Product Market Competition and Internal Governance: Evidence from the Sarbanes Oxley Act*

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Abstract

We use the Sarbanes Oxley Act (SOX) as a quasi-natural experiment to examine the link between product market competition and internal governance mechanisms. Consistent with notion that competition plays an important role in aligning incentives within the firm, SOX led to a larger improvement in the operation of firms in concentrated industries than in non-concentrated industries. Further, within concentrated industries, the effect is especially pronounced among firms with weaker governance mechanisms prior to SOX. We corroborate these findings using two additional regulatory changes in the U.S. and abroad. Overall, our results indicate that corporate governance is more important when firms face less product market competition.

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1. Introduction

Early scholars such as Alchian (1950) and Stigler (1958) have argued that competition in the product market is a powerful mechanism ensuring that management does not waste corporate resources. If management inefficiently consumes large amounts of resources in a competitive market environment, then the firm will be unable to compete and will become insolvent. Later studies formalize this intuition in various models (e.g., Hart 1983, Schmidt 1997, Aghion, Dewatripont, and Rey 1999).[1] One cannot underestimate the implications of these arguments. To the extent that product market competition aligns incentives of management, there is perhaps little need for formal governance mechanisms to do this task.

In this study, we use the Sarbanes Oxley Act of 2002 (SOX) as a natural laboratory to test the hypothesis that product market competition substitutes for formal governance mechanisms in mitigating agency conflicts. Instituted in 2002, SOX requires enhanced governance standards from public firms. The main provisions include increased penalties on officers who forge financial documents; more timely disclosure of equity transactions by corporate insiders; independence of audit committees; certification of financial statements by the chief executive officer (CEO) and the chief financial officer (CFO); and new procedures to evaluate the effectiveness of firms' internal controls. In conjunction with SOX, U.S. stock exchanges required their listed companies to comply with additional corporate governance requirements, such as a requirement for a majority of independent directors on the board and a requirement for independence of nominating and compensation committees. The SOX requirements were put in place to ensure that boards become stronger monitors of managerial decisions and managers have stronger incentives to be transparent and to maximize shareholder value.[2]

[1] We note that not all theoretical studies agree that product market competition necessarily increases efficiency. For example, Scharfstein (1988) argues that because profits are lower in competitive industries, the incentives of the manager to exert effort are lower. See also Hermalin (1992). Raith (2003) resolves some of this ambiguity by endogenizing entry into the product market. He shows that once entry is endogenized, stronger competition implies better alignment of incentives.

[2] There are many anecdotes of corporate scandals prior to SOX where managers were not maximizing shareholder value. For example, in the case of WorldCom, *The New York Times* reports that CEO Ebbers had incentives to grow the company through acquisitions even when these acquisitions were value-destroying: "[…]because of accounting

We hypothesize that firms in industries characterized by weak product market competition should experience higher efficiency gains after SOX than firms in industries with strong product market competition. These efficiency gains are due to stronger monitoring by board members over managerial decisions after SOX and due to stronger incentives of managers to make decisions that maximize shareholder value.[3] For example, the SOX governance requirements from boards are likely to pressure board members to become more involved in overseeing managerial decisions and to question dubious investment decisions. Similarly, CEOs who are held more accountable for corporate wrongdoing are likely to feel more pressured to focus on maximizing long-term core performance rather than on actions that cause temporary stock-price movements. Consistent with this hypothesis, we find that firms in concentrated industries improved their returns on assets (ROA) in the period after SOX by about 1.5% more than firms in non-concentrated industries. The improvement is economically large and is persistent over time. This change in ROA represents an improvement in performance of approximately 21% relative to the average ROA of the firms in our sample. We also find that the efficiency gains stem from increased operational efficiency. Specifically, we find that firms in concentrated industries experienced a larger reduction in their ratio of cost of goods sold to sales after SOX than did firms in non-concentrated industries. We also find that, within concentrated industries, the increase in ROA is especially pronounced among firms with weaker governance mechanisms prior to SOX and those engaged in earnings management.

These efficiency results are consistent with product market competition substituting for formal governance requirements. However, an alternative interpretation is that the increase in operating performance was a shift in the focus of firms from long-term performance to short-term performance - a shift that does not necessarily improve firms' overall value. Threatened by tougher penalties imposed by SOX,

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maneuvers, each new acquisition allowed the company to report higher per-share profits, even when its core business was barely growing, or losing ground." (*The New York Times*, August 8th, 2002).

[3] The assumption behind the main hypothesis is that firms in less competitive industries will benefit more from SOX. We essentially assume that there are decreasing returns to governance, i.e., that firms in competitive industries are already well governed and close to optimal investment behavior, so that regulating their behavior further does not lead to much further improvements in firm performance. In contrast, firms in less competitive industries have worse governance and they experience larger marginal gains from additional governance through SOX.

CEOs could have become too conservative and reduced investment, becoming more myopic (Kang, Liu, and Qi, 2014).

While this interpretation does not necessarily explain why firms in concentrated industries should be more myopic than firms in competitive industries, we perform additional tests to differentiate between these two interpretations. To that end, we examine whether other corporate decisions within concentrated industries indicate myopic behavior. We first analyze investment decisions of firms in concentrated industries. Specifically, within concentrated industries, we examine whether the sensitivity of investment to information from stock prices has decreased, and whether acquisition announcements after SOX are associated with lower abnormal returns. The first test follows the idea that myopic CEOs would ignore market information when making investment decisions and therefore their investment decisions would be less sensitive to stock prices, (e.g., Chen, Goldstein and Jiang, 2007). The second test follows the idea that the announcement of myopic acquisitions is perceived less favorably by the market and will thus have lower abnormal returns (e.g., Masulis, Wang and Xie 2007).

Contrary to the prediction of the myopic investment hypothesis, we do not find an overall decrease in the sensitivity of investment to firm performance in concentrated industries or a decrease in the market reaction to the announcement of M&A deals in concentrated industries post SOX.

Although our results using SOX are economically and statistically significant, one concern with empirical studies examining the impact of a particular regulatory event on firms is that other aspects of firm behavior affecting efficiency may have changed concurrently, resulting in miss-specified empirical models. To address this concern, we examine two additional quasi-natural experiments: the adoption of the Cadbury committee recommendation in the UK in 1992 and the electric utility deregulation in the US in 1992.

The Cadbury Committee recommended that UK firms have at least three non-employee directors on the board and separate the CEO from the chairman position. Empirical studies exploring this regulatory event find that it resulted in higher board scrutiny over managers (e.g., Dahya, McConnell and Travlos 2002). The Energy Policy Act of 1992 opened the market for electricity across the U.S. The deregulation

itself was associated with increased efficiency in electric utility firms (Fabrizio, Rose and Wolfram 2007). The Cadbury Committee recommendation event is another regulatory shock to governance, similar to SOX, and we examine whether this event differentially affects companies in more or less competitive industries. The Energy Policy Act event is a shock to competition, and we examine how this event differentially affects companies that are initially better or worse governed.

Consistent with our analysis of SOX, we find that firms in concentrated industries experienced a significantly larger increase in operating performance after the Cadbury Committee recommendations compared to firms in non-concentrated industries. We also find that the utility deregulation was followed by a larger increase in operating performance among firms that had weaker governance mechanisms in place prior to the deregulation.

Since SOX was approved immediately after the recession of 2001, it is possible that our main results are driven by the differential ability of firms in non-concentrated and concentrated industries to survive recessions. We therefore perform a placebo test in which we examine differences in efficiency gains between concentrated and non-concentrated industries around U.S. recession years. Consistent with our interpretation that our results are not driven by business cycle effects, we find no significant differences in efficiency gains between concentrated and non-concentrated industries around recession periods.

We form a battery of additional robustness tests and examine other possible explanations for our results. We find that all of the results remain economically and statistically significant across the robustness tests and alternative specifications.

Our study makes several important contributions to our understanding of the interaction between market competition and firms' internal governance. First, it contributes to the recent literature that examines the relation between product market competition and governance. Existing studies focus on the relation between product market competition and external governance mechanisms – namely the market for corporate control. For example, Giroud and Mueller (2010) show that when legislation shields firms from the market for corporate control, firms in concentrated industries experience a larger decrease in operating performance

compared to firms in non-concentrated industries. In a similar vein, Giroud and Mueller (2011) show that the existence of anti-takeover amendments in the firm charter and bylaws, as captured by the measure of Gompers, Ishii, and Metrick (2001), is associated with lower shareholder value only in concentrated industries. Although these papers document a strong link between competition and the disciplinary role of the market for corporate control, there is considerable debate on the relevance of the market for corporate control in public U.S. firms today. Since the 1980's, firms have developed sophisticated anti-takeover mechanisms (Jensen 1993, Bebchuk and Cohen 2005) and state legislators have passed anti-takeover rules (Easterbrook and Fischel 1991, Bertrand and Mullainathan 2003) that have significantly reduced the effectiveness of the market for corporate control. Jensen (1993), for example, writes that, "With the shutdown of the capital markets as an effective mechanism for motivating change, renewal, and exit, we are left to depend on the *internal control system* to act to preserve organizational assets".

Evidence from outside the U.S. shows that in many countries, the market for corporate control is simply non-existent (Denis and McConnell (2003)). These arguments suggest that an analysis of the relation between competition and corporate governance cannot be complete without examining its relation with internal governance mechanisms, such as monitoring by the board of directors and enhanced internal controls.[4] Our study fills this gap in the literature.

Second, our study contributes to the literature on the effect of SOX on U.S. corporations. For example, Chhaochharia and Grinstein (2007) show a positive announcement effect of SOX on non-complying firms, which were mainly large firms. Iliev (2010) shows that SOX imposed large costs on small firms, and Duchin, Matsusaka and Ozbas (2010) show that board independence requirements were beneficial in firms that faced low costs of acquiring information. Complementing this literature, our study shows that SOX had a larger impact on firms in non-competitive industries than on firms in competitive industries.

Third, this study also belongs to a growing empirical literature that examines the role of product market competition in aligning managerial incentives. One line of research focuses on the direct relation

[4] Consistent with our argument, Giroud and Mueller (2010) write that "[M]ore research is needed before we can conclude that firm-level governance instruments are moot in competitive industries" (page 330).

between product market competition and efficiency. For example, Nickell (1996) studies the relation between production efficiency and product market competition in UK firms. Caves and Barton (1990) and Caves (1992) find that above a certain level of industry concentration, technical efficiency is reduced. Nickell, Nicolitsas and Dryden (1997) observe that UK firms that face more competition also experience higher levels of productivity growth.[5] More recently, Fabrizio et al. (2010) find that since the utilities deregulation in the 1990's, U.S. utilities have become more productive. Our paper extends these earlier efforts by showing how internal corporate governance interacts with product market competition.

