JEL Classification: *D*4, *G*30
Keywords: corporate governance, competition, product market, fluidity, substitution, profitability

Corporate Governance Quality and a Firm's Adaptation to Competitive Threats*

JAN KURZEJA – Institute of Economic Studies at the Faculty of Social Sciences, Charles University in Prague (jankurzeja22@gmail.com)

JIRI NOVAK - Institute of Economic Studies at the Faculty of Social Sciences, Charles University in Prague (jiri.novak@fsv.cuni.cz)

Abstract
This paper shows that regulatory improvements of corporate governance quality mandated by the Sarbanes-Oxley Act (SOX) are associated with a better ability of firms to adapt to product-market competitive threats. We contribute to prior research by using a novel approach of capturing the dynamic forward-looking aspect of competitive intensity based on linguistic comparison of firms' product descriptions in 10-K filings. Our measure of competitive intensity – the product market fluidity – captures the increase in verbal similarity of rival firms' product descriptions. Mandated changes to corporate governance are associated with lower future operating profitability and the profitability reductions are more pronounced in firms that experience lower competitive pressure before SOX implementation. However, firms facing competitive threats experience smaller declines in operating performance in the post-SOX period, which suggests that the improved corporate governance mechanisms make firms better able to accommodate competitive pressure. Using a novel approach to capture the dynamic aspect of competitive intensity the paper provides a new perspective on the 'substitution' hypothesis between corporate governance and product market competition.

1. Introduction

Corporate governance mechanisms aim at ensuring that a firm's management, who typically hold only a limited equity stake in the company (Ofek and Yermack 2000; Florackis, Kanas, and Kostakis 2015), make decisions that maximize shareholder value rather than their own welfare. Companies have considerable discretion in structuring the relationship between individual stakeholders. Nevertheless, some corporate governance mechanisms are mandated by the regulators and they must be adopted by all firm subject to regulation. Regulatory interventions may help firm owners overcome managerial entrenchment or coordination problems. However, as the agency problem may be more severe in some firms than in others one-size-fits-all regulatory requirements may not be optimal for every firm. Firms where the inherent agency conflict between owners and managers is less severe may find corporate governance mechanisms imposed by regulation too costly. In this paper we

* We gratefully acknowledge financial support from Deloitte, the Czech Science Foundation, grant number 15-13040S, and the People Program (Marie Curie Actions) of the European Union's Seventh Framework Program FP7/2007-2013/ under REA grant agreement number 609642.

investigate how external economic forces that exert competitive pressure on firms affect desirability of mandatory improvements in corporate governance mechanisms.

The Sarbanes-Oxley Act (SOX) that was passed by the U.S. Congress in 2002 significantly enhanced corporate governance requirements for firms listed in the U. S. The bill followed a series of major financial reporting scandals including those in WorldCom that was investigated by the Security and Exchange Commission (S.E.C.) since April 1999, Enron investigated since October 2001, Tyco that came under S.E.C. scrutiny in January 2002. The bill was passed by the House in April 2002. Soon after that it was it was approved by the Senate in June 2002 and signed into law by the President in July 2002. The expedite enactment of the law was motivated by the premise that improvements in corporate governance are needed to prevent accounting fraud from re-occurring in the future. SOX has a rather broad jurisdiction. All firm that have their equity listed at one of the main U.S. stock exchanges as well as dually listed foreign firms with 500 or more US-based shareholders must comply with the law.

SOX contains eleven titles related to different aspects of corporate governance including tighter oversight of auditors, stricter requirements for auditor independence, stronger provisions preventing conflicts of interest of security analysts, financial advisors, brokers and dealers, enhanced requirements for the internal control mechanisms related to the financial reporting processes, as well as criminal accountability of top executives for the financial reporting fraud. See Coates (2007) for further background and institutional details. Prior research shows that SOX indeed improved overall corporate governance quality (Iliev 2010; Brochet 2010; DeFond and Lennox 2011; Cohen, Dey, and Lys 2008). At the same time, there is ample evidence on the significant compliance costs (Engel, Hayes, and Wang 2007; Zhang 2007; Linck, Netter, and Yang 2009; Iliev 2010). In fact, that some firms seem to have found SOX compliance so expensive that they decided to delist from U.S. stock markets. This suggest that not all firms find externally-imposed corporate governance improvements cost-effective.

In this paper we extend prior research on the 'substitution' hypothesis between corporate governance and product market competition by investigating how disciplining forces of competition affect the costs and benefits of policy-imposed improvements in corporate governance. Prior research suggests that product market competition can substitute for formal corporate governance mechanisms by endangering managers' survival and increasing their incentives to make effort. Lack of competition tends to be associated with lower managerial effort and *ceteris paribus* inferior firm performance. Hicks (1935) remarks that "the best of all monopoly profits is a quiet life" (p. 8). Hart (1983) and Hermalin (1992) argue that competition minimizes corporate slack and it result in overall increase of efficiency. Vickers (1995) concludes that while the dominating firm benefits from weak competition the overall welfare of all market participants decreases as competition weakens. If competitive pressure aligns managerial and owners' interests it reduces the need to monitor the management and hence *ceteris paribus* it limits the benefits of corporate governance improvements required by regulation.

Prior research on the relationship between product market competition and corporate governance typically uses industry concentration measured by the Herfindahl-Hirschman Index (HHI) as an inverse proxy for competitive intensity (Giroud and Mueller 2010, 2011; Chhaochharia et al. 2012). It is commonly argued

that firms in concentrated industries enjoy greater market power, which insulates them from the disciplining pressure of competition and increases the importance of formal corporate governance mechanisms. However, Berger (2014) argues that industry concentration is a problematic proxy of competitive intensity. Computation of HHI depends on industry definition that is inherently subjective. Past research suggests that the correlation between concentration indices computed using different industry definitions (e.g. SIC, NAICS, GICS) is rather low, which suggests that the measures are noisy (Bhojraj, Lee, and Oler 2003; Krishnan and Press 2003; Ali, Klasa, and Yeung 2009; Hrazdil and Zhang 2012). Furthermore, Berger (2014) argues that even conceptually industry concentration is unlikely to capture competitive intensity well. There are numerous industries that are highly concentrated but still intensively competitive, e.g. large passenger aircraft market dominated by Airbus and Boeing, medium passenger aircraft market dominated by Bombardier and Embraer, home furniture market dominated by IKEA and Target, etc.

In this paper we contribute to the literature on the relationship between competition and corporate governance by using a novel approach of estimating the dynamic aspect of competitive intensity that should be particularly relevant for managerial incentives and for the design of optimal corporate governance mechanisms. We use a newly developed measure of product market fluidity (Hoberg, Phillips, and Prabhala 2014) that reflects the extent to which completive threats by a firm's rivals increase competitive pressure on the firm. The measure is based on textual comparison on product descriptions in a firm's 10-K filings. It captures an increase in verbal similarity of rival firms' product descriptions relative to the firm's own product description. Product market fluidity has a number of advantages relative to the conventional measures of competitive intensity. It directly captures the dynamic aspect of competitive intensity, it is forward looking, it is independent of static industry definitions, and as it is mostly determined by competitors' moves towards the firm's product space, which alleviates the endogeneity concerns. By construction product market fluidity directly captures the competitive pressure a firm face. Higher external validity of the measure allows for drawing stronger inferences enhancing the contribution of our paper.

This paper provides evidence that the cost-benefit trade-off of regulatory interventions to the quality of corporate governance is affected by the intensity of competitive threats a firm faces in its product markets. We show that on average firms' operating profitability declines following the implementation of SOX. However, the decline is less pronounced for firms that experience greater competitive threats in the years preceding SOX. This suggests that a firm's long-term exposure to competitive threats makes it less costly to introduce more demanding corporate governance mechanisms. Furthermore, we provide evidence that the policy-imposed orporate governance improvements condition a firm's ability to handle impending competitive threats. In particular, recent competitive threats have a less negative effect on current operating profitability in the post-SOX period when the firms are subject to more demanding corporate governance requirements. This suggests that better corporate governance mechanisms improve a firm's ability to shield its current operating profitability form the effect of competitive pressure.

