	(1.795)
Treatment*Board	2.335	0.190	3.310
Independence	(2.106)	(0.156)	(3.372)
Treatment *Post	2.641*	0.253**	4.280**
	(1.452)	(0.099)	(1.893)
Treatment*Post*Board	-4.510**	-0.300**	-7.201**
Independence	(2.305)	(0.150)	(3.457)
Constant	2.574	2.322***	-4.234
	(4.452)	(0.392)	(8.172)
Firm&Governance Controls	Yes	Yes	Yes
Year & Firm Fixed Effects	Yes	Yes	Yes
Adjusted R^2	0.621	0.259	0.347
Observation	1,613	1,613	1,462
Panel B: Analysis with Small Firm Indicator as Main Variable			
Variables	**Adj. ROA**	**Adj. Asset Turnover**	**Adj. Sales Growth**
	I	**II**	**III**
Small Firm	-1.637**	-0.082	1.633
	(0.719)	(0.090)	(1.702)
Treatment*Small Firm	0.335	0.316*	-3.556*
	(0.837)	(0.166)	(2.132)
Treatment *Post	-0.045	0.073**	-0.596
	(0.310)	(0.029)	(0.719)
Treatment*Post*Small Firm	-0.367	-0.031	0.290
	(0.462)	(0.034)	(0.794)
Constant	0.874	2.520***	0.414
	(3.534)	(0.288)	(6.011)
Firm&Governance Controls	Yes	Yes	Yes
Year & Firm Fixed Effects	Yes	Yes	Yes
Adjusted R^2	0.421	0.252	0.272
Observation	3,173	3,173	3,125

Figure OA.1: Investments and R&D Engagement by Non-Compliant and Compliant Firms
This figure shows the distribution of investments and R&D activity by non-compliant and compliant firms across years. Panel A displays Return on Investment (ROI) and change in investments (in Million $) for non-compliant and compliant firms. ROI is gains from investments after tax over invested capital. Panel B shows the percentage of non-compliant and compliant firms in the sample that engage in R&D related acquisitions per year.

Panel A: ROI and Change in Investments



Panel B: R&D Related Acquisitions