Finally, our results complement those of Giroud and Mueller (2010) and Bertrand and Mullainathan (2003), who find evidence supporting the predictions of the "quiet life" hypothesis, namely that managers in concentrated industries avoid difficult tasks such as firing employees, negotiating with employees over salaries, or negotiating with suppliers over prices of inputs. We find evidence that firms in concentrated industries decreased investments and R&D expenses after SOX compared to firms in non-concentrated industries. Our findings thus indicate that managers in firms in concentrated industries not only enjoy the quiet life, but also have the tendency to overinvest, consistent with the empire building hypothesis.

This study continues as follows. Section 2 describes the data and the variables. Section 3 discusses the empirical strategy and reports the empirical results. Section 4 reports the robustness tests and Section 5 concludes.

2. Data and Variables

2.1 Data

For the main analysis, our data consists of the entire Compustat database over the period 2000-2006. SOX became effective in July 2002, and so we compare firms' measures of efficiency between the period before SOX (2000-2002) and the period after SOX (2003-2006). Unlike Giroud and Mueller (2010), we do not exclude utility companies from the sample because utilities were largely deregulated by 2000 and so we should not expect utilities to behave any differently than non-utilities. However, our results are unaffected if

[5] See also Januszewski et al. (2002) for additional analysis on German firms.

we exclude utility companies (as well as financial companies) from the sample. We require all firms to have the following variables in Compustat: assets, sales, earnings before interest, taxes, depreciation and amortization, and cost of goods sold.[6] Our final sample includes 38,053 firm-year observations.

In later sections, we examine additional settings to corroborate our main findings. These tests involve the use of several other databases. We collect information on M&A deals from the SDC database to examine the effect of SOX on M&A activity in the US. We use data on firm governance from the Corporate Library database and the RiskMetrics Corporate Governance Quotient (CGQ) database to determine the effect of SOX on firms with different governance mechanisms. We collect financial data on UK firms from the Worldscope database to examine the effect of the Cadbury recommendations on firms in the UK.

2.2 Variables and Summary Statistics

As in previous studies, we assume that firms in more concentrated industries face less competition than firms in less concentrated industries (for example, Aggarwal and Samwick 1999, Allayannis and Ihrig 2001, Campello 2006, MacKay and Phillips 2005, Haushalter, Klasa, and Maxwell 2007, and Giroud and Mueller 2010, 2011). Our main variable of interest is therefore industry concentration. We rely on the industry concentration measures for U.S. firms from the Census Bureau. The Census Bureau conducts industry surveys of U.S. firms every five years and calculates industry concentration measures based on all U.S. firms, both private and public. We use the 2002 data since it is the most relevant data for the level of industry concentration around SOX. The bureau provides concentration measures for every industry, based on the North American Industry Classification System (NAICS), and it provides different industry concentration measures for manufacturing and non-manufacturing industries. For manufacturing industries, it provides the Herfindahl index (based on the sales of the largest 50 U.S. firms). The Herfindahl index is the sum of the squares of the market share (in percentages) of the firms that belong to the same industry. For

[6] We do not require all firms to have general, sales and administrative costs because this variable is missing for about 15% of the firm-years in our sample. Conditioning on this variable or assuming that this variable is zero for the missing observations does not change any of our results.

non-manufacturing industries, the Economic Census provides the market share of the top 50 firms in the industry.

To calibrate competition across these two measures, we use separate rankings for each one: We define industries as concentrated if they are among the top 50% of the distribution of industries that use the same concentration criteria (Herfindahl for manufacturing firms and market share for non-manufacturing firms). Firms in the bottom 50% of the distribution of industries are defined as operating in non-concentrated industries.[7]

We start by measuring firm performance using Return on Assets (ROA), defined as the ratio of Earnings before Interest, Taxes, Depreciation, and Amortization (EBITDA) to Assets. This measure captures overall operating performance in firms. We then decompose the ratio as follows:

$$\frac{EBITDA}{Assets} = \frac{EBITDA}{Sales} \times \frac{Sales}{Assets} \qquad (1)$$

$$where \ \frac{EBITDA}{Sales} = \frac{(Sales - COGS - SGA)}{Sales} = 1 - \frac{COGS}{Sales} - \frac{SGA}{Sales} \qquad (2)$$

COGS is cost of goods sold, and SGA is sales, general, and administrative expenses. Equation (1) shows that changes in ROA can come from the following two sources: changes in EBITDA to Sales, and changes in Sales to Assets. The ratio of EBITDA to Sales, known also as EBITDA margin, measures production efficiency, and the ratio of Sales to Assets, known also as asset turnover, measures how efficiently assets are used to generate sales. Firms that generate higher sales relative to their assets are more efficient in utilizing their assets. This measure captures to some extent the tendency of management to overinvest ("empire building") in non-productive assets. Previous studies use these measures to capture different aspects of the level of efficiency in firms (e.g., Ang, Cole, and Lin 2000).

[7] We also perform robustness tests where we use more refined concentration rankings, and where we run separate analyses on manufacturing and non-manufacturing firms, using the actual concentration measures instead of rankings. Our results are not sensitive to these alternative definitions of industry concentration.

The ratio of EBITDA to Sales can be further decomposed to one minus COGS to Sales and SGA to Sales (Equation 2). The ratio of COGS to Sales measures efficiency in the production of the goods. The ratio of SGA to Sales captures the efficiency in overhead and administrative costs. All else being equal, firms that have a higher ratio of administrative expenses to sales spend more of their revenues on overhead and administrative costs and therefore are less efficient. The ratios of COGS/Sales and SGA/Sales capture the tendency of management to enjoy the "quiet life" (Bertrand and Mullainathan 2003, Giroud and Mueller 2010).

We follow the literature (e.g., Giroud and Mueller 2010) and include in our regressions size and size squared to control for non-linear patterns in size, and the age of the firm to control for firm maturity. Following the literature, our measure of size is the natural log of firm assets. Across all specifications, we winsorize all variables at the 1% and 99% levels.

Table 1 shows summary statistics of the variables in our sample. Panel A shows the statistics of the entire 38,053 firm-year observations in the sample. These firms have mean ROA of 7% and EBITDA margin of 12%. COGS is on average 59% of sales and SGA is on average 33% of sales. Asset turnover is on average 100%. We note that only 32,968 firm-year observations report administrative expenses so our analysis of administrative expenses is confined only to this sub-sample of firms.

The industry concentration measures are the Herfindahl index of the largest 50 firms for manufacturing industries and the sale share of the largest 50 firms (%) for non-manufacturing industries. On average, the Herfindahl concentration index is 787 (on a scale of 10,000) with the 5^{th} percentile, the least concentrated industries, having an index of 63 or less, and the 95^{th} percentile (most concentrated industries) having an index of 2,059 or more. Sales share of the largest 50 firms in the industry is 65% on average, ranging from 22% for the 5^{th} percentile of the observations to 93% for the 95^{th} percentile of the observations.

A firm in our sample has $8,156 million in assets on average and a median of $363 million. The large difference between the mean and the median suggests that the sample contains both large and small

firms, and it is skewed by several very large firms. Firm age is on average 13.5 years, where age is measured as the time since the firm first appeared in CRSP.

Panel B shows the efficiency and performance ratios across concentrated and non-concentrated industries in each of the years 2000-2006. Average ROA in concentrated industries is lower than in non-concentrated industries. The pattern is robust in each and every year of the sample. However, EBITDA/Sales is larger in concentrated industries than in non-concentrated industries. This pattern suggests that firms in concentrated industries made larger investments in the past to achieve the same level of profits, and that they are able to achieve higher EBITDA margin (possibly due to market power) compared to firms in non-concentrated industries. The asset turnover ratio is larger in non-concentrated industries than in concentrated industries in every year in our sample. An opposite pattern appears in the ratio of SGA/Sales: in every year in the sample, firms in non-concentrated industries have, on average, lower administrative expenses to sales. The ratio of COGS/Sales is higher in non-concentrated industries compared to concentrated industries.

The patterns in ROA, SGA/Sales, and Sales/Asset ratios are consistent with the notion that firms in concentrated industries are less efficient than firms in non-concentrated industries. However, we are careful about drawing conclusions from these patterns. We note that, by definition, firms that operate in concentrated industries face different production opportunities and might face different growth opportunities than firms in non-concentrated industries. Moreover, firms in non-concentrated industries could bear higher production costs to sales than firms in concentrated industries since, in concentrated industries more of the surplus is likely captured by the consumer. Our empirical strategy, described in the next section, controls for these differences through firm fixed-effect regressions.

3. Empirical Strategy and Results

We examine whether the passage of SOX has a different effect on firms in concentrated and non-concentrated industries. We estimate:

$$y_{ijt} = \alpha_i + \alpha_t + \beta_1 CI_j \times SOX_t + \gamma' X_{ijt} + \varepsilon_{ijt}. \quad (3)$$

where *i* indexes firms, *j* indexes industries, *t* indexes time, y_{ijt} is the dependent variable of interest (e.g., ROA, Sales/Assets, etc.), α_i, and α_t are firm and year fixed effects, respectively, CI_j is an indicator variable for whether industry *j* is a concentrated industry in the year 2002, SOX_t is a dummy that equals one if the year is later than 2002 (the year of the passage of SOX), X_{ijt} is a vector of controls and ε_{ijt} is the error term. Across all of our specifications we also cluster the errors at the firm level to control for correlation in errors within firms.[8] The coefficient β_1 measures the effect of SOX on firms in concentrated industries relative to firms in non-concentrated industries.

Our setting involves changes to governance mechanisms as given by the effect of SOX. Our assumption is that Sarbanes Oxley mandated governance requirements that were not perfect substitutes to other governance mechanisms in firms. For example, the SOX requirement of larger penalties on managers who commit fraud cannot be easily imitated by other governance mechanisms that firms impose on themselves. To the extent that these mechanisms enhance alignment of incentives (our assumption), and to the extent that alignment of incentives is already stronger in firms in non-concentrated industries (our hypothesis), we should see stronger improvements in the alignment of incentives among firms in concentrated industries.

We estimate Equation (3) using a difference-in-difference approach. The first difference compares changes in the dependent variable before and after SOX separately for firms in concentrated and non-concentrated industries. The second difference takes the difference between those two differences. Results are reported in Table 2.