The paper contributes to the literature on the interaction between corporate governance and product market competition. Past research mostly measures

discretionary corporate governance quality, e.g. G-Index, and it shows that firms that *choose* to have higher corporate governance quality experience lower competition induced operating profitability improvements (e.g. Giroud and Mueller 2011). Alternatively, past research uses industry concentration as an inverse proxy for competitive intensity and it shows that exogenous shocks to corporate governance quality matter less for operating performance in more dispersed industries where firms are disciplined by competitive forces (e.g. Giroud and Mueller 2010; Chhaochharia et al. 2012). We use a novel approach in capturing the dynamic (rather than static) aspect of competition and we show that long-term exposure to intensive competition competitive threats makes it less costly for firms to implement externally-mandated corporate governance improvements, and these improvements make firms better able to adapt to impending competitive threats in the future. Our results thus provide a new perspective on the 'substitution' hypothesis between corporate governance and product market competition.

The remainder of the paper is organized as follows. In section 2 we review literature on competition and corporate governance and we formulate our hypotheses. In section 3 we discuss our research design. We discuss our results in section 4 and section 5 concludes.

2. Literature and Hypotheses

2.1. Corporate Governance

The separation between ownership and control in public companies leads to an agency problem as managers with limited equity stake in the firm do not fully internalize the benefits of their effort and hence they have incentives to shirk and to pursue their own welfare (Jensen 1986). Already Smith (1776) recognizes that "The directors of such [joint-stock] companies, however, being the managers rather of other people's money than of their own, it cannot well be expected, that they should watch over it with the same anxious vigilance with which the partners in a private company frequently watch over their own.... Negligence and profusion, therefore, must always prevail, more or less, in the management of the affairs of such a company." Ofek and Yermack (2000) report that in the United States 90 percent of chief executive officers of large public firms own less than 5 percent of their company stocks. Florackis, Kanas, and Kostakis (2015) use a more recent sample of firms listed on NYSE, AMEX and NASDAQ and they report mean (median) ownership by all firm's managers and directors mentioned in its proxy statement of 15.4 percent (8.1 percent). This implies that a firm's executives benefit only from a fraction of value they generate through their management. Gillan (2006) argues that the split between ownership and control impacts not only on all directly involved stakeholders, but also on the entire economy.

To overcome the agency problem firms set up corporate governance mechanisms that incentivize and monitor the management (see Shleifer and Vishny 1997 for an overview). Using corporate governance mechanism is costly both in terms of the direct implementation costs, and also indirectly by potentially inducing sub-optimal managerial behavior. For example, granting executives stock options incentivizes them to make greater effort to enhance firm value, but it may also induce short-termistic decisions aimed at boosting upcoming quarterly earnings (Yermack 1995; Gopalan et al. 2014). Effectiveness of corporate governance depends on the

extent to which observable measures of firm performance reflect managerial effort and quality of their decisions (Core, Holthausen, and Larcker 1999). Failures of corporate governance mechanisms impair shareholder value and they may result in corporate scandals, including the extreme cases of Enron, WorldCom, Tyco, etc. (Agrawal and Chadha 2005).

Firm-level quality of corporate governance is determined by discretionary choices made by the firm as well as by mandatory economy-wide or industry-wide regulation. Firms have significant discretion in designing their corporate governance mechanism. It is thus plausible to expect that they rationally choose mechanism best suited for the context they operate in. Firm-level choices of corporate governance quality are thus likely to reflect optimal responses to the underlying economics. Sometimes, however, market regulators mandate corporate governance mechanisms that must be implemented regardless of whether they are cost-effective for individual firms. A typical example of the latter is SOX that was made into law in 2002 and imposed stricter corporate governance requirements and increased penalty for violation of corporate governance rules (Coates 2007).

Prior evidence suggests that SOX made corporate governance mechanisms more effective and it increased the disciplining pressure on firm management. Iliev (2010) concludes that SOX lead to greater conservatism in reporting earnings, Cohen, Dey, and Lys (2008) document lower accrual-based earnings management in post-SOX era, and DeFond and Lennox (2011) provide evidence that SOX improved audit quality. Brochet (2010) shows that SOX lowered the incidence of informed insider trading. At the same time, there is evidence that SOX required significant compliance costs that prompted some firms to leave U.S. stock markets to avoid incurring these costs (Engel, Hayes, and Wang 2007; Zhang 2007; Linck, Netter, and Yang 2009; Iliev 2010).

In this paper we investigate how more stringent corporate governance requirements resulting from a regulatory change affect a firm's ability to adapt to competitive threats. We argue that discretionary and regulatory changes in corporate governance quality are likely to have different implications for a firm's profitability. When deciding on the design of their corporate governance firms likely trade off the benefits and the cost of alternative measures and they adopt the most suitable mechanisms in their context. These choices are thus likely to enhance a firm's profitability. In contrast, changes mandated by regulation ignore firm-specific cost-benefit trade-offs. On average, they are likely to strengthen firms' corporate governance, however, for some firms their cost may outweigh the benefit. Provided that some portion of the compliance costs are be fixed, the trade-off may be particularly disadvantageous for smaller firms. Small firms outnumber large firms in the economy. Thus, on average, we expect the mandatory corporate governance changes to have a negative impact on firm profitability. We formalize this prediction in the following hypothesis.

Hypothesis 1: *On average, policy-imposed improvements in corporate governance are associated with lower future operating profitability.*

2.2. Product Market Competition

It is widely acknowledged that intensity of product market competition has numerous implications for a firm's economic environment affecting managerial incentives, firm profitability, and risk. It is intuitive to argue that competition incentivizes management and reduces slack. Shleifer and Vishny (1997) suggest that "product market competition is probably the most powerful force toward economic efficiency in the world" (p. 738). Nevertheless, past research shows that competition has at least two (opposite) effects on managerial incentives (Schmidt 1997; Raith 2003; Baggs and de Bettignies 2007). On one hand, competition increases the probability of a firm's liquidation, which incentivizes managers to make greater effort to fend of the risk of losing their job. On the other hand though, intensive competition depresses firms' profits, which lowers potential benefits of efficiency improvements and impairs managerial incentives. Hart (1983) shows that competition increases managerial incentives in a special case when there is a common cost component among competing firms and managers are infinitely risk averse. In a more general setting, Raith (2003) shows that intensive competition unambiguously leads to higher managerial effort when market structure is determined endogenously because falling profits make some firms exit the market, which lets the surviving firms produce larger output giving them greater incentive to reduce their costs.

Past research also documents how product market competition affects the structure of managers' compensation contracts (Karuna 2007; Baggs and de Bettignies 2007). Similarly to managers, owners face potential adverse effects of liquidation, which is more likely when competition is intensive. On the other hand, the risk of a job loss aligns managers' and owner's interests and so less compensation is needed to induce the desired level of incentives. Hermalin (1994) argues that theoretical predictions are ambiguous and strategic behavior may even lead to asymmetric equilibria when some firms prefer contracts that strongly incentivize managers and some do not. Empirical research concludes that competition makes owners seek managerial talent more aggressively (Baggs, Bettignies, and Ries 2013) and to tie their compensation more closely to performance (Cuñat and Guadalupe 2005, 2009a, 2009b). Furthermore, intensive competition is associated with and higher executive turnover (DeFond and Park 1999).

Past research suggests that intensive product market competition puts pressure on the management and it can therefore substitute for formal corporate governance mechanisms. Allen and Gale (1998) argue that in the U.S. setting two most important corporate governance mechanisms are (i) the board of directors, and (ii) the market for corporate control. Giroud and Mueller (2010) find that firms in concentrated industries (that are arguably less competitive) experience a significant drop in operating performance following a passage of business combination laws that weaken corporate governance by reducing hostile takeover threats. They further show that input costs, wages, and overhead costs all increase, which is consistent with the "quiet-life" hypothesis (Bertrand and Mullainathan 2003) suggesting that managers avoid cognitively difficult activities including tough price negotiations with suppliers, trade unions, and organizational units. In a similar vein, Giroud and Mueller (2011) show that in concentrated industries corporate governance quality measured by the G-Index (Gompers, Ishii, and Metrick 2003) is more strongly associated with stock returns,

operating profitability and lower firm value, which suggests that formal corporate governance is more important in less competitive industries. Similarly, in a recent working paper Chhaochharia et al. (2012) show that after the implementation of SOX firms in concentrated industries experienced greater improvements in operational efficiency resulting from a significant reduction in production and administrative costs.

