Corporate governance and firm performance: Evidence from the oil price collapse of 2014-15

NICLAS ANDRÉN

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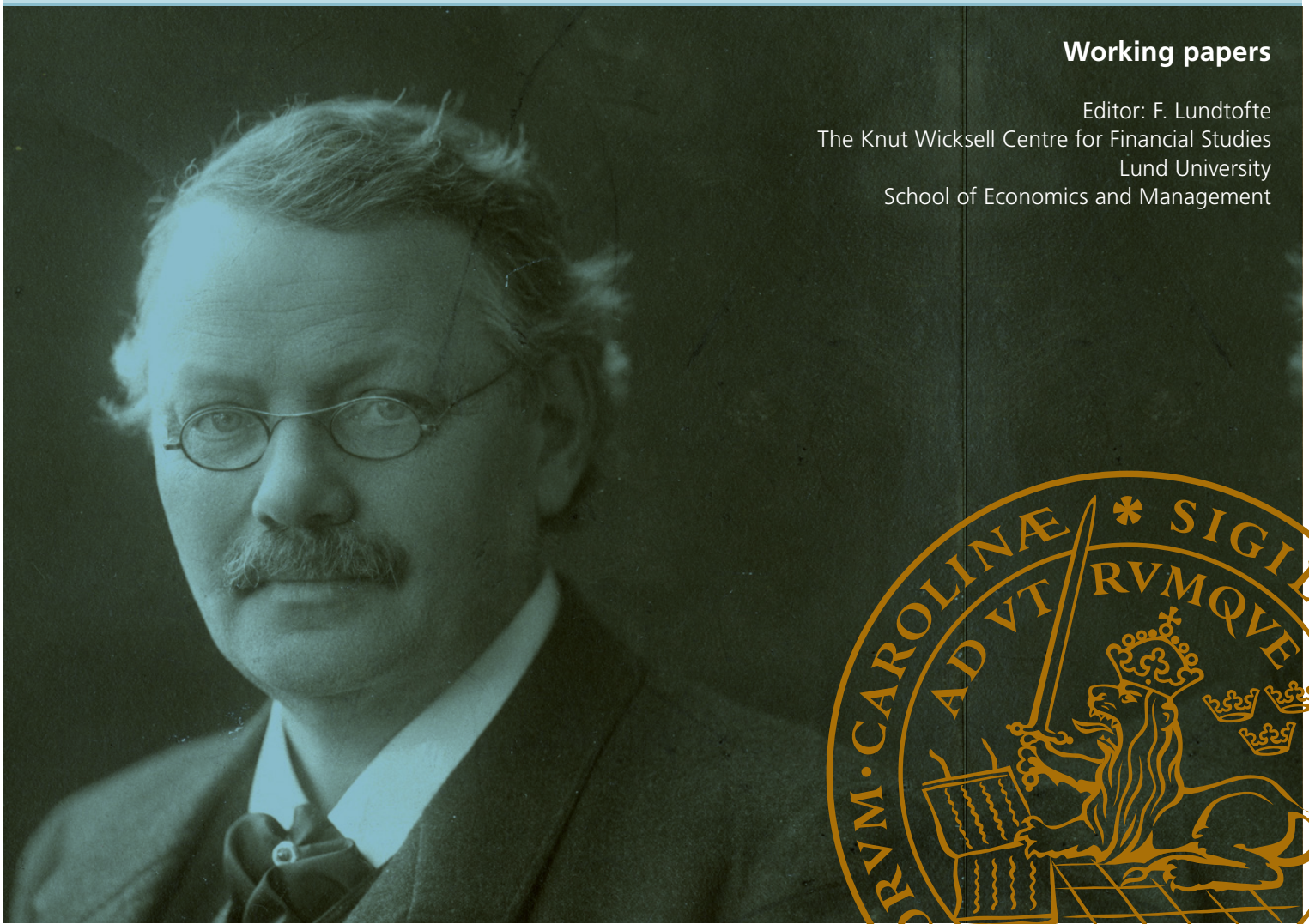

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Corporate governance and firm performance: Evidence from the oil price collapse of 2014-15

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Abstract

This paper analyses how board classification, board independence, and inside ownership affects US oil-company performance using the oil price collapse of the autumn and winter of 2014 as a natural experiment. Firms with classified boards suffered during the collapse. An important source of value destruction is that classified boards aggravated the impact of corporate risk taking on performance. On the contrary, the greater the ownership level of insiders, the better the firm sustained the crisis. The performance-ownership relationship seems to be non-monotonic. In particular, inside ownership mediates the impact of leverage on performance. As for board independence, it seems to be of no relevance to firm performance.