The first column of Table 2 shows the regression results where the dependent variable is the natural log of one plus ROA. This regression controls for firm fixed effects, size, size squared and age. Consistent with the notion that SOX had a stronger effect on non-competitive firms, we find that the coefficient of the

[8] Clustering at the industry sector level (1-digit SIC code level) instead of the firm level does not alter any of the results.

interaction term ($CI_j \times SOX_t$) is positive (0.0143) and statistically significant. We also find a significant relation between our control variables and performance. Consistent with Giroud and Mueller (2010), we find that there is a non-linear positive relation between size and performance, where the size coefficient is positive and the size-squared coefficient is negative. The relation between age and performance is positive in our regression, which is opposite to the results in Giroud and Mueller (2010). We attribute this difference to the fact that their identification strategy controls for state-year effects, which could capture age differences between firms across different states (mainly Delaware firms vs. non-Delaware firms).

The second column of Table 2 shows the results where the dependent variable is the natural log of one plus the Sales/Asset ratio. Here, we find that the coefficient of the interaction term ($CI_j \times SOX_t$) is negative (-0.0063) and insignificant. This result suggests that the increase in ROA in concentrated industries compared to non-concentrated industries was not the result of an increase in Sales/Assets.

In the third column the dependent variable is the natural log of one plus EBITDA/Sales. Indeed, as expected, we observe an increase in EBITDA/Sales in concentrated industries compared to non-concentrated industries. The increase is roughly 1.38% and is in the same order of magnitude as when the dependent variable is the natural log of one plus ROA. Thus, the increase in performance in concentrated industries is due to an increase in operating margins rather than an increase in asset turnover. One can view an increase in asset turnover as a sign of better allocation of assets for production (e.g., reduction in overcapacity) and an increase in operational margins as a sign of a reduction in production costs for a given level of sales (e.g., more efficient use of existing assets).

To gain further insight into the drivers behind the increased efficiency in concentrated industries in the post-SOX period, we further break EBITDA into its two components (see Equation 2). The fourth column shows the results where the dependent variable is the natural log of one plus COGS/Sales. We find a decrease in COGS/Sales after SOX in concentrated industries compared to non-concentrated industries

(around 1.9% lower). Thus, the increase in ROA in concentrated industries after SOX can be partly attributed to the decrease in COGS/Sales.[9]

Finally, we run the same regression, but this time the dependent variable is the natural log of one plus SGA/Sales. The last column shows that the SGA/Sales ratio has increased in concentrated industries. This result implies that SOX has increased efficiency in production but at the same time it increased overhead costs. This result would be consistent with the argument that SOX entailed large overhead costs associated with increased accounting controls on concentrated industries (coefficient of 0.0081). However, as we will show later, this result is not robust and is driven by particular sectors in the economy that saw a large change in their expenses, irrespective of their concentration level.

Overall, our results thus far indicate that SOX was associated with larger efficiency gains in concentrated industries, compared to non-concentrated industries. These findings are consistent with the notion that competition decreases managerial slack and that internal governance mechanisms are more important in concentrated industries than non-concentrated industries. The findings also show that the effect results from increased efficiency in production. While there are some increases in overhead costs, they are, on average, lower than the efficiency gains, and therefore the overall effect is positive.

3.1 Heterogeneity Across Firms in Concentrated Industries

The results thus far suggest that firms in concentrated industries improved performance after SOX more than firms in non-concentrated industries. If these results are indeed due to better alignment of incentives, we should expect larger improvement within concentrated industries in firms that did not already have governance mechanisms in place prior to SOX. These firms were more affected by SOX and therefore

[9] We also examine whether the decrease in COGS/Sales is a result of an increase in sales or a decrease in cost of goods sold. To that end, we run a regression similar to regression 3 except that we replace the dependent variable with the natural log of COGS. The coefficient β_1 in this specification is negative and significant, suggesting that cost of goods sold has actually decreased in concentrated industries after SOX. We also rerun the same regression, replacing the dependent variable with the natural log of Sales. The coefficient β_1 in this specification is not statistically significant from zero. We conclude that the decrease in COGS/Sales comes from the decrease in costs. We thank an anonymous referee for suggesting this test.

should see a larger improvement in performance. (e.g., Chhaochharia and Grinstein 2007). To examine this hypothesis, we separate firms within concentrated industries into firms that had strong governance mechanisms in place prior to SOX and firms that did not have strong governance mechanisms. We then examine the change in performance in these two groups of firms after SOX.

We use three different measures of governance. The first measure we use is Discretionary Accruals. This measure has been identified in the literature as an indicator of diversion of CEO incentives from value maximization. For example, Teoh et al. (1998 a,b) and Defond et al. (1994) find that managers in firms with high discretionary accruals tend to artificially boost their earnings prior to equity offerings and prior to debt covenant violations. Moreover, Dechow et al. (1996) show that firms violating accounting regulations tend to have abnormally large discretionary accruals. For each firm, we calculate the discretionary accruals using the modified Jones model (1996). We then define firms that are in the top 50% of discretionary accruals in our sample in the year 2002 as firms that are more likely to be affected by the rule.

The second measure we use is classified boards, defined as boards whose members can hold their position for more than a year (typically three years). This measure has also been identified in the literature as an indicator of managerial entrenchment (e.g., Faleye (2007) and Bebchuk and Cohen (2005)). We define firms with classified boards in the year 2002 as firms that are more likely to be affected by the rules.

The third measure we use is a combined score of firms with high Discretionary Accruals, Classified Boards, and low Corporate Governance Index measure (CGQ). The CGQ measure was developed by Institutional Shareholder Services (currently known as RiskMetrics).[10] The data we use is ISS's CGQ ranking in 2002 for U.S. public firms. Factors used in the CGQ formula include board structure and composition, the executive and director compensation charter, and bylaw provisions. We then define firms that are in the bottom 50% of the ranking of CGQ as firms that are more affected by the rule.

Our specification is similar to that of regression 3 except that we add another explanatory variable: a triple interaction of SOX (year>2002) with the Concentrated Industry dummy and with the measure of

[10] This measure was used in several prior studies to measure governance in firms (e.g., Aggarwal et al., 2008, Chhaochharia et al., 2009).

governance, using in separate regressions each of the measures above. We also include double interactions of these governance measures with the year 2002 and with the concentration industry indicator variable. We present the results in Table 3.

Column 1 shows the regression results where the firms more affected by SOX are the firms with higher discretionary accruals in 2002 (dummy Earnings Management=1). The results show that efficiency gains in concentrated industries with high discretionary accruals are positive and statistically significant, with a coefficient of 0.0313. The positive coefficient means that these firms experienced a larger increase in ROA relative to the average increase in concentrated industries post SOX. Column 2 reports the regression results using classified board measure. Again, efficiency gains here are positive in firms with lower governance index, suggesting that these firms also saw a larger increase in ROA. The coefficient is not significant, suggesting perhaps that this measure is not a strong predictor of firms that were more affected by the rule. Column 3 uses the combined index. The coefficient of the triple-interaction term is positive, with a coefficient of 0.0303. The positive coefficient is significant at the 10% significance level.

Overall, the results in Table 3 corroborate the interpretation that firms in concentrated industries saw larger efficiency gains due to enhanced governance due to SOX. Across the three measures of governance, we observe larger gains in firms in concentrated industries that do not have governance mechanisms in place and therefore are more likely to be affected by SOX.

3.2 Efficiency Gains vs. Myopic Behavior

We interpret our results thus far as consistent with efficiency gains post SOX in concentrated industries, and even more so in concentrated industries with fewer governance mechanisms in place. However, one might argue that firms in concentrated industries became more myopic after SOX: The increase in operating performance can be interpreted as firms sacrificing long-term investments for short-term goals; a shift that does not necessarily improve firms' overall value. We note that the myopic explanation does not explain why firms in concentrated industries after SOX should be more myopic than

firms in non-concentrated industries. We therefore view the myopic explanation as somewhat incomplete. Nevertheless, we examine this argument in depth.

To investigate this issue, we first examine trends in investment surrounding SOX across firms in concentrated and non-concentrated industries. Indeed, as reported in Table 4, we find evidence that firms in concentrated industries significantly reduced investment after SOX, consistent with increased efficiency but also with myopic behavior. We differentiate between these two explanations by focusing on changes in other decisions that were made in concentrated industries post SOX and examine whether these changes in decisions indicate myopic or efficient behavior. We focus on two corporate decisions: investment decisions and merger and acquisitions decisions.

In the first test, we examine the sensitivity of investment to information from stock prices. This measure is used to examine the reliance of CEO investment decisions on relevant market information (e.g., Chen, Goldstein and Jiang, 2007). If the CEOs in concentrated industries behave more myopically after SOX, then we should expect the CEOs to rely less on market information post SOX in making investment decisions. Our specification follows Chen, Goldstein and Jiang (2007), and is as follows:

$$I_{ijt} = \alpha_i + \gamma_t + \beta_1 \times Q_{i,t-1} \times (1-CI_j) + \beta_2 \times Q_{i,t-1} \times SOX_t \times (1-CI_j) + \beta_3 \times Q_{i,t-1} \times CI_j + \beta_4 \times Q_{i,t-1} \times SOX \times CI_j + [Controls_{ijt}] + \varepsilon_{ijt} \quad (4)$$

where I_{ijt} is investment of firm i of industry j at time t, $Q_{i,t-1}$ is Tobin's Q ratio of firm i at time t-1, and CI_j is an indicator variable for whether the firm belongs to a concentrated industry. The variable α_i controls for firm-specific characteristics and γ_t controls for time-specific changes in investment across all firms. SOX is an indicator variable for whether the year is after 2002 (the year where SOX was enacted). The control variables follow Chen, Goldstein and Jiang (2007).

The coefficients of primary interest are β_2 and β_4. β_2 is associated with the triple interaction, Q, SOX dummy, and non-concentrated industries dummy. Thus, it captures the relation between investment in firms in non-concentrated industries after SOX and Tobin's Q ratio. To the extent that firms in non-concentrated

industries pay less attention to their stock price when investing after SOX, the coefficient β_2 should be negative. Similarly, the coefficient β_4 is associated with the triple interaction, Q, SOX, and concentrated industries dummy. Thus, it captures the relation between investment in firms in concentrated industries after SOX and Tobin's Q ratio. Again, a negative coefficient of β_4 would suggest a myopic investment behavior after SOX in firms in concentrated industries.

In addition to testing whether $\beta_4<0$, we can also test if $\beta_4 < \beta_2$, which means that the sensitivity of investment to Q increases less in concentrated industries than in non-concentrated industries, consistent with the myopic behavior hypothesis.

We use two measures to capture investment, (similar to those used in Chen, Goldstein and Jiang 2007): Capital expenditure plus R&D scaled by beginning-of-year assets (CAPXRD), and change in assets scaled by beginning-of-year assets (CHGASSET). We report the results in the Table 5.