In this paper we examine the dynamic aspect of competition, namely the competitive threats that a firm faces from its existing and potential rivals. We argue that the greater the threat the firm faces the more efficient it has to be. We expect the more efficient firms to be better able to accommodate corporate governance requirements mandated by regulatory policies. Therefore, we predict that firms facing competitive threats before the implementation of SOX find its implementation less costly and experience smaller declines in operating profitability.

Hypothesis 2: *Firms exposed to competitive threats in years preceding the regulatory shock to corporate governance experience a smaller decline in long-term operating profitability between the pre-event and post-event period.*

Impending competitive threats resulting from a firm's rivals moving into a firm's product space is likely to depress future firm profitability. Firms are likely to lose some of their market share to the incoming rivals. This implies that their fixed costs have to be spread to fewer units sold, which increases the per-unit production and selling costs. Furthermore, firms under a competitive pressure may also need to charge lower selling prices to retain some of their existing customers, which decreases their operating profit margin. In addition, the new rivals may also bid up the prices of raw materials needed for the production putting further pressure on a firm's operating profit margin. Taken together, all these tendencies suggest that intensified competition tends to depress a firm's future operating profitability.

Even though some firms may find the policy-imposed corporate governance mechanisms costly they benefit from the greater disciplining effect they induce. Since managers have discretion over how productive resources are utilized in the firm, they can conceivably make decisions that maximize their own welfare rather than the value to the shareholders. Self-interested managers may evade board oversight, pursue value-destroying acquisition, or enjoy a quiet life by underinvesting in complex projects, all of which harm firm profitability. Entrenched managers may also avoid efficiency improving takeovers. We propose that the managers' engagement in value-destroying activities is increasing in the misalignment of interest between owners and managers that is affected by the quality of a firm's corporate governance.

As long as policy-imposed improvements in corporate governance reduce the agency conflict between the owners and managers they should make firms more robust and better prepared for handling future challenges. Better corporate governance should imply less value destroying investment decisions that may be hard to abandon when competition intensifies. Furthermore, more effective corporate governance should induce greater effort in improving a firm's operating efficiency, which reduces financial slack increases a firm's ability to adapt to increased competitive pressure stemming from new competitive threats. We therefore expect firms to be better able to shield off their operating profitability from the impact impending competitive threats after the implementation of SOX that lead to corporate governance improvements that

made firms more fit to face competitive challenges. Following this line of reasoning we formulate our third hypothesis.

Hypothesis 3: *Recent competitive threats have a less negative impact on firms' current operating performance in the post-SOX period than in the pre-SOX period.*

3. Research Design

3.1. Empirical Models

We use three main model specifications to provide empirical support for the three hypotheses. The first specification related to Hypothesis 1 investigates whether firms on average experience lower operating profitability when regulatory requirements on corporate governance mechanisms are more stringent. We measure operating profitability by a firm's return on assets (*ROA*). Following Fairfield, Whisenant, and Yohn (2003) we define *ROA* as the operating income after depreciation normalized to twelve months divided by total assets. Operating income after depreciation captures a firm's operating income net of all operating expenses. At the same time, it is not affected by a firm's financing decisions as the interest expense resulting from using debt to finance the firm does not affect operating income. Total assets represent the resources employed to generate the operating income. *ROA* thus measures operating profitability per unit of capital invested and it is not affected by the composition nor the cost of a firm's financing.

$$ROA_{it} = \beta_0 + \beta_1 postSOX_{it} + \Sigma\beta_k Controls_{it-1} + \Sigma\beta_l IFE_{it} + \Sigma\beta_m YFE_t + \varepsilon_{it} \quad (1)$$

where ROA_{it} is the return on assets for firm *i* and year *t* defined as operating income after depreciation normalized for twelve months divided by total assets, $postSOX_{it}$ is an indicator variable equal to 1 for fiscal years in the estimation sample period window ending after August 2002, $Controls_{it}$ are control variables that we discuss below, IFE_{it} are the Fama and French (1997) industry fixed effects, and YFE_{it} are fiscal year fixed effects. We winsorize all continuous variables at top and bottom one per cent and we double cluster standard errors at the firm and year level (Petersen 2009). We provide a definition of all variables in Table 1. We expect the coefficient β_1 to be negative.

To empirically test Hypothesis 2 for every firm we compute time-series mean *ROA* over past five years and we take the difference of this measure after and before the implementation of SOX (*Diff 5y ROA*). We regress *Diff 5y ROA* on five year mean product market fluidity before the SOX implementation (*Mean 5y Fluidity*). We also perform a modification of our methodology where we replace *Mean 5y Fluidity* with an indicator variable equal to one when the measure is above its median and zero otherwise (*High 5y Fluidity*). As the test is performed in cross-section, we do not include year fixed effects. We winsorize all continuous variables at top and bottom one per cent and we cluster standard errors at the firm level. We test whether the coefficient β_1 is positive.

$$Diff\ 5y\ ROA_i = \beta_0 + \beta_1 Mean\ 5y\ Fluidity_i + \Sigma\beta_k Controls_i + \Sigma\beta_l IFE_i + \varepsilon_i \quad (2)$$

We use the following specification to test Hypothesis 3. We define use product market fluidity (*Fluidity*) as well as the control variables below. All continuous variables are winsorized at top and bottom one per cent and we double cluster standard errors at the firm and year level (Petersen 2009). We expect the negative impact on firms' profitability stemming from competitive threats to be less pronounced after the implementation of SOX and therefore we test whether the slope coefficient β_3 at the interaction term is positive.

$$ROA_{it} = \beta_0 + \beta_1 Fluidity_{it-1} + \beta_2 postSOX_{it} + \beta_3 Fluidity_{it-1} * postSOX_{it} + \Sigma\beta_k Controls_{it-1} + \Sigma\beta_l IFE_{it} + \Sigma\beta_m YFE_t + \varepsilon_{it} \quad (3)$$

3.2. Product Market Fluidity

We use product market fluidity (*Fluidity*) provided by Hoberg, Phillips, and Prabhala (2014) as the proxy for the intensity of competitive pressure a firm faces in its product markets. Fluidity captures an increase in verbal similarity of rival firms' product descriptions in 10-K filings relative to the firm's own product description. Product descriptions in 10-K filings are regulated disclosures following Regulation S-K under the U.S. Securities Act of 1933, which requires product descriptions to be representative and significant. Thus, vocabulary used in product descriptions should be characteristic of a firm's product portfolio.

To compute fluidity Hoberg, Phillips, and Prabhala (2014) first list all words used in product descriptions of all firms. Then for every firm and year they code a vector of zeros and ones indicating whether a given word is or is not used by the firm in their product description. For example, if the first seven words in the list are Telephone, Cellular, Digital, Analog, Internet, iPhone, and Android, a vector $W_{i,t}$ = [1, 1, 0, 1, 1, 0, 1] indicates that a firm *i* uses the words Telephone, Cellular, Analog, Internet, and Android and it does not use words Digital and iPhone. Then for every firm and year the authors compute a change vector as the difference between this year's vector and past year's vector. If the above company a year ago only used words Telephone, Cellular its last year's word vector is $W_{i,t-1}$ = [1, 1, 0, 0, 0, 0, 0] and hence its change vector is $C_{i,t}$ = [0, 0, 0, 1, 1, 0, 1] indicating that this year the firm is newly using words Analog, Internet, and Android.