Column 1 shows the results when the measure of investment is capital expenditure plus R&D. The coefficient of Q to investment after SOX in concentrated industries ($Q_{i,t-1}\times SOX\times CI_j$) is positive (0.19%) and statistically different from zero. This result means that the sensitivity of investment to Tobin's Q in concentrated industries has increased after SOX. This result does not support the myopic investment argument.

Column 1 also shows that the coefficient of the sensitivity of investment to Q after SOX in non-concentrated industries ($Q_{i,t-1}\times SOX\times (1-CI_j)$) is negative (-0.62%) and statistically different from zero. This coefficient is significantly smaller than the coefficient associated with concentrated industries (0.19%), suggesting that sensitivity of investment to Tobin's Q has improved in concentrated industries compared to non-concentrated industries.

Column 2 shows the results when the measure of investment is changes in assets. Here, again, the change in sensitivity of investment to Tobin's Q after SOX in concentrated industries is positive and significant. However, the coefficient (2.16%) is smaller than the coefficient associated with changes in sensitivity after SOX in non-concentrated industries (4.01%). The difference between the coefficients is

statistically different than zero. This means that the sensitivity of investment to Tobin's Q in concentrated industries has not increased after SOX compared to non-concentrated industries.

Overall, we find mixed evidence that sensitivity of investment to performance has decreased in concentrated industries after SOX. When measuring investment with capital expenditure and R&D expenses there is actually an increase in investment sensitivity. However, when measuring investment with changes in assets, there is a decrease in investment sensitivity. We, therefore, cautiously interpret our results as not supporting the myopic investment explanation. Nevertheless, the fact that one of the regressions shows results that are consistent with myopic behavior could suggest that the results, at least to an extent, depend on how we measure investment. The next test helps us to better assess the robustness of the above results.

We examine whether the announcements of takeovers by acquirers post SOX exhibit more negative abnormal returns. If the market perceives firm behavior after SOX to be more myopic, then we should expect the abnormal return associated with the announcement of acquisitions to be more negative after SOX.

We collect data from the SDC database on all acquisitions between the years 2000-2006, where the target size is at least $1 million and the acquirer status is public. We then regress the abnormal returns of these deals on whether the announcement was after SOX (i.e., after 2002) and whether it was in a concentrated industry. In this difference-in-difference regression we also control for other factors that might affect announcement returns. We follow Masulis, Wang, and Xie (2007) and include controls such as whether it is a cash or stock deal, and whether it is a diversifying acquisition. Specifically, we run the following regression:

$$AR_{ijt} = \gamma_t + \beta_1 CI_j + \beta_2 \times CI_j \times SOX_t + [Controls_{ijt}] + \varepsilon_{ijt} \qquad (5)$$

where AR_{ijt} is the abnormal return (in percentage points) to firm *i* of industry j in year *t* from four days before the announcement of the acquisition to one day after the announcement, and CI_j is an indicator variable for whether the acquiring firm belongs to a concentrated industry. SOX is an indicator variable for whether the year t is after 2002. If firms in concentrated industries see a smaller acquisition return after SOX

then the coefficient β_2 of the interaction term $CI_j \times SOX$ should be negative and significant. We present the results in Table 6.

The results in column 1 show that the coefficient of the interaction term $CI_j \times SOX$ is positive (0.3397), suggesting that acquiring firms in concentrated industries did not see a decrease in abnormal returns after SOX. If anything, firms in concentrated industries saw an increase of about 0.3% in their announcement returns. Column 2 and Column 3 show the results where we define SOX as an indicator variable which equals 1 if the year is after 2003 and after 2004 respectively. We run these two regressions to account for the possibility that the effect of SOX on announcement returns was felt only a year or two after the enactment of the rule. The coefficient of the interaction term $CI_j \times SOX$ remains positive across the two specifications, further corroborating the findings that acquiring firms in concentrated industries did not see a lower announcement return after SOX.

In general, the tests in this section do not point to myopic behavior by firms in concentrated industries after SOX. Capital Expenditure and R&D expense decisions in firms in concentrated industries after SOX are, in general, more sensitive to firm value as before SOX; and acquisition decisions of acquiring firms in concentrated industries after SOX are not perceived less favorably by the market after SOX than before. Therefore, we conclude that increased performance in concentrated industries after SOX is not merely due to a shift towards short-term goals at the expense of long-term investment efficiency.

3.3 Other Exogenous Shocks to Governance and Competition

One of the concerns with empirical studies examining the impact of a particular event on firms is how to ensure omitted variables correlated with the event are not the reason for the reported results. For example, SOX was confounded by other events such as the 9/11 terrorist attacks, the downturn in the U.S. economy, the burst of the high-tech bubble, the surge in oil prices, etc., all of which could have impacted firms in concentrated industries differently than firms in non-concentrated industries.

In this subsection we try to alleviate these concerns by examining two additional quasi-natural laboratory events, unrelated to SOX. The first event is a shock to governance mechanisms in firms, similar in nature to SOX, which took place in the UK a decade prior to SOX. The second quasi-natural laboratory event is the deregulation of the utility industry in the U.S. in the 1990's.

Examining these two events offers up two advantages. First, the two events did not overlap with SOX. Moreover, one of the events occurred in another country. Therefore, we feel confident that these events are not driven by the same potentially confounding events as SOX. Second, each of these two events captures a shock to a different variable, holding the other variables constant. The first event captures the effect of a shock to governance across competitive and non-competitive industries. The second event captures the effect of a shock to competition across strongly governed and weakly governed firms. The variation in these settings further alleviates concerns that we capture a spurious relation between governance, competition and performance.

The first event is the adoption of the Cadbury Committee recommendation in the UK in 1992. Following governance failures in UK firms in the late 1980's, the Financial Reporting Council, the London Stock Exchange and representatives of the accountancy profession in the UK asked Sir Adrian Cadbury to chair a committee whose aim was to investigate the British corporate governance system and to suggest improvements in order to restore investor confidence in the system. The resulting report entitled "Code of Best Practices", embodied recommendations that boards of UK corporations include at least three outside directors and that the positions of chairman and CEO be held by different individuals. This code of best practices was adopted by public UK firms, and was found to have a positive effect on boards' monitoring activities (Dahya, McConnell and Travlos 2002).

To examine the effect of the Cadbury committee report on firm efficiency, we follow the same methodology as the one used in our analysis of the SOX event. Our main data source for the UK is Worldscope. The Worldscope database consists of accounting data for public UK firms. Since we do not have census data on industry concentration in the UK, we compute the index manually, using the

Worldscope data. Similar to Giroud and Mueller (2010), we create a concentration index based on industry sales data from the Worldscope database. Since the Cadbury committee report was issued in 1992, we calculate a Herfindahl index based on sales in 1992, using the industry classification FTAG 4 from Worldscope.[11] We then use this classification to separate firms into more concentrated and less concentrated industries.

We examine firms' performance in concentrated and non-concentrated industries around the event. We use the same data structure and methodology as in Dahya, McConnell, and Travlos (2002) who examine changes in performance in firms during the period 1988-1995. Our data consists of an unbalanced sample of 10,019 firm-year observations and we use the same methodology that we used to test the impact of SOX (i.e. Table 2).

The results from this analysis are reported in Table 7. The first column shows that firms in concentrated industries experienced a significant increase in ROA in the period after the Cadbury Committee Report compared to firms in non-concentrated industries. This result is similar to the result obtained using the SOX event for US firms, and further supports the argument that internal governance mechanisms have a larger impact on firms' performance in concentrated industries compared to non-concentrated industries.

Interestingly, the sources of the increased performance are somewhat different between the two events. The results in the second and third columns of Table 7 suggest that the increase in performance can be attributed to both an increase in Sales/Assets and an increase in EBITDA/Sales. This result implies that the Cadbury Committee Report recommendation was associated not only with increased margins (efficiency), but also with a higher asset turnover. In addition, there is a decrease in SGA/Sales, rather than a decrease in COGS/Sales. We note, however, that this difference between the sources of gains between the

[11] We would ideally create a Herfindahl index that is based on a sample of private and public firms (like the Herfindahl measure for U.S. firms) but such data, when available for UK industries, cannot be matched to Worldscope's industry classifications. We therefore create the Herfindahl index based on public companies. The FTAG4 is the FTSE industry classification based on Economic and Industrial sector of equity at level 4. There are 39 sectors under this categorization.

two events could be driven by differing accounting treatment of production costs in the U.S. and the UK, respectively.

Interestingly, we also find that there is no decrease in capital expenditure in firms in concentrated industries after the Cadbury Committee Report recommendations, (column 6).[12] The coefficient is positive but insignificant. While the increase in performance is strong in both the SOX event and the Cadbury Report event, the effect on investments is less robust, consistent with the fact that we do not have a clear cut prediction regarding the effect of these regulatory changes on investment. Moreover, the alternative myopic explanation would require both events to entail a decrease in investment in concentrated industries after the regulatory changes. Our result stands in contrast to this interpretation.

The second exogenous event we examine is the utility deregulation event in the energy sector in the U.S. in the 1990's. The electricity industry in the U.S. went through an extensive deregulation in the period 1990-2000. After the enactment of Energy Policy Act of 1992 (EPA), many states in the U.S. opened access to the transmission of electricity by non-utility plants, allowing local utilities to buy their electricity. The process culminated with full market restructuring, allowing utilities in one state to transfer their electricity directly to retail customers in another state and compete directly with local utilities.[13] The deregulation was implemented across states at different points in time. Fabrizio, Rose and Wolfram (2007) document large efficiency gains from the deregulation both at the time of the initial implementation of the EPA and after the states implemented restructuring. We examine how efficiency changed as a function of corporate governance across the different state-level deregulation events over time.

Our hypothesis is that internal governance in the utility industry substitutes for product market competition. Therefore, we expect utilities with weaker governance to experience larger increases in ROA after the deregulation events. To test the hypothesis we form the following panel regression, where the

[12] Here we use only capital expenditure rather than capital expenditure and R&D because the vast majority of firms in our UK sample do not report R&D expenses. We therefore view this measure as less precise in this sample.
[13] (http://www.eia.gov/electricity/policies/restructuring/)

dependent variable is Log(1+ROA) and the explanatory variables are dummies for the restructuring years and the deregulation years, interacted with measures of weak governance:

$$\text{Log}\,(1+ROA_{ijt}) = \beta_1 Deregulation_{jt} + \beta_2 Deregulation_{jt} \times Weak\_Governance_{ijt} + \beta_3 Weak\_Governance_{ijt} + \beta_4 Size_{ijt} + \beta_5 Size\_squared_{ijt} + \beta_6 Age_{ijt} + \alpha_i + \gamma_t + \varepsilon_{ijt} \quad (7)$$

where *i* indexes firms, *j* indexes states, and *t* indexes time.

The specification in regression 7 includes an indicator variable $Deregulation_{jt}$, which equals 1 if state j has already implemented deregulation in year t, and 0 otherwise. $Weak\_Governance_{ijt}$ is an indicator variable for whether firm i in state j had weak governance in year t. Our measure of weak governance is whether the firm had earnings management larger than median earnings management in the year 1992. This variable is measured by the level of discretionary accruals in the firm. As discussed in section 3.1, this measure has been used in past studies to measure misalignment of CEO incentives. Also included in the regression is an interaction term $Deregulation_{jt} \times Weak\_Governance_{ijt}$. This interaction term captures the incremental effect of deregulation on performance in firms with weak governance. If indeed deregulation aligns managerial incentives, then we should find a stronger effect of the deregulation on performance in firms that have weaker governance. Also included in the regression are controls for size and age and firm and year fixed effects. Our sample consists of all firms in the energy utility sector (SIC codes between 4900 and 4999) in the years 1990-2008.[14]

We find that the deregulation was associated with positive effect on ROA in firms with high discretionary accruals. Specifically, Table 8 shows that ROA increases by 0.0055 in firms in concentrated industries post deregulation; significant at the 10% level. This result suggests that an increase in competitiveness increases efficiency for firms with poorer corporate governance relative to better-governed firms. The results across the two events provide further support to the positive effect of product market competition on incentive alignment.

[14] We note that there is a possibility that operating performance in industries subject to regulation might not be comparable to operating performance in industries that are not subject to regulation. To some extent, we control for this possibility by adding an indicator variable for the year of deregulation.

We conclude this section with one additional test. The SOX event occurred just after a recession in the U.S. economy. It is possible that our results are driven by the differential effect of the recession between firms in concentrated and non-concentrated industries. We therefore run a placebo test in which we examine patterns in operational efficiencies around recession years to see if we find a similar pattern there. We identify recession years between 1976-2000 from the National Bureau of Economic Research web site, and repeat the regression analysis for all Compustat firms, where the interaction term is with a recession dummy – for whether that year was a recession year. We run two regressions. The first regression is over the period 1976-1995, in order to ensure that our results are not driven by the 2001 recession. The second regression is run over the period 1976-2006 including the 2001 recession. We present the results of this analysis in Table 9. The table shows that, on average, the effect of recessions on change in ROA in concentrated industries is not significantly different than the change in ROA in non-concentrated industries during the recession (coefficient of 0.0023 for the interaction term and not statistically significant from zero). Overall, the results are inconsistent with the idea that the increase in efficiency in non-concentrated industries was driven by recession years.[15]

4. Robustness

The results in the previous section indeed suggest that the relation between internal governance mechanisms and competition is not driven by unobserved variables (correlated with SOX). We also show it extends to other events and is not unique to SOX. In this section we provide additional stress-tests of our results.

One potential concern with our findings is that the changes in the operating performance of firms in concentrated industries, coinciding with SOX, are driven by unobserved industry shocks. We cannot rule out this possibility completely, since our identification is at the industry level, but we can mitigate this concern by controlling for sector-level shocks around SOX. Since industry sectors include both concentrated and

[15] Since the year 2001 was associated with a downturn in the high-tech sector, we also reran the regressions after taking out the high-tech sector (untabulated). Our results do not change after removing the high-tech sector.

non-concentrated industries, we can achieve identification. By adding the sector-year dummies we identify whether concentrated industries within a given sector have higher performance post SOX compared to non-concentrated industries within the same sector. The sector variable is based on the 48 industry sector definition of Fama and French (1997). As a comparison, the number of NAICS industries in our sample is 762. Thus, within a sector there are, on average, 762/48 = 15.88 different industries. We therefore have enough variability in concentration levels in industries within a given sector.

The results, reported in Table 10, show that ROA increased after SOX in concentrated industries, even after controlling for sector year effects (coefficient of 0.0168). The results for EBITDA/Sales, COGS/Sales, and Sales/Assets are consistent with our previous results. Interestingly, the SGA/Sales ratio regression shows a negative coefficient for concentrated industries after SOX. This means that our previous finding that SGA/Sales increased after SOX in concentrated industries is attributed to sector-related productivity shocks not associated with the level of concentration.

To further examine whether there are particular sectors that drive our results, we examine the robustness of the results to the omission of utilities and financials (not reported in a table). Taking away financials does not change our conclusion regarding improved performance in concentrated industries. We note that we observe that the coefficient of SGA/Sales becomes significantly negative and that the other effects are identical to our previous findings. This result implies that the positive effect reported earlier is at least partially explained by changes in SGA/Sales in the financial sector. Removing utilities does not alter any of the results in Table 2.[16]

We also examine year-by-year changes in the efficiency of firms in concentrated industries around SOX. We rerun regression (1) except that now we add interaction variables of the concentration dummy with each of the years in the period 2001-2006. The results, reported in Table 11, are consistent with the

[16] Another concern is that our window around the event is too small to capture long-term changes in performance. The logic behind this choice that we and other papers make is that too-long of a panel is likely to include other events that contaminate the effect of SOX. For example, large macro events such as the 2008-2009 crash are likely to have a differential effect across industries (e.g., the car and real estate industries suffered a great deal from the crash), which is likely to contaminate the SOX effect. Nevertheless, we experimented with longer sample periods (i.e., starting in 1999 instead of 2000 and ending in 2008 instead of 2006) and our results are robust to the inclusion of these years.

interpretation that the increase in efficiency is due to SOX. The increase in EBITDA/Sales and in ROA starts in 2003, a year after the implementation of the rule, and they are persistent after SOX.[17]

Another possible concern is that our results are driven by changes in industry structure. Perhaps some industries experienced a change to their structure and became more (or less) concentrated. To address this concern, we use the Economic Census Bureau concentration measures for the year 2007, five years after the rule, and examine changes in the concentration measures between 2002 and 2007. We then exclude from the sample all industries that are at the top 10% in terms of the (absolute) change in their concentration measures between the two periods. If our results are driven by these industries, then excluding these industries from the sample should reduce the significance of our results. We present the regression results in Table 12. The table shows that the results are similar to the original results in Table 2. The coefficient of the interaction term CI×SOX is 0.0149 when the dependent variable is ROA (compared to 0.0143 in Table 2) and the coefficient of the interaction term is 0.0175 when the dependent variable is the operating margin (compared to 0.0138 in Table 2). Therefore, our results are unlikely to be driven by changes in the industry structure after the rule.

Finally, we examine alternative measures of industry concentration. By necessity, the concentration index used in the previous section combines two separate measures. The first is the Herfindahl index, measured only for firms in the industrial sector. The second is the percent of sales in the largest firms in the industry, measured only for firms in the services sector. For each measure we use the median cutoff to differentiate between concentrated and non-concentrated industries. One concern is that these two measures are different from one another and so combining them could lead to biased results. For example, if industries in the services sector are all relatively concentrated and industries in the industrial sector are all relatively

[17] We also note that the efficiency gains remain large in 2006. This result is not surprising given that some sections of the SOX itself took several years to implement. For example, section 404 (internal controls), considered one of the most important aspects of SOX, was implemented over a long window of time, reaching full implementation only in 2007 (Iliev 2010). Moreover, we would not expect the effect of SOX to necessarily be immediate. For example, the impact of better investment decisions on performance often takes several years. Similarly, a change in the sensitivity of CEO replacement to performance might be observed several years down the road, when a performance downturn occurs.

non-concentrated, then combining the index of the services sector with the index of the industrial sector would cause low-ranked industries in the service sector to be misclassified as non-concentrated and would cause high-ranked industries in the industrial sector to be misclassified as concentrated. Another concern is that a ranking method does not fully encapsulate the absolute differences in concentration levels across industries.

To address these concerns, we perform two additional tests. First, we separate the sample into firms that belong to the manufacturing sector (and have the Herfindahl index) and firms that belong to the services sector (and have the percent sales index). We then run the original regressions for each sub-group of firms and use two measures of concentration. The first is the actual concentration ranking within each sub-group of firms (measured between 0 – lowest concentration and 1 – highest concentration) and the second is the natural log of the concentration measure (Herfindahl for the manufacturing firms and the percentage of sales by the largest 50 sellers for the non-manufacturing firms).[18] The results (not shown) are that the coefficient of the concentration index is positive and significant for both the manufacturing sector and the services sector. Interestingly, the coefficient of the ranking variable is of the same order of magnitude across both manufacturing and services sectors. The coefficient is 0.0137 for the services sector and 0.0147 for the manufacturing sector. The coefficient of 0.0137 implies that firms in the most concentrated industry (rank of 1) had a 1.37% increase in ROA after SOX compared to firms in the least concentrated industry (rank of 0). The results for log of the concentration measure provide similar results. For example, the coefficient of the log (Herfindahl index) is 0.0073, implying that firms whose Herfindahl index is one standard deviation above the mean experienced an increase in ROA that is 1.71% larger than those for firms whose Herfindahl index is one standard deviation below the mean.

[18] We use the log of the concentration measures because both the Herfindahl index and the percentage of sales by the largest 50 sellers have a finite support [0,1], which results in suppressed variations across industries with a relative abundance of firms (since both indexes approach zero as n becomes large). Taking a log of the indexes transforms the support [0,1] to [-∞,0], and allows for larger differences among industries even when there are relatively large number of firms.

Overall, the robustness tests in this section reinforce the original results that firms in concentrated industries experienced a larger improvement in efficiency after SOX and further rule out other explanations for the results.

5. Conclusion

This study explores how the interaction between product market competition and corporate governance mechanisms affect the alignment of incentives within firms; with a particular focus on the effect of the SOX on performance and efficiency in firms in competitive and less competitive industries. We find that the SOX was indeed associated with significantly larger increases in efficiency gains in firms that belong to less competitive industries. Firms in less competitive industries experience a larger improvement in their returns on assets. This change in ROA represents an improvement in performance of approximately 21% relative to the average ROA of the firms in our sample. We also find that the source of the gains in efficiency stems from increased operational efficiency. Within concentrated industries, the effect is especially pronounced among firms with weaker governance mechanisms prior to SOX.

Our findings on greater positive impact of internal corporate governance mechanisms on the alignment of incentives are not limited to SOX. We find that the utility deregulation event in the U.S. in the 1990's was followed by a notable increase in operating performance among firms that lacked governance mechanisms in place; suggesting that greater product market competition following deregulation played a significant role when corporate governance mechanisms were not well developed. We find similar results for UK firms after the implementation of the Cadbury Committee recommendations in 1992.