Change vectors of all other firm in the economy are then aggregated by adding up their elements. A firm's *i* aggregate change vector $G_{i,t}$ = [0, 0, 0, 0, 2, 1, 1] indicates that there is no annual change in the way a firm's competitors use words Telephone, Cellular, Digital, and Analog, however, this year two more competitors newly use the word Internet and one competitor started using the word iPhone and one competitor newly mentions the word Android in its product description. The word vectors and the aggregate change vectors are then normalized to unit length by adding up the sum of squares of vector elements (equal to 6 for the aggregate change vector $G_{i,t}$ from the example above, 0 + 0 + 0 + 0 + 4 + 1 + 1 = 6) and multiplying each vector element by

the square root of one over the sum of squares of vector elements (equal to 0.408 for the aggregate change vector $G_{i,t}$ from the example above, $(1/6)^{0.5} = 0.408$). *Fluidity* is defined as the dot product of the normalized word vector for a firm and normalized aggregate change vector (in the example above $Fluidity_{i,t}$ = [0.447, 0.447, 0, 0.447, 0.447, 0, 0.447] · [0, 0, 0, 0, 0.816, 0.408, 0.408] = 0 + 0 + 0 + 0 + 0.365 + 0 + 0.183 = 0.548). *Fluidity* thus captures the cosine similarity between a firm's normalized word vector and its normalized aggregate change vector. In other words, *Fluidity* shows how much more similar the competitors' product descriptions have become over the past year relative to the firm's own product description. See Hoberg, Phillips, and Prabhala (2014) for more details on the construction of the measure[1]

Product market fluidity has a number of advantages relative to the conventional measures of competitive intensity. First, it is constructed with the intention to directly capture the arrival of competitive threats. Conventional variables measure competitive intensity only indirectly assuming a negative association between competitive intensity and industry concentration or between competitive intensity and profit margins. Past research shows that neither industry concentration (Berger 2014) nor profit margins (Boone 2008) capture intensified competition reliably. Second, the measure is forward looking and hence better suited for capturing competitive dynamics. The use of words in product descriptions likely reflects recent or perhaps even intended future moves of rivals into a firm's product space. Measures based on industry concentration assume industry structure that is expected to result from intensive competition in equilibrium. Fast changing industries may never reach a state that can reasonably well be approximated by equilibrium characteristics.

Third, the aggregate change vector comprises all 'other' firms in the sample and so computing *Fluidity* is independent of industry definition. Industries can be defined using several criteria and so any conventional industry classifications (e.g. SIC, NAICS, GIGS) are subject to judgment. Past research shows that the correlation between concentration measures using different industry definitions is quite low and so inferences made based on them may be sensitive to the way industries are defined

(Bhojraj, Lee, and Oler 2003; Krishnan and Press 2003; Ali, Klasa, and Yeung 2009; Hrazdil and Zhang 2012). Fourth, as *Fluidity* is chiefly determined by competitors' choice of language in describing their products and so the measure is less subject to conventional endogeneity concerns. It is not likely that managers choose their product description vocabulary so that they induce changes in competitors' product descriptions in a way that affects a firm's ability to adapt to competitive threats.

3.3. Control Variables

We use two sets of control variables that are likely to affect operating profitability but are unrelated to the quality of corporate governance and competition. In the first set we control for firm size measured as the natural logarithm of the market

[1] Median industry *Fluidity* is the highest in Pharmaceuticals, Communication, Coal, Healthcare, Oil and Gas, and Medical Equipment and it is the lowest in Beer and Liquor, Transportation, Consumer Goods, Food Products, Shipping Containers, and Textiles using Fama and French (1997) industry classification (not tabulated).

value of equity (*lnME*), relative market valuation measured as the natural logarithm of a firm's book-to-market equity ratio (*lnBE/ME*), past stock price development measured by the stock return including dividends in excess of the S&P 500 index over the past fiscal year (*ExRet*), and stock price volatility defined as the standard deviation of daily raw stock returns over the past fiscal year (*sdRet*). Furthermore, we modify the set of our control variables following Chhaochharia et al. (2012) and we use the natural logarithm of book value of total assets (*lnTotAss*) and its squared term (*lnTotAss2*) as alternative proxies for firm size. Table 1 provides definitions of all variables.

Table 1 Definition of Variables

Diff 5y ROA	The difference between 5-year time-series mean return on assets (*ROA*) after and before the implementation of SOX.
ExRet	Excess return over the past fiscal year defined as the raw return on the stock including dividends less the return on S&P 500 index ending at the fiscal year end.
ExROA	Industry-adjusted return on assets defined as a difference between a company's return on asset and median return on asset in a combination of Fama and French (1997) industry and year. Return on assets defined as operating income after depreciation normalized for 12 months in non-standard fiscal years divided by total assets.
Fluidity	Product market fluidity. The difference between a firm's vector of words used in its 10-K filing product description and the aggregate change in firm rivals' product description word vector. See Hoberg, Phillips, and Prabhala (2014) for more details.
High 5y Fluidity	Indicator variable equal to one when 5-year time-series mean product market fluidity before the SOX implementation (*Mean 5y Fluidity*) is above its median and zero otherwise.
lnBE/ME	Natural logarithm of a firm's book-to-market equity ratio at the past fiscal year end.
lnME	Firm size defined as the natural logarithm of the market value of equity at the fiscal year end.
lnTotAss	Firm size defined as the natural logarithm of book value of total assets at the fiscal year end.
lnTotAss2	Square term of firm size defined as squared natural logarithm of book value of total assets at the fiscal year end.
MA Score	The managerial ability score from Demerjian, Lev, and McVay (2012).
Mean 5y Fluidity	5-year time-series mean product market fluidity (Fluidity) before the SOX implementation.
postSOX	Indicator variable equal to 1 for fiscal years ending after August 2002 and zero otherwise. For some specifications we limit the estimation windows to 3 or 5 year before and after the implementation of SOX.
ROA	Operating profitability measured by return on assets (ROA) defined as operating income after depreciation normalized for twelve months divided by total assets.
SdRet	Volatility of a firm's stock return defined as the standard deviation of daily raw returns over the past fiscal year ending at the fiscal year end.

Notes: Definitions of variables used in the study. All continuous variables winsorized at top and bottom 1 per cent.

3.4. Data Sample

We collect annual accounting data for all firms listed in one of the U.S. stock exchanges covered in COMPUSTAT Annual for years 1998 to 2008 that surround the

implementation of SOX in 2002. We start our data sample period in 1998, i.e. five years before the implementation of SOX as the data on product market fluidity are available since that year. We finish our sample in 2008 to have five years of post-SOX data. Following prior research and we exclude financial firms (SIC codes 6000 – 6799) and utility firms (SIC codes 4900 – 4999) because the unusual structure of their assets. We collect capital market data on stock prices and stock returns from CRSP. We download data on product market fluidity (Hoberg, Phillips, and Prabhala 2014) and on managerial ability score (Demerjian, Lev, and McVay 2012) from the author's web sites.

Table 2 Descriptive Statistics

	N	*mean*	*sd*	*p25*	*p50*	*p75*
ExRet	40 115	0.060	0.717	-0.378	-0.071	0.280
ExROA	80 929	-0.245	0.908	-0.135	0.000	0.071
Fluidity	44 647	7.150	3.419	4.541	6.627	9.255
lnBE/ME	43 063	-0.792	0.901	-1.322	-0.736	-0.214
lnME	44 742	5.476	2.064	3.977	5.425	6.859
lnTotAss	81 429	4.060	2.741	2.324	4.118	5.934
lnTotAss2	81 429	24.214	22.981	6.178	17.415	35.467
MA Score	64 452	-0.010	0.159	-0.111	-0.021	0.078
postSOX	81 932	0.590	0.492	0.000	1.000	1.000
ROA	44 853	-0.017	0.345	-0.060	-0.005	0.050
SdRet	43 560	0.041	0.024	0.024	0.035	0.052

Notes: Number of observations (N), pooled-sample mean (mean), standard deviation (sd), first quartile (p25), median (p50), third quartile (p75) for variables used in the study for fiscal years 1998 to 2008. All continuous variables but for stock returns winsorized at top and bottom 1 per cent. Variable definitions in Table 1.

Table 2 shows descriptive statistics for variables used in the study. *Fluidity* is available for 44,647 firm-years for years 1998 to 2008 and its mean of 7.150 is fairly close to the median 6.627. The sample is fairly evenly split between the pre- and post-SOX period with approximately 59 percent of the observations coming from the post-SOX period. Mean and median *ROA* for the sample period are -1.7 percent and -0.5 percent respectively.