Our findings further our understanding on the effect of the interaction of product market competition and internal governance in firms; on the impact of SOX on the cross-section of firms; and on role of product market competition in aligning managerial incentives. Given the current regulatory environment, these relationships have important policy implications. As the current situation in the U.S. dictates, there is a de-facto separation between the regulatory bodies that govern the extent of competition (the Department of

Justice and the Federal Trade Commission) and those that govern alignment of incentives within corporations (the SEC and related regulatory bodies). The former is concerned with competition and non-monopolistic price behavior, while the latter is concerned with monitoring management behavior and the latter's behavior toward other claimholders, mainly investors.

The findings of this paper suggest that this separation is potentially inefficient. It posits an important interaction between product market competition and corporate governance, which implies that these features are inter-related and act as substitutes. It is valuable, and perhaps imperative, to take the extent of product market competition into account when devising and implementing corporate governance mechanisms.

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TABLE 1: SUMMARY STATISTICS

Panel A shows summary statistics for the full sample and panel B shows summary statistics of performance and efficiency ratios of firms across concentrated industries and non-concentrated industries. The sample consists of all Compustat firms in the years 2000-2006 that have the following data: Sales (Compustat Data #12), Assets (Compustat Data #6), Cost of Goods Sold (COGS) (Compustat Data #41) and Earnings before Interest, Taxes, Depreciation and Amortization (EBITDA) (Compustat Data #13). ROA is Data #13/Data #6. In addition, we require that ROA>-1. EBITDA/Sales is Data #13/Data #12. Industry concentration measures are taken from the Economic Census Bureau for the year 2002. The Economic Census Bureau provides one measure for manufacturing industries and another measure for non-manufacturing industries. For manufacturing industries, the industry concentration measure is the Herfindahl measure. For non-manufacturing industries the concentration measure is the market share (in terms of sales) of the largest 50 firms in the industry. Firms are classified as belonging to a Non-concentrated industry if their NAICS industry classification is at the bottom 50% across all industries that use the same concentration measure in the Economic Census Bureau. All variables are winsorized at the 1% and 99% levels.

Panel A: Summary statistics

	Mean	Median	StDev	5th Percentile	95th Percentile	N
Performance						
ROA	0.07	0.08	0.15	-0.20	0.26	38053
EBITDA/Sales	0.12	0.12	0.23	-0.30	0.45	38053
COGS/Sales	0.59	0.61	0.24	0.19	0.92	38053
Sales/Assets	1.00	0.82	0.86	0.06	2.72	38053
SGA/Sales	0.33	0.27	0.25	0.06	0.84	32968
Industry concentration						
Herfindahl Index	787	635	649	63	2059	15275
Sale Share (%)	65	68	21	22	93	22778
Controls						
Assets ($Million)	8156	363	60884	10	20520	38053
Sales ($ Million)	2550	200	10811	9	11242	38053
Age	13.5	9.0	12.3	1.0	39.0	38053

Panel B: Performance variables by year and industry concentration (average values)

	ROA			EBITDA/Sales			Sales/Assets			COGS/Sales			SGA/Sales		
Year	Non conc.	Conc.		Non conc.	Conc.		Non conc.	Conc.		Non conc.	Conc.		Non conc.	Conc.	
2000	0.077	0.056	***	0.067	0.114	***	1.282	0.875	***	0.656	0.601	***	0.31	0.341	***
	(0.004)	(0.003)		(0.005)	(0.003)		(0.018)	(0.013)		(0.005)	(0.004)		(0.006)	(0.004)	
2001	0.062	0.042	***	0.052	0.101	***	1.299	0.894	***	0.659	0.603	***	0.321	0.352	***
	(0.004)	(0.003)		(0.005)	(0.004)		(0.019)	(0.014)		(0.005)	(0.004)		(0.006)	(0.005)	
2002	0.069	0.046	***	0.062	0.122	***	1.284	0.888	***	0.654	0.575	***	0.313	0.357	***
	(0.004)	(0.003)		(0.005)	(0.004)		(0.019)	(0.014)		(0.005)	(0.004)		(0.006)	(0.005)	
2003	0.079	0.059	***	0.076	0.148	***	1.285	0.885	***	0.646	0.553	***	0.303	0.348	***
	(0.004)	(0.002)		(0.004)	(0.004)		(0.021)	(0.014)		(0.005)	(0.004)		(0.006)	(0.004)	
2004	0.095	0.071	***	0.095	0.162	***	1.248	0.88	***	0.637	0.547	***	0.293	0.338	***
	(0.004)	(0.002)		(0.005)	(0.004)		(0.021)	(0.014)		(0.005)	(0.004)		(0.006)	(0.004)	
2005	0.101	0.072	***	0.102	0.167	***	1.275	0.867	***	0.638	0.55	***	0.282	0.328	***
	(0.003)	(0.002)		(0.005)	(0.004)		(0.021)	(0.014)		(0.005)	(0.004)		(0.005)	(0.004)	
2006	0.093	0.072	***	0.100	0.158	***	1.247	0.855	***	0.629	0.563	***	0.292	0.322	***
	(0.004)	(0.002)		(0.005)	(0.004)		(0.021)	(0.014)		(0.005)	(0.004)		(0.006)	(0.004)	
All	0.081	0.056	***	0.078	0.114	***	1.276	0.875	***	0.646	0.601	***	0.303	0.341	***
	(0.001)	(0.001)		(0.002)	(0.001)		(0.008)	(0.005)		(0.002)	(0.002)		(0.002)	(0.002)	

TABLE 2: THE EFFECT OF SOX ACROSS CONCENTRATED AND NON-CONCENTRATED INDUSTRIES - PERFORMANCE AND EFFICIENCY

The table shows difference-in-differences panel regression results of changes in firm-level efficiency and performance in firms across concentrated and non-concentrated industries. The sample consists of 38,053 firm-year observations in the years 2000-2006. The dependent variables are as defined in Table 1. For a firm that belongs to manufacturing industries, CI (Concentration Index) equals 1 if the Herfindahl value of the industry that the firm belongs to is above median (among all manufacturing industries in the Economic Census Bureau database) and zero otherwise. For non-manufacturing industries, CI equals 1 if the market share of the largest 50 firms in the industry is above median (among all non-manufacturing industries) and zero otherwise. SOX equals 1 if the year is greater than 2002 and zero otherwise. Size is defined as the log of assets (Compustat data 6) Size squared is the squared value of log of total assets. Age is the log of the number of years that a firm exists in CRSP. Regression includes year and firm fixed effects. Standard errors are clustered by firm. *,**,*** are significance at the 10%, 5% and 1% levels for tests of differences between statistics in non-concentrated and concentrated industries.

	log(1+ROA)		Log(1+Sales/Assets)		Log(1+EBITDA/Sales)		Log(1+COGS/Sales)		Log(1+SGA/Sales)	
	(1)		(2)		(3)		(4)		(5)	
CI*SOX	0.0143	***	-0.0063		0.0138	**	-0.0189	***	0.0081	***
	(0.004)		(0.004)		(0.006)		(0.002)		(0.002)	
Size	0.202	***	-0.2114	***	0.0732	***	-0.0031		-0.0444	***
	(0.018)		(0.010)		(0.017)		(0.005)		(0.006)	
Size-squared	-0.0141	***	0.0064	***	-0.0039	***	-0.0002		0.0024	***
	(0.001)		(0.001)		(0.001)		(0.000)		(0.000)	
Age	0.0117	**	0.0464	***	0.0746	***	-0.0061	**	-0.0195	***
	(0.005)		(0.004)		(0.010)		(0.002)		(0.003)	
Year Fixed Effects	+		+		+		+		+	
Firm Fixed Effects	+		+		+		+		+	
Clustererd Standard Errors	+		+		+		+		+	
N	38,053		38,053		38,053		38,053		32,968	
Adjusted R^2	0.56		0.93		0.59		0.83		0.87	

TABLE 3: THE EFFECT OF SOX ACROSS CONCENTRATED AND NON-CONCENTRATED INDUSTRIES – VARIATION WITHIN CONCENTRATED INDUSTRIES

The table shows difference-in-differences panel regression results of changes in firm-level efficiency and performance in firms across concentrated and non-concentrated industries. The dependent variable is Log(1+ROA), where ROA is as defined in Table 1. The regressions are similar to those in Table 2 except that there are additional interaction terms. In particular, there is an additional interaction term of SOX with an indicator variable of weak governance in concentrated industries. This variable is Earnings Management (column 1), firms with classified boards (column 2) and firms with low CGQ combined score (column 3). Earnings Management is defined as firms which have higher than median discretionary accruals in the sample as of 2002. We estimate level of discretionary accruals using the modified Jones model (Jones 1996). Classified Board is a dummy variable that takes a value 1 as of 2002 if the firm has a classified board and 0 otherwise. Low CGQ combined score is defined as firms with Earnings Management, Classified Board and below sample median Corporate Governance Quotient scores, as provided by Institutional Shareholder Services as of 2002. All regressions include firm and year fixed effects. Standard errors are clustered by firm. *,**,*** are significance at the 10%, 5% and 1% levels.

Dependent variable: Log(1+ROA)

	(1)		(2)		(3)	
CI×SOX×Earnings_Management	0.0313	**				
	(0.014)					
CI×SOX×Classified_Board			0.0008			
			(0.008)			
CI×SOX×CGQ Combined Score					0.0301	*
					(0.015)	
CI×SOX	0.0056		0.0133	*	0.0125	**
	(0.009)		(0.007)		(0.006)	
SOX×Earnings_Management	0.0094					
	(0.010)					
SOX×Classified_Board			0.0053			
			(0.007)			
SOX×CGQ Combined Score					-0.0007	
					(0.010)	
Size	0.2476	***	0.2246	***	0.3092	***
	(0.036)		(0.034)		(0.064)	
Size-squared	-0.0168	***	-0.0142	***	-0.0200	***
	(0.002)		(0.002)		(0.004)	
Age	0.0377	***	0.0181	**	0.035	***
	(0.011)		(0.007)		(0.010)	
Year Fixed Effects	+		+		+	
Firm Fixed Effects	+		+		+	
Clustered Standard Errors	+		+		+	
N	12,595		14,363		7,554	
Adjusted R^2	0.56		0.64		0.59	

TABLE 4: THE EFFECT OF SOX ACROSS CONCENTRATED AND NON-CONCENTRATED INDUSTRIES ON INVESTMENT DECISIONS

The table shows difference-in-differences panel regression results of changes in Capital expenditure (Compustat data 128) and R&D expenses (Compustat data 46) in firms across concentrated and non-concentrated industries. The variables are winsorized at the 1% and 99% level. The sample consists of 38,053 firm-year observations in the years 2000-2006. The For a firm that belongs to manufacturing industries, CI (Concentration Index) equals 1 if the Herfindahl value of the industry that the firm belongs to is above median (among all manufacturing industries in the Economic Census Bureau database) and zero otherwise. For non-manufacturing industries, CI equals 1 if the market share of the largest 50 firms in the industry is above median (among all non-manufacturing industries) and zero otherwise. SOX equals 1 if the year is greater than 2002 and zero otherwise. Size is defined as the log of assets (Compustat data 6) Size squared is the squared value of log of total assets. Age is the log of the number of years that a firm exists in CRSP. Regression includes firm fixed effects. Standard errors are clustered by firm. *,**,*** are significance at the 10%, 5% and 1% levels for tests of differences between statistics in non-concentrated and concentrated industries.

Panel A: Average capital expenditure and R&D expenses across the years

Year	Log(1+Capx/Assets)		Log(1+R&D/Assets)		Log(1+R&D/Assets) 0's imputed for missing R&D		Propensity to innovate=1 if R&D >0 and 0 otherwise. 0's imputed for missing R&D	
	Non Conc	Conc	Non Conc	Conc	Non Conc	Conc	Non Conc	Conc
2000	0.0517	0.0525	0.0457	0.0788	0.0257	0.0444	40.9%	47.5%
2001	0.0449	0.0488	0.0504	0.0852	0.0288	0.0476	42.5%	47.4%
2002	0.0382	0.0407	0.0484	0.0877	0.0281	0.0496	43.3%	48.4%
2003	0.0369	0.0359	0.0467	0.0826	0.0276	0.0468	44.2%	48.2%
2004	0.0391	0.0321	0.0437	0.0759	0.0265	0.0356	45.6%	40.4%
2005	0.0415	0.0339	0.0425	0.0376	0.0259	0.0346	45.3%	40.2%
2006	0.0422	0.0356	0.0434	0.0367	0.0268	0.0338	46.4%	39.6%

Panel B: Regression results

	Log(1+Capx/Assets)		Log(1+R&D/Assets)		Log(1+R&D/Assets) 0's imputed for missing R&D Tobit		Propensity to innovate=1 if R&D >0 and 0 otherwise. 0's imputed for missing R&D Probit	
	(1)		(2)		(3)		(4)	
CI×SOX	-0.0018	*	-0.0033	**	-0.0024		-0.0168	*
	(0.0009)		(0.0014)		(0.0018)		(0.0095)	
Size	0.0033	**	-0.0576	***	-0.0503	***	0.0107	***
	(0.0016)		(0.0043)		(0.0044)		(0.0026)	
Size –squared	-0.00029	**	0.0025	**	0.0016	***	0.0003	
	(0.0001)		(0.0003)		(0.0003)		(0.0002)	
Age	-0.0011		0.0014	***	0.0035	***	0.0401	**
	(0.0027)		(0.0003)		(0.0005)		(0.0146)	
Year Fixed Effects	+		+		+		+	
Firm Fixed Effects	+		+		+		+	
Clustered Standard Errors	+		+		+		+	
N	34,716		19,049		34,716		34,716	
Adjusted R^2	0.63		0.87					

TABLE 5: THE EFFECT OF SOX ACROSS CONCENTRATED AND NON-CONCENTRATED INDUSTRIES – INVESTMENT PRICE SENSITIVITY

The table shows difference-in-difference regressions of change in investment price sensitivity across concentrated and non-concentrated industries. Investment is measured as change in assets scaled by beginning-of-year assets. (Change in Assets) and capital expenditure plus R&D scaled by beginning of year assets. (Capital expenditure & R&D). Q is Tobins Q at (t-1) where Tobin's Q is (assets+(closing price*shares outstanding)-Common equity)/assets. Inverse asset is 1/assets; Cash flow is (income before extraordinary items+ R&D +Depreciation)/Assets and Returns is cumulative monthly returns over the last three years less the market return. For a firm that belongs to manufacturing industries, CI (Concentration Index) equals 1 if the Herfindahl value of the industry that the firm belongs to is above median (among all manufacturing industries in the Economic Census Bureau database) and zero otherwise. For non-manufacturing industries, CI equals 1 if the market share of the largest 50 firms in the industry is above median (among all non-manufacturing industries) and zero otherwise. SOX equals 1 if the year is greater than 2002 and zero otherwise. *,**,*** are significance at the 10%, 5% and 1% levels.

	Capital Expenditure and R&D Expenses		Change in Assets	
	(1)		(2)	
$Q_{i,t-1}$×CI	0.0183	***	0.0988	***
	[0.000]		[0.002]	
$Q_{i,t-1}$×SOX×CI	0.0019	**	0.0216	***
	[0.001]		[0.003]	
$Q_{i,t-1}$× (1-CI)	0.014	***	0.0637	***
	[0.001]		[0.004]	
$Q_{i,t-1}$×SOX× (1-CI)	-0.0062	***	0.0401	***
	[0.001]		[0.006]	
SOX×CI	-0.0073	*	-0.0019	
	[0.004]		[0.019]	
Inverse Asset	1.6058	***	9.3999	***
	[0.039]		[0.196]	
Cash Flow	0.0134	***	0.558	***
	[0.004]		[0.022]	
Return	-0.0019	***	-0.0269	***
	[0.000]		[0.002]	
Year Fixed Effects	+		+	
Firm Fixed Effects	+		+	
N	22,163		24,543	
Adjusted R^2	0.742		0.340	

TABLE 6: THE EFFECT OF SOX ACROSS CONCENTRATED AND NON-CONCENTRATED INDUSTRIES – ANNOUNCEMENT RETURNS TO ACQUIRING FIRMS

The dependent variable is the cumulative abnormal return associated with the announcement of a merger or an acquisition. The sample is from the SDC database and it consists of all acquisitions between the years 1999-2006, where the target size is $1 million or larger and the acquirer status is public. Shares percentage held by the acquirer in the target before the acquisition is less than 50% and 100% afterwards. The window for calculating the abnormal return is two days before the announcement untill two days after the announcement – a total of 5 days. The abnormal returns are calculated based on a market model relative to the value-weighted NYSE, NASDAQ, and AMEX index. Estimation window is 210 days before the event until 10 days before the event. The regression specification follows Masulis, Wang, and Xie (2007). Size is the natural log of assets; Tobins Q is (assets+(closing price*shares outstanding)-Common equity)/assets ; Leverage is (long term debt +short term debt)/assets; Free cash flow is (Operating Income Before Depreciation-Income taxes-Interest Expenses-Capital expenditure)/assets and price run-up is the cumulative acquirer returns less the market return in the (-210 , -11) window before the merger. CI (Concentration Index) equals 1 if the Herfindahl value of the industry that the firm belongs to is above median (among all manufacturing industries in the Economic Census Bureau database) and zero otherwise. For non-manufacturing industries, CI equals 1 if the market share of the largest 50 firms in the industry is above median (among all non-manufacturing industries) and zero otherwise. SOX equals 1 if the year is greater than 2002 and zero otherwise. *,**,*** are significance at the 10%, 5% and 1% levels.

Dependent Variable: Announcement Abnormal Returns

	(1)		(2)		(3)	
CI×SOX	0.3397					
	(0.609)					
CI×Year>2003			0.604			
			(0.518)			
CI×Year>2004					0.8435	*
					(0.480)	
CI	-0.3118		-0.3922		-0.3857	
	(0.551)		(0.462)		(0.390)	
Tobin's Q	-0.2918	***	-0.2913	***	-0.2917	***
	(0.069)		(0.069)		(0.069)	
Leverage	1.2847		1.2856		1.2852	
	(0.950)		(0.953)		(0.953)	
Price Run-Up	-1.184	***	-1.1819	***	-1.1821	***
	(0.354)		(0.354)		(0.354)	
Log(Assets)	-0.4958	***	-0.4952	***	-0.4956	***
	(0.072)		(0.072)		(0.072)	
Hi-Tech Industry×Relative Price Deal	0.0062		0.0062		0.0063	
	(0.013)		(0.013)		(0.013)	
Public Target×Cash Deal	-0.2112		-0.2162		-0.2234	
	(0.383)		(0.383)		(0.384)	
Public Target×Stock Deal	-3.9911	***	-3.9923	***	-3.9901	***
	(0.411)		(0.411)		(0.411)	
Private Target×Cash Deal	-0.357		-0.3647		-0.369	
	(0.302)		(0.301)		(0.301)	
Private Target×Stock Deal	1.288	***	1.2845	***	1.2818	***
	(0.450)		(0.449)		(0.450)	
Industry M&A	-18.5567		-17.09		-16.2009	
	(121.555)		(120.850)		(120.644)	
Diversifying Acquisition	-0.3397		-0.3363		-0.3335	
	(0.265)		(0.265)		(0.265)	
Year Fixed Effects	+		+		+	
Observations	6,643		6,643		6,643	
Adjusted R-squared	0.042		0.042		0.042	

TABLE 7: THE EFFECT OF CADBURY COMMITTEE REPORT ACROSS CONCENTRATED AND NON-CONCENTRATED INDUSTRIES - PERFORMANCE AND EFFICIENCY

The table shows summary statistics of performance and efficiency ratios of firms in our sample over the time period 1988-1995. The sample consists of UK firms in Worldscope that have data on: Sales, Assets, Administrative Expenses, Cost of Goods Sold, and Earnings before interest, taxes, Depreciation and Amortization (EBITDA). ROA is defined as EBITDA/Assets. In addition, we require that ROA>-1. Industry concentration measures are created based on sales data in Worldscope for UK firms. The measure of concentration is a Herfindahl index based on the FTAG 4 industry classification defined for the year 1992. We compute a Herfindahl index for each industry based on sales. *,**,*** are significance at the 10%, 5% and 1% levels for tests of differences between statistics in non-concentrated and concentrated industries.