Table 3 shows a correlation matrix of variables used in the main tests. Most of the correlations are rather modest, which alleviates possible concerns about multi-collinearity. As expected we observe strong correlations between the various size proxies (*lnME, lnTotAss, lnTotAss2*), which supports the intuition that they capture the same underlying construct. Furthermore, the negative correlations between the size proxies and *SdRet* suggests that smaller firms have more volatile stock returns. Furthermore, the correlation matrix also shows a strong positive correlation between two operating profitability measures *ROA* and *ExROA* and a modest positive correlation between the two-operating profitability and *MA Score* (0.270 and 0.290).

These modest correlations suggest that *MA Score* is not simply a proxy for operating profitability and it captures only a specific aspect of a firm's profit generating ability.

Table 3 Correlation Matrix

	ExRet	*ExROA*	*Fluidity*	*lnBE/ME*	*lnME*	*lnTotAss*	*lnTotAss2*	*MA Score*	*postSOX*	*ROA*	*SdRet*
ExRet		0.261	-0.043	-0.333	0.271	0.162	0.162	0.169	0.206	0.295	-0.137
		(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
ExROA	0.123		-0.063	-0.268	0.365	0.315	0.315	0.361	-0.028	0.801	-0.273
	(0.000)		(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Fluidity	0.028	-0.129		-0.232	0.061	-0.076	-0.076	-0.142	0.061	-0.302	0.273
	(0.000)	(0.000)		(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
lnBE/ME	-0.329	-0.017	-0.238		-0.439	-0.104	-0.104	-0.144	-0.052	-0.187	0.081
	(0.000)	(0.002)	(0.000)		(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
lnME	0.166	0.265	0.072	-0.425		0.882	0.882	0.191	0.182	0.398	-0.571
	(0.000)	(0.000)	(0.000)	(0.000)		(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
lnTotAss	0.051	0.351	-0.062	-0.084	0.888		1.000	0.184	0.116	0.415	-0.598
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)		(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
lnTotAss2	0.036	0.265	-0.058	-0.111	0.875	0.970		0.184	0.116	0.415	-0.598
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)		(0.000)	(0.000)	(0.000)	(0.000)
MA Score	0.115	0.270	-0.111	-0.143	0.177	0.156	0.145		-0.000	0.448	-0.205
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)		(0.967)	(0.000)	(0.000)
postSOX	0.115	0.010	0.070	-0.041	0.177	0.116	0.111	0.003		0.019	-0.256
	(0.000)	(0.070)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.624)		(0.000)	(0.000)
ROA	0.116	0.944	-0.286	0.059	0.263	0.398	0.309	0.290	0.032		-0.461
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)		(0.000)
SdRet	0.047	-0.299	0.222	0.070	-0.548	-0.564	-0.510	-0.182	-0.231	-0.371	
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	

Notes: Pearson's correlation coefficients below the main diagonal, Spearman's rank correlations above the main diagonal. P-values in brackets below coefficients. Based on non-missing observations for all variables for years 1998 to 2008. All continuous variables winsorized at top and bottom 1 per cent. Variable definitions in Table 1.

4. Results

We first investigate how the implementation of SOX in 2002 had an adverse effect on firms' operating profitability (Hypothesis 1). Following the argument above, we suggest that SOX increases the compliance cost beyond the equilibrium level with a negative effect on firm profitability. Furthermore, we expect the compliance cost to be particularly pressing for smaller firms that represent a larger proportion of the sample. We thus anticipate an overall decline in operating profitability following SOX. Consistent with Hypothesis 1, Table 4 shows that after controlling for standard profitability determinants, year and industry fixed effects operating profitability (*ROA*) is on average lower after the implementation of SOX (*postSOX*) than before it. To assess the robustness of our findings to the choice of control variables we follow Chhaochharia et al. (2012) and we measure firm size as the natural logarithm of book value of total assets. Table 4 shows that when using this proxy for firm size together with its squared term and year and industry fixed effects the *postSOX* indicator variable remains significantly negative. We then extend our sample period from three to five years before and after the implementation of SOX and we re-compute both results. The results for the extended window are similar to those for the three-year pre- and post-window. Overall, our results support Hypothesis 1.

We further investigate how the decline in operating performance is affected by the incidence of competitive threats to the firm in years preceding SOX. We argue that competitive threats put pressure on a firm. As firms react on these competitive threats they need to reduce corporate slack and become more efficient. We expect the more efficient firms to be better able to accommodate new corporate governance requirements that are mandated by SOX. Therefore, we predict smaller declines in operating profitability in firms that faced competitive threats before the implementation of SOX.

For each firm, we measure mean *Fluidity* in five years preceding the implementation of SOX. We then regress firm-level change in 5-year mean operating profitability around the implementation of SOX on the mean 5-year *Fluidity* before SOX. Consistent with the result discussed above the intercept in Model 1 reported in Table 5 is significantly negative suggesting that on average firms experienced a decline in operating performance around SOX. More importantly, however, the slope coefficient at mean past 5-year *Fluidity* is significantly positive, which suggests that firms that faced competitive threats before SOX implementation experienced a less pronounced decline in operating performance. These results are consistent with competitive threats increasing firm efficiency and making them better prepared for exogenously imposed tightening of corporate governance requirements.

We perform several modifications to our methodology to assess the robustness of the above result. First, we use the two set of control variables for firm size together with industry fixed effects. Note that year fixed effects are not applicable in this specification as the test is cross-sectional and we use 5-year averages for our main variables. The slope coefficient at lagged mean 5-year *Fluidity* remains positive and strongly significant. We than define and indicator variable *High 5y Fluidity* as equal to one if the mean 5-year *Fluidity* is above the median before SOX implementation and zero otherwise. We re-compute our results using this indicator variable. We observe a positive slope coefficient at *High 5y Fluidity* in all three specifications.

Table 4 Sarbanes-Oxley Act

	3 Years Pre- and Post-SOX		*5 Years Pre- and Post-SOX*	
	ROA (y0)	*ROA (y0)*	*ROA (y0)*	*ROA (y0)*
	coef/t	*coef/t*	*coef/t*	*coef/t*
Intercept	0.114***	-1.200***	0.081***	-1.181***
	(3.70)	(-22.60)	(2.71)	(-26.83)
postSOX	-0.006***	-0.032***	-0.006***	-0.031***
	(-2.78)	(-37.94)	(-4.14)	(-9.33)
lnME (y-1)	0.021***		0.026***	
	(8.50)		(8.49)	
lnBE/ME (y-1)	0.049***		0.057***	
	(7.64)		(8.33)	
ExRet (y-1)	0.065***		0.074***	
	(4.29)		(5.54)	
SdRet (y-1)	-4.427***		-4.139***	
	(-15.24)		(-14.35)	
lnTotAss		0.502***		0.493***
		(37.99)		(36.09)
lnTotAss2		-0.042***		-0.041***
		(-31.06)		(-34.03)
Industry FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Number of observations	24 266	50 829	38 626	80 865
Adjusted R2	0.245	0.594	0.239	0.578

Notes: The table shows operating profitability (ROA) in the after the implementation of SOX (postSOX). The first and the second empirical models correspond to a three-year pre- and post-SOX windows, the third and the fourth models are based on five-year pre- and post-SOX windows. Variable definitions in Table 1. All continuous variables winsorized at top and bottom 1 per cent. Reported t-statistics in parentheses based on two-way clustered standard errors at the firm and year level (Petersen 2009). Industry fixed effects based on Fama and French (1997). Year fixed effects based on fiscal years. ***, **, * indicate statistical significance at 1%, 5%, and 10% level respectively.

Table 5 Product Market Fluidity

	Diff 5y ROA	*Diff 5y ROA*	*Diff 5y ROA*	*Diff 5y ROA*	*Diff 5y ROA*	*Diff 5y ROA*
	coef/t	*coef/t*	*coef/t*	*coef/t*	*coef/t*	*coef/t*
Intercept	-0.061***	-0.055	-0.153***	-0.014***	-0.030	-0.113***
	(-5.60)	(-1.62)	(-2.86)	(-2.89)	(-0.98)	(-3.28)
Mean 5y Fluidity (y-1)	0.012***	0.008***	0.012***			
	(6.61)	(4.69)	(5.40)			
High 5y Fluidity (y-1)				0.043***	0.025***	0.049***
				(4.47)	(3.49)	(4.93)
lnME (y-1)		-0.007***			-0.006***	
		(-2.71)			(-2.72)	
lnBE/ME (y-1)		-0.035***			-0.035***	
		(-4.22)			(-4.75)	
ExRet (y-1)		0.038***			0.032***	
		(3.85)			(3.47)	
SdRet (y-1)		1.681***			1.843***	
		(4.89)			(5.80)	
lnTotAss			0.054***			0.053***
			(2.88)			(4.35)
lnTotAss2			-0.006***			-0.005***
			(-3.39)			(-4.60)
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	2 652	2 143	2 649	4 167	2 424	4 151
Adjusted R2	0.020	0.130	0.049	0.003	0.124	0.039

Notes: The table shows operating profitability around the implementation of SOX (Diff 5y ROA) is affected by competitive threats a firm experiences in the five preceding years (Mean 5y Fluidity, High 5y Fluidity). Variable definitions in Table 1. All continuous variables winsorized at top and bottom 1 per cent. Reported t-statistics in parentheses based on two-way clustered standard errors at the firm and year level (Petersen 2009). Industry fixed effects based on Fama and French (1997). Year fixed effects based on fiscal years. ***, **, * indicate statistical significance at 1%, 5%, and 10% level respectively.

Computation of *Fluidity* requires information from a firm's 10-K filings. Consequently, firms that are not listed in U.S. and hence that are not obliged to file their 10-Ks with the S.E.C. are not included in our sample. To explore the possibility that companies face competitive pressure by foreign firms we investigate how the changes in operating profitability around the implementation of SOX (*Diff 5y ROA*) are affected by large non-transitory declines in import tariffs (*TariffDrop*) in the firm's industry in 5 years preceding the implementation of SOX. Reductions in import tariffs increase international competitors' incentives to enter or to become more active in given product markets, which puts pressure on incumbent firms. Reductions in import

tariffs are used as a proxy for increased competitive intensity in a number of prior studies (e.g. Valta 2012; Frésard and Valta 2013; Alimov 2014; Berger 2014).

We use data on U.S. imports that is available for manufacturing firms between 1992 and 2005 (Feenstra 1996; Feenstra, Romalis, and Schott 2002; Schott 2010). Following Valta (2012) we aggregate the data at 3-digit SIC level and then for every combination of industry and year we compute ad valorem tariff rate as the ratio of duties collected to dutiable value of the goods. We then compute a median annual change in import tariff rates for each industry and we identify a large decline as one that is larger than twice the industry median change. Following Valta (2012) we exclude tariff rate reductions that are preceded or followed by correspondingly large increases as such declines likely do not represent permanent shocks to competitive conditions.

We find only weak support for our prediction. The slope coefficient at *TariffDrop* is positive as expected, but it is not statistically significant (0.022, *t*-stat 1.39, *p*-value 0.163, not tabulated). This suggests that there is only weak evidence that the increase in operating profitability around SOX (*Diff 5y ROA*) is larger for firms in industries that experienced a large decline in import tariffs over the five years preceding the implementation of SOX.

Our main results relate to the effect of externally imposed corporate governance requirements on a firm's ability to accommodate competitive threats by the rivals. We argue that despite of the cost these measures entail they have a positive effect on a reduction of corporate slack, which makes firms better equipped to accommodate competitive challenges. We therefore predict that impending competitive threats lead to lower declines in current operating profitability after the implementation of SOX that imposed better corporate governance. To empirically test this prediction we regress a firm's operating profitability (*ROA*) on 1-year lagged *Fluidity* and we interact the *Fluidity* variable with an indicator variable *postSOX* that is equal to 1 for fiscal years ending after August 2002. In these regressions we use a combination of firm and year fixed effects. Firm fixed effects capture firm-specific level of operating profitability and year fixed effects absorb common time-series variation driven by economic conditions. The dependent variables thus capture the impact of recent competitive threats on deviations of firm operating profitability from its standard levels for a given firm in a given year.

The results presented in Table 6 support our Hypothesis 3. The main effect on lagged *Fluidity* measure is negative and strongly significant in all specifications consistent with the expectations that impending competitive threats depress current profitability. Furthermore, the main effect of *postSOX* indicator variable is always negative and it is significant in some specifications. Similarly to the results discussed above this suggests that firm operating profitability is on average lower after the implementation of SOX. Our focus is on the slope coefficients at the interaction terms of *postSOX* and *Fluidity*. These coefficients are positive and significant in all specifications. Consistent with Hypothesis 3 this result suggests that recent competitive threats have a less negative effect on a firm's current operating profitability when in the post-SOX period firms comply with the more stringent externally-imposed corporate governance requirements.

Table 6 Operating Profitability

	3 Years Pre- and Post-SOX			*5 Years Pre- and Post-SOX*		
	ROA (y0)	***ROA (y0)***	***ROA (y0)***	***ROA (y0)***	***ROA (y0)***	***ROA (y0)***
	coef/t	*coef/t*	*coef/t*	*coef/t*	*coef/t*	*coef/t*
Intercept	0.043*	0.073**	-1.507***	0.044**	-0.027	-1.456***
	(1.81)	(2.24)	(-19.71)	(2.03)	(-0.82)	(-22.57)
Fluidity (y-1)	-0.013***	-0.009***	-0.019***	-0.013***	-0.011***	-0.019***
	(-5.46)	(-5.36)	(-9.15)	(-6.53)	(-7.23)	(-10.86)
postSOX	-0.038**	-0.019	-0.034**	-0.039**	-0.025*	-0.018
	(-2.21)	(-1.45)	(-2.43)	(-2.19)	(-1.74)	(-1.30)
postSOX * Fluidity (y-1)	0.005***	0.004***	0.006***	0.005***	0.005***	0.004***
	(2.82)	(3.09)	(4.06)	(3.24)	(3.92)	(3.07)
lnME (y-1)		-0.009			0.017***	
		(-1.49)			(3.18)	
lnBE/ME (y-1)		-0.031***			-0.012*	
		(-4.58)			(-1.79)	
ExRet (y-1)		0.022***			0.023***	
		(8.47)			(8.73)	
SdRet (y-1)		-0.635***			-0.732***	
		(-3.78)			(-5.16)	
lnTotAss			0.632***			0.599***
			(20.92)			(23.36)
lnTotAss2			-0.053***			-0.049***
			(-18.46)			(-20.48)
Firm FE	yes	yes	yes	yes	yes	yes
Year FE	yes	yes	yes	yes	yes	yes
Number of observations	28 028	22 172	28 028	44 611	35 179	44 611
Adjusted R2	0.010	0.040	0.353	0.011	0.036	0.332

Notes: The table shows how future operating profitability (ROA) following competitive threats (Fluidity) is affected by the implementation of SOX (postSOX). The first three empirical models correspond to a three-year pre- and post-SOX windows, the following three models are based on five-year pre- and post-SOX windows. Variable definitions in Table 1. All continuous variables winsorized at top and bottom 1 per cent. Reported t-statistics in parentheses based on two-way clustered standard errors at the firm and year level (Petersen 2009). Year fixed effects based on fiscal years. ***, **, * indicate statistical significance at 1%, 5%, and 10% level respectively.