	Log(1+ROA)		Log(1+Sales/Assets)		Log(1+EBITDA/Sales)		Log(1+COGS/Sales)		Log(1+SGA/sales)		Log(1+Capex/Assets)
	(1)		(2)		(3)		(4)		(5)		(6)
CI× Year>1992	0.0344	**	0.0460	*	0.0538	*	0.0135		-0.0434	***	0.0219
	(0.0160)		(0.0236)		(0.0318)		(0.0476)		(0.0143)		(0.015)
Size	0.0901	***	0.0750		0.1101		-0.2351	**	-0.1273	***	-0.0174
	(0.0292)		(0.0624)		(0.0721)		(0.1090)		(0.0342)		(0.029)
Size–squared	-0.0030	**	-0.0068	**	-0.0027		0.0060		0.0046	***	-0.0013
	(0.0013)		(0.0028)		(0.0031)		(0.0049)		(0.0015)		(0.001)
Year Fixed Effects	+		+		+		+		+		+
Firm Fixed Effects	+		+		+		+		+		+
Clustered Standard Errors	+		+		+		+		+		+
N	10,019		10,019		10,019		8,839		7,591		9,214
Adjusted R^2	0.460		0.898		0.440		0.373		0.838		0.421

TABLE 8: THE EFFECT OF UTILITY DEREGULATION ON EFFICIENCY OF UTILITY COMPANIES

This table shows the difference –in –difference regressions results state electricity deregulation following EPA Act of 1992 on performance of firms with poor corporate governance in the electricity sector (SIC codes : 4900-4999).The sample period is 1990-2002. The deregulation dummy takes a value 1 in the year that a state deregulated and all years after that and 0 otherwise. Performance is measured as log (1+ROA). Earnings Management is a dummy variable that equals one if a firm has discretionary accruals above sample median and zero otherwise. Discretionary accruals are computed using the modified Jones (1996) method. Size is the natural log of assets (Compustat data 6). Size squared is the squared value of log of total assets. Age is the log of the number of years that a firm exists in CRSP. Regression include year and firm fixed effects. Standard errors are clustered by firm. *,**,*** are significance at the 10%, 5% and 1% levels for tests of differences between statistics in deregulated and regulated states.

Dependent variable: log (1+ROA)

Deregulation	0.0007	
	(0.002)	
Earnings Management	0.0010	
	(0.001)	
Deregulation*Earnings Management	0.0055	*
	(0.003)	
Size	-0.0407	***
	(0.015)	
Size - squared	0.0004	
	(0.001)	
Age	0.0243	
	(0.015)	
Firm Fixed Effects	+	
Year Fixed Effects	+	
Clustered Standard Errors	+	
Observations	1,231	
R^2	0.304	

TABLE 9: PLACEBO TEST – EFFICIENCY ACROSS CONCENTRATED AND NON CONCENTRATED INDUSTRIES AROUND ECONOMIC RECESSIONS

The table shows difference-in-differences panel regression results of changes in firm-level efficiency and performance in firms across concentrated and non-concentrated industries around economic recessions in the US between 1976 and 2006. The source for recession years is from the NBER website. The sample consists of 168,372 firm-year observations. The dependent variable is Log (1+ROA). For a firm that belongs to manufacturing industries, CI index is dummy variable if the Herfindahl index is above the sample median defined each year. The Herfindahl index is created every year based of the 3 digit SIC codes using sales from the COMPUSTAT database. Size is the log of assets (Compustat data 6) . Size squared is the squared value of log of total assets. Age is the log of the number of years that a firm exists in CRSP. Regression includes year and firm fixed effects. Standard errors are clustered by firm. *,**,*** are significance at the 10%, 5% and 1% levels for tests of differences between statistics in non-concentrated and concentrated industries.

Dependent Variable : Log(1+ROA)

	1976-2006		1976-1995	
CI ×recession year	0.0023		0.001	
	(0.002)		(0.002)	
Size	0.0659	***	0.0531	***
	(0.004)		(0.005)	
Size –squared	-0.0039	***	-0.0036	***
	0.000		(0.000)	
Age	-0.0308	***	-0.0309	***
	(0.002)		(0.003)	
Firm Fixed Effects	+		+	
Year Fixed Effects	+		+	
Clustered Standard Errors	+		+	
N	168,372		102,765	
Adjusted R^2	0.42		0.42	

TABLE 10: ROBUSTNESS - CONTROLING FOR SECTOR SHOCKS

The table shows difference-in-differences panel regression results of changes in firm-level efficiency and performance in firms across concentrated and non-concentrated industries after controlling for sector shocks. Sectors are defined as the Fama-French 48 industries. The sample consists of 38053 firm-year observations across the years 2000-2006. The dependent variables are as defined in Table 1. For a firm that belongs to manufacturing industries, CI (Concentration Index) equals 1 if the Herfindahl value of the industry that the firm belongs to is above median (among all manufacturing industries in the Economic Census Bureau database) and zero otherwise. For non-manufacturing industries, CI equals 1 if the market share of the largest 50 firms in the industry is above median (among all non-manufacturing industries) and zero otherwise. SOX equals 1 if the year is greater than 2002 and zero otherwise. Size is defined as the log of assets (Compustat data 6) . Size squared is the squared value of log of total assets. Age is the log of the number of years that a firm exists in CRSP. Regression includes year and firm fixed effects. Standard errors are clustered by firm. *,**,*** are significance at the 10%, 5% and 1% levels for tests of differences between statistics in non-concentrated and concentrated industries.

	log(1+ROA)		Log(1+Sales/Assets)		Log(1+EBITDA/Sales)		Log(1+COGS/Sales)		Log(1+SGA/Sales)	
CI*SOX	0.0168	***	-0.0033		0.0206	***	-0.0043	**	-0.0053	***
	(0.006)		(0.005)		(0.007)		(0.002)		(0.002)	
Size	0.2022	***	-0.2135	***	0.0677	***	-0.0026		-0.0401	***
	(0.018)		(0.010)		(0.017)		(0.005)		(0.006)	
Size-squared	-0.0141	***	0.0063	***	-0.0031	**	0.0002		0.0015	***
	(0.001)		(0.001)		(0.001)		(0.000)		(0.000)	
Age	0.0059		0.0502	***	0.0596	***	0.0003		-0.0176	***
	(0.005)		(0.005)		(0.010)		(0.002)		(0.003)	
Industry Year Fixed Effects	+		+		+		+		+	
Firm Fixed Effects	+		+		+		+		+	
Clustered Standard Errors	+		+		+		+		+	
N	38,053		38,053		38,053		38,053		32,968	
Adjusted R^2	0.56		0.93		0.59		0.85		0.88	

TABLE 11: ROBUSTNESS – YEAR-BY-YEAR EFFECTS

The table shows difference-in-differences panel regression results of changes in firm-level efficiency and performance in firms across concentrated and non-concentrated industries with interactions of year dummies with the concentration variable. The sample consists of 38,053 firm-year observations across the years 2000-2006. The dependent variables are as defined in Table 1. For a firm that belongs to manufacturing industries, CI (Concentration Index) equals 1 if the Herfindahl value of the industry that the firm belongs to is above median (among all manufacturing industries in the Economic Census Bureau database) and zero otherwise. For non-manufacturing industries, CI equals 1 if the market share of the largest 50 firms in the industry is above median (among all non-manufacturing industries) and zero otherwise. Size is defined as the log of assets (Compustat data 6) . Size squared is the squared value of log of total assets. Age is the log of the number of years that a firm exists in CRSP. Regression includes year and firm fixed effects. Standard errors are clustered by firm. *,**,*** are significance at the 10%, 5% and 1% levels for tests of differences between statistics in non-concentrated and concentrated industries.

Dependent variable:	Log(1+ROA)		Log(1+Sales/Assets)		Log(1+EBITDA /Sales)	
CI×2001	0.0018		0.0029		-0.0047	
	(0.006)		(0.004)		(0.010)	
CI×2002	0.0006		-0.0002		0.0054	
	(0.007)		(0.005)		(0.010)	
CI×2003	0.0121	*	-0.0003		0.021	**
	(0.007)		(0.005)		(0.011)	
CI×2004	0.0142	*	-0.0001		0.0158	
	(0.007)		(0.006)		(0.010)	
CI×2005	0.0152	**	-0.0109	*	0.0177	*
	(0.007)		(0.006)		(0.011)	
CI×2006	0.0208	***	-0.0135	**	-0.0018	
	(0.007)		(0.006)		(0.011)	
Size	0.2024	***	-0.2119	***	0.0724	***
	(0.018)		(0.010)		(0.017)	
Size -squared	-0.0141	***	0.0064	***	-0.0038	***
	(0.001)		(0.001)		(0.001)	
Age	0.0116	**	0.0466	***	0.0748	***
	(0.005)		(0.004)		(0.010)	
Year Fixed Effects	+		+		+	
Firm Fixed Effects	+		+		+	
Clustered Standard Errors	+		+		+	
N	38,053		38,053		38,053	
Adjusted R^2	0.55		0.932		0.588	

TABLE 12: ROBUSTNESS - CONTROLLING FOR CHANGES IN INDUSTRY STRUCTURE AFTER SOX

The table shows difference-in-differences panel regression results of changes in firm-level efficiency and performance in firms across concentrated and non-concentrated industries. For each industry in Compustat, concentration measures were taken from the Economic Census Bureau in the years 2002 and 2007. For manufacturing industries the concentration measure is the Herfindahl index and for non-manufacturing industries the measure is the market share of the largest 50 firms in the industry (in terms of sales). Industries whose concentration measure changed significantly between these two periods (absolute percentage change is at the 10% tail of the distribution of industries with the same concentration measure) were taken out of the sample. The final sample consists of 36193 firm year observations. The dependent variables are as defined in Table 1. For a firm that belongs to manufacturing industries, CI (Concentration Index) equals 1 if the Herfindahl value of the industry that the firm belongs to is above median (among all manufacturing industries in the Economic Census Bureau database) and zero otherwise. For non-manufacturing industries, CI equals 1 if the market share of the largest 50 firms in the industry is above median (among all non-manufacturing industries) and zero otherwise. SOX equals 1 if the year is greater than 2002 and zero otherwise. Size is defined as the log of assets (Compustat data 6). Size squared is the squared value of log of total assets. Age is the log of the number of years that a firm exists in CRSP. Regression includes year and firm fixed effects. Standard errors are clustered by firm. *,**,*** are significance at the 10%, 5% and 1% levels for tests of differences between statistics in non-concentrated and concentrated industries.

	Log(1+ROA)		Log(1+Sales/Assets)		Log(1+EBITDA /Sales)		Log(1+COGS/Sales)		Log(1+SGA/sales)	
CI×SOX	0.0149	***	-0.0034		0.0175	**	-0.0194	***	0.0075	***
	(0.0048)		(0.0042)		(0.0070)		(0.0020)		(0.0024)	
Size	0.2030	***	-0.2105	***	0.0727	***	-0.0041		-0.0438	***
	(0.0185)		(0.0105)		(0.0174)		(0.0054)		(0.0059)	
Size -squared	-0.0143	***	0.0064	***	-0.0039	***	-0.0001		0.0023	***
	(0.0013)		(0.0008)		(0.0013)		(0.0004)		(0.0005)	
Age	0.0053	***	0.0136	***	0.0046		0.0017		-0.0061	***
	(0.0011)		(0.0045)		(0.0065)		(0.0068)		(0.0019)	
Year Fixed Effects	+		+		+		+		+	
Firm Fixed Effects	+		+		+		+		+	
Clustered Standard Errors	+		+		+		+		+	
N	36,193		36,193		36,193		36,193		31,382	
Adjusted R^2	0.55		0.93		0.59		0.87		0.9	