Table 7 Industry-Adjusted Operating Profitability

	3 Years Pre- and Post-SOX			*5 Years Pre- and Post-SOX*		
	ExROA (y0)	***ExROA (y0)***	***ExROA (y0)***	***ExROA (y0)***	***ExROA (y0)***	***ExROA (y0)***
	coef/t	*coef/t*	*coef/t*	*coef/t*	*coef/t*	*coef/t*
Intercept	0.003	-0.004	-1.569***	0.005	-0.115***	-1.496***
	(0.13)	(-0.12)	(-20.47)	(0.24)	(-3.58)	(-23.15)
Fluidity (y-1)	-0.009***	-0.005***	-0.015***	-0.009***	-0.007***	-0.015***
	(-3.91)	(-3.37)	(-7.50)	(-4.77)	(-5.08)	(-8.90)
postSOX	-0.029*	-0.010	-0.024*	-0.032*	-0.017	-0.012
	(-1.67)	(-0.78)	(-1.78)	(-1.79)	(-1.19)	(-0.81)
postSOX * Fluidity (y-1)	0.003**	0.003**	0.004***	0.004**	0.004***	0.003**
	(1.97)	(2.19)	(3.14)	(2.51)	(3.02)	(2.22)
lnME (y-1)		0.004			0.023***	
		(0.74)			(4.42)	
lnBE/ME (y-1)		-0.028***			-0.011	
		(-4.11)			(-1.63)	
ExRet (y-1)		0.015***			0.018***	
		(5.65)			(6.65)	
SdRet (y-1)		-0.245			-0.402***	
		(-1.48)			(-2.88)	
lnTotAss			0.635***			0.599***
			(20.73)			(23.20)
lnTotAss2			-0.053***			-0.049***
			(-17.99)			(-20.27)
Firm FE	yes	yes	yes	yes	yes	yes
Year FE	yes	yes	yes	yes	yes	yes
Number of observations	28 028	22 172	28 028	44 611	35 179	44 611
Adjusted R2	0.004	0.029	0.355	0.005	0.027	0.329

Notes: The table shows how future industry-adjusted operating profitability (*ExROA*) following competitive threats (*Fluidity*) is affected by the implementation of SOX (*postSOX*). The first three empirical models correspond to a three-year pre- and post-SOX windows, the following three models are based on five-year pre- and post-SOX windows. Variable definitions in Table 1. All continuous variables winsorized at top and bottom 1 per cent. Reported *t-statistics* in parentheses based on two-way clustered standard errors at the firm and year level (Petersen 2009). Year fixed effects based on fiscal years. ***, **, * indicate statistical significance at 1%, 5%, and 10% level respectively.

We further consider the possibility that the results may be driven by variation in industry-level operating profitability that proxies for the "abnormal" profitability a firm achieves relative to its industry peers. For every combination of Fama and French

(1997) industry and year we compute median industry operating profitability. We then define firm excess operating profitability (*ExROA*) as the difference between firm *ROA* and the median industry operating profitability in a given year. Table 7 shows the results where *ExROA* is used as a dependent variable. These results comparable to the ones presented in Table 6. Consistent with Hypothesis 3 the slope coefficients at the interaction terms of *postSOX* and *Fluidity* are significantly positive. This increases our confidence that our results are not driven by industry variation in operating profitability.

Finally, we acknowledge that a firm's profit generating capacity may be affected by variation in factors other than the new corporate governance requirements mandated by SOX. While using firm and year fixed effects should alleviate this concern, we address this issue directly by using management ability score (*MA Score*) provided by Demerjian, Lev, and McVay (2012) as the dependent variable. *MA Score* measures the ability of the management team, relative to their industry peers, to transform corporate resources to revenues. The score is based on data envelopment analysis (DEA) that measures a firm's relative within-industry efficiency by capturing how close the firm is to the efficient frontier of revenue generation determined by the firms in the industry. *MA Score* is the portion a firm revenue generating efficiency that is not attributable to standard firm characteristics such as size, market share, etc. The score thus captures the ability of the management team to turn available resources to revenues.

We argue that more stringent corporate governance mechanisms put pressure on the management that is likely to enhance their efficiency. A more efficiently operating firm should be less affected by competitive threats. We therefore anticipate that impending competitive threats will depress *MA Score* less after the implementation of SOX. *MA Score* isolates the productivity component that is specific to a given firm's management. As the firm management are directly affected by the quality of corporate governance mechanisms, we expect *MA Score* to capture the direct impact of SOX on management efficiency. The results are again consistent with our expectations. All the interaction terms between *postSOX* and *Fluidity* are positive and they are significant in specifications using a standard set of controls. Taken together, our results provide support for Hypothesis 3 that suggests that impending competitive threats have a weaker effect on a firm's operating profitability in the post-SOX period when a firm is subject to policy-imposed improvements in corporate governance.

Table 8 Management Ability Score

	3 Years Pre- and Post-SOX			*5 Years Pre- and Post-SOX*		
	MA Score (y0)	***MA Score (y0)***	***MA Score (y0)***	***MA Score (y0)***	***MA Score (y0)***	***MA Score (y0)***
	coef/t	*coef/t*	*coef/t*	*coef/t*	*coef/t*	*coef/t*
Intercept	0.013*	0.033**	0.022	0.013	0.031**	0.023
	(1.66)	(2.48)	(1.59)	(1.59)	(2.28)	(1.50)
Fluidity (y-1)	-0.003***	-0.003***	-0.003***	-0.003***	-0.003***	-0.003***
	(-4.48)	(-4.01)	(-4.57)	(-4.00)	(-3.56)	(-4.23)
postSOX	-0.005	-0.013*	-0.003	-0.002	-0.013*	-0.002
	(-0.70)	(-1.91)	(-0.49)	(-0.32)	(-1.93)	(-0.38)
postSOX * Fluidity (y-1)	0.001*	0.002***	0.001	0.001	0.002***	0.001
	(1.73)	(3.33)	(1.51)	(1.18)	(3.61)	(1.35)
lnME (y-1)		-0.006***			-0.010***	
		(-3.24)			(-4.28)	
lnBE/ME (y-1)		-0.033***			-0.032***	
		(-16.18)			(-13.09)	
ExRet (y-1)		0.011***			0.010***	
		(9.36)			(7.95)	
SdRet (y-1)		-0.229***			-0.185**	
		(-3.51)			(-2.50)	
lnTotAss			-0.020***			-0.022***
			(-4.28)			(-4.59)
lnTotAss2			0.003***			0.004***
			(5.87)			(5.91)
Firm FE	yes	yes	yes	yes	yes	yes
Year FE	yes	yes	yes	yes	yes	yes
Number of observations	41 667	33 076	41 667	26 280	20 915	26 280
Adjusted R2	0.019	0.076	0.023	0.021	0.076	0.026

Notes: The table shows how future firm ability to generate revenues from available resources (*MA Score*) following competitive threats (*Fluidity*) is affected by the implementation of SOX (*postSOX*). The first three empirical models correspond to a three-year pre- and post-SOX windows, the following three models are based on five-year pre- and post-SOX windows. Variable definitions in Table 1. All continuous variables winsorized at top and bottom 1 per cent. Reported *t-statistics* in parentheses based on two-way clustered standard errors at the firm and year level (Petersen 2009). Year fixed effects based on fiscal years. ***, **, * indicate statistical significance at 1%, 5%, and 10% level respectively.

5. Conclusion

This paper provides evidence that policy-imposed improvements in corporate governance are associated with a better firm ability to adapt to competitive threats. We provide evidence that the externally imposed improvements to corporate governance are costly for firms and they are associated with lower future operating profitability. Furthermore, the paper shows that the declines in operating profitability are less pronounced for firms that experience competitive threats before the new corporate governance regulation is effective. This suggests that the competitive threats make firms fitter and it allow them to incorporate the newly mandated corporate governance mechanisms at a lower cost.

Our main results suggest that when the new corporate governance mechanisms are implemented impending competitive threats that firms face are associated with smaller declines in operating performance, which suggests that more stringent corporate governance requirements make firms better able to accommodate competitive pressures. Our paper thus complements prior research by documenting how exogenously-imposed changes in corporate governance quality interact with dynamic changes in the competitive landscape in affecting a firm's operating profitability. Our results suggest that the relationship between corporate governance and product market competition is more complex than previously thought.

REFERENCES

Agrawal A, Chadha S (2005): Corporate Governance and Accounting Scandals. *The Journal of Law & Economics,* 48 (2): 371–406.

Ali A, Klasa S, Yeung E (2009): The Limitations of Industry Concentration Measures Constructed with Compustat Data: Implications for Finance Research. *Review of Financial Studies,* 22 (10): 3839–3871.

Alimov A (2014): Product Market Competition and the Value of Corporate Cash: Evidence from Trade Liberalization. *Journal of Corporate Finance,* 25: 122–139.

Allen F, Gale D (1998): Corporate Governance and Competition. *New York University Working Paper.*

Baggs J, de Bettignies JE (2007): Product Market Competition and Agency Costs. *Journal of Industrial Economics,* 55 (2): 289–323.

Baggs J, de Bettignies JE, Ries J (2013): Product Market Competition and Returns to Talent. *Journal of Economics & Management Strategy,* 22 (3): 569–593.

Berger E (2014): Survival of the Fittest: An Assessment of the Herfindahl Index and Product Market Competition. *Rice University Working Paper.*

Bertrand M, Mullainathan S (2003): Enjoying the Quiet Life? Corporate Governance and Managerial Preferences. *Journal of Political Economy,* 111 (5): 1043–1075.

Bhojraj S, Lee CMC, Oler DK (2003): What's My Line? A Comparison of Industry Classification Schemes for Capital Market Research. *Journal of Accounting Research,* 41 (5): 745–774.

Boone J (2008): A New Way to Measure Competition. *Economic Journal,* 118 (531): 1245–1261.

Brochet F (2010): Information Content of Insider Trades before and after the Sarbanes-Oxley Act. *Accounting Review,* 85 (2): 419–446.

Chhaochharia V, Grinstein Y, Grullon G, Michaely R (2012): *Product Market Competition and Internal Governance: Evidence from the Sarbanes Oxley Act*, NY: Social Science Research Network, Rochester.

Coates JC (2007): The Goals and Promise of the Sarbanes–Oxley Act. *Journal of Economic Perspectives,* 21 (1): 91–116.

Cohen DA, Dey A, Lys TZ (2008): Real and Accrual-Based Earnings Management in the Pre- and Post-Sarbanes-Oxley Periods. *The Accounting Review,* 83 (3): 757–787.

Core JE, Holthausen RW, Larcker DF (1999): Corporate Governance, Chief Executive Officer Compensation, and Firm Performance. *Journal of Financial Economics*, 51 (3): 371–406.

Cuñat V, Guadalupe M (2005): How Does Product Market Competition Shape Incentive Contracts? *Journal of the European Economic Association*, 3 (5): 1058–1082.

Cuñat V, Guadalupe M (2009a): Executive Compensation and Competition in the Banking and Financial Sectors. *Journal of Banking & Finance,* 33 (3): 495–504.

Cuñat V, Guadalupe M (2009b): Globalization and the Provision of Incentives inside the Firm: The Effect of Foreign Competition. *Journal of Labor Economics,* 27 (2): 179–212.

DeFond ML, Lennox CS (2011): The Effect of SOX on Small Auditor Exits and Audit Quality. *Journal of Accounting and Economics,* 52 (1): 21–40.

DeFond ML, Park CW (1999): The Effect of Competition on CEO Turnover. *Journal of Accounting and Economics,* 27 (1): 35–56.

Demerjian P, Lev B, McVay S (2012): Quantifying Managerial Ability: A New Measure and Validity Tests. *Management Science,* 58 (7): 1229–1248.

Engel E, Hayes RM, Wang X (2007): The Sarbanes–Oxley Act and Firms' Going-Private Decisions. *Journal of Accounting and Economics,* 44 (1–2): 116–145.

Fairfield PM, Whisenant JS, Yohn TL (2003): Accrued Earnings and Growth: Implications for Future Profitability and Market Mispricing. *The Accounting Review*, 78 (1): 353–371.

Fama EF, French KR (1997): Industry Costs of Equity. *Journal of Financial Economics*, 43 (2): 153–193.

Feenstra RC (1996): U.S. Imports, 1972-1994: Data and Concordances. *NBER Working paper*, no. 5515.

Feenstra RC, Romalis J, Schott PK (2002): U.S. Imports, Exports, and Tariff Data, 1989-2001. *NBER Working paper*, no. 9387.

Florackis C, Kanas A, Kostakis A (2015): Dividend Policy, Managerial Ownership and Debt Financing: A Non-Parametric Perspective. *European Journal of Operational Research*, 241 (3): 783–795.

Frésard L, Valta P (2013): Competitive Pressure and Corporate Investment: Evidence from Trade Liberalization. *Working paper*.

Gillan SL (2006): Recent Developments in Corporate Governance: An Overview. *Journal of Corporate Finance*, 12 (3): 381–402.

Giroud X, Mueller HM (2010): Does Corporate Governance Matter in Competitive Industries? *Journal of Financial Economics*, 95 (3): 312–331.

Giroud X, Mueller HM (2011): Corporate Governance, Product Market Competition, and Equity Prices. *Journal of Finance*, 66 (2): 563–600.

Gompers P, Ishii J, Metrick A (2003): Corporate Governance and Equity Prices. *Quarterly Journal of Economics*, 118 (1): 107–155.

Gopalan R, Milbourn T, Song F, Thakor AV (2014): Duration of Executive Compensation. *Journal of Finance*, 69 (6): 2777–2817.

Hart OD (1983): The Market Mechanism as an Incentive Scheme. *The Bell Journal of Economics*, 14 (2): 366–382.

Hermalin BE (1992): The Effects of Competition on Executive Behavior. *RAND Journal of Economics (RAND Journal of Economics)*, 23 (3): 350–365.

Hermalin BE (1994): Heterogeneity in Organizational Form: Why Otherwise Identical Firms Choose Different Incentives for Their Managers. *The RAND Journal of Economics*, 25 (4): 518–537.

Hicks JR (1935: Annual Survey of Economic Theory: The Theory of Monopoly. *Econometrica* 3, (1): 1–20.

Hoberg G, Phillips G, Prabhala N (2014): Product Market Threats, Payouts, and Financial Flexibility. *The Journal of Finance*, 69 (1): 293–324.

Hrazdil K, Zhang R (2012): "The Importance of Industry Classification in Estimating Concentration Ratios." *Economics Letters* 114 (2), 224–227.

Iliev P (2010): The Effect of SOX Section 404: Costs, Earnings Quality, and Stock Prices. *The Journal of Finance*, 65 (3): 1163–1196.

Jensen MC (1986): Agency Costs of Free Cash Flow, Corporate Finance, and Takeovers. *American Economic Review*, 76 (2): 323–29.

Karuna C (2007): "Industry Product Market Competition and Managerial Incentives." *Journal of Accounting and Economics* 43 (2–3), 275–297.

Krishnan J, Press E (2003): The North American Industry Classification System and Its Implications for Accounting Research. *Contemporary Accounting Research*, 20 (4): 685–717.

Linck JS, Netter JM, Yang T (2009): The Effects and Unintended Consequences of the Sarbanes-Oxley Act on the Supply and Demand for Directors. *Review of Financial Studies*, 22 (8): 3287–3328.

Ofek E, Yermack D, (2000): Taking Stock: Equity-Based Compensation and the Evolution of Managerial Ownership. *The Journal of Finance*, 55 (3): 1367–1384.

Petersen MA (2009): Estimating Standard Errors in Finance Panel Data Sets: Comparing Approaches. *Review of Financial Studies,* 22 (1): 435–480.

Raith M (2003): Competition, Risk, and Managerial Incentives. *American Economic Review,* 93 (4): 1425–1436.

Schmidt KM (1997): Managerial Incentives and Product Market Competition. *Review of Economic Studies,* 64 (2): 191–213.

Schott P (2010): *US Manufacturing Exports and Imports by SIC or NAICS Category and Partner Country, 1972 to 2005*.

Shleifer A, Vishny RW (1997): A Survey of Corporate Governance. *Journal of Finance* 52 (2): 737–783.

Smith A (1776): *An Inquiry into the Nature and Causes of the Wealth of Nations*.

Valta P (2012): Competition and the Cost of Debt. *Journal of Financial Economics,* 105 (3): 661–682.

Vickers J (1995): Concepts of Competition. *Oxford Economic Papers,* 47 (1): 1–23.

Yermack D (1995): Do Corporations Award CEO Stock Options Effectively? *Journal of Financial Economics,* 39 (2–3):237–269.

Zhang IX (2007): Economic Consequences of the Sarbanes–Oxley Act of 2002. *Journal of Accounting and Economics,* 44 (1–2): 74–115.