Keywords: Corporate governance, board classification, inside ownership, board independence, entrenchment, performance

JEL codes: G14, G30, G32, G34

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1. Introduction

Agency models typically assume agency costs to be countercyclical (Eisfeldt and Rampini, 2008; Hermalin and Weisbach, 1998; Holmström and Weiss, 1985). Accordingly, Johnson et al (2000) and Mitton (2002) argue that the appropriation of firm value by entrenched insiders could become more severe, and good governance consequently be more valuable during a crisis. The agency-theoretic prescriptions for good governance emphasize three principal mechanisms: incentive alignment (Jensen and Meckling, 1976), monitoring (Fama and Jensen, 1983), and discipline by the market for corporate control (Jensen and Ruback, 1983). While these mechanisms are theoretically justified their efficiency remains subject to debate as prior research is ambiguous as to whether (when) they are beneficial or detrimental to firm performance.

My contribution to the debate is an examination of the influence of board classification, board independence, and inside ownership on performance for US oil companies during the oil-price collapse of the autumn and winter of 2014. I find that firms with classified boards substantially underperform firms with unitary boards and that performance is an increasing function of inside ownership. An important explanation behind these effects is that board classification and inside ownership moderate the effect of corporate risk taking on performance. In contrast, there is no evidence that board independence influence performance.

Endogeneity is a key problem in the corporate-governance literature, as the firm's governance structure may be the solution to, rather than the determinant of contracting problems between management and shareholders. Endogeneity makes it difficult to make causal claims on the importance of governance in periods when governance structure and firm performance are in

endogenous equilibrium and stock prices reflect investor expectations about performance differences of differentially governed firms. Accordingly, attempts to link governance to firm performance using cross-sections and panels have met with mixed results (see Brown et al 2011 and Adams et al 2010 for surveys of the literature). Overcoming self-selection bias requires exogenous variation in the severity of the agency problem, and the shock must not be foreseen by the market and incorporated into share prices. Consequently, event studies that use severe environmental shocks to identify exogenous variation in economic determinants of governance structures are typically more successful in revealing a significant, though not necessarily consistent relationship. Mitton (2002), Lemmon and Lins (2003), and Baek et al (2004) find that better-governed non-financial firms performed better during the Asian financial crisis (AFC) of 1997-98. Francis et al (2012) and Lins et al (2013) find similar results for non-financial firms during the global financial crisis (GFC) of 2007-08. On the contrary, studies of the impact of governance on the performance of banks during the GFC find that better-governed banks performed worse (Bhagat and Bolton, 2014; Minton et al, 2014; Beltratti and Stulz, 2012; Erkens et al, 2012; Fahlenbrach and Stulz, 2011), the main explanation forwarded being that better-governed banks took greater risks prior to the GFC, which materialized as greater losses during the crisis. Board classification, independence, and inside ownership remain severely understudied using such event studies, though.

There are several advantages to studying the oil-price collapse. Firstly, it was detrimental enough to plausibly push the governance-performance relationship out of equilibrium. Over a period of just 75 days the oil price fell by more than 50%, taking the values of oil companies with it in the fall. Oil-price volatility tripled and median distance to default in the sample increased fiftyfold. Importantly, the collapse seemed to take everyone by surprise, analysts, investors, and managers alike, making it an effective natural experiment. Secondly, the collapse

allows me to examine more unambiguously the relation between corporate governance and firm performance. In contrast to previous shock studies of the AFC or the GFC I exploit the benefit of a precipitous shock that was so abrupt that firms did not have time to forcefully respond until after the fact. This brings me closer to a pure event-study setup. The key role played by OPEC, and in particular the November 27, 2014 announcement that OPEC abandoned its policy of price targeting that had been in place since the early 2000s in favor of maintaining market share, allows me to study pure announcement effects. Thirdly, I exploit the benefit of an industry-specific shock, allowing me to work with a more homogeneous sample of firms and to undertake more rigorous robustness testing.

I find board classification to be significantly detrimental to firm performance, both during the collapse and in response to the OPEC announcement. Firms with classified boards generated holding-period returns (*HPRs*) over the collapse roughly ten percentage points lower than unitary-board firms. This is a quarter of the median *HPR* of -41%, so the economic importance of board classification is substantial. This confirms findings for panels of firms that suggest that classified boards have a detrimental effect on firm value (e g, Rose, 2009; Faleye, 2007; Bebchuk and Cohen, 2005). Cremers and Sepe (2016) criticize these studies for capturing correlation rather than causality. They, as well as Guo et al (2008) instead investigate firms that declassify, but come to opposing results. However, the decision to declassify is an endogenous one. More convincingly, Cohen and Wang (2013) investigate the market response to two Delaware court rulings that influenced the takeover protection provided by board classification, finding results consistent with board classification entrenching insiders.

An important source of value destruction by classified boards is that they aggravate the impact of corporate risk taking on performance. Whether measured by volatility in stock returns, value

of growth opportunities, probability of default, or acquisition spending, I show that risk taking was punished during the collapse and particularly so in firms with classified boards. Fahlenbrach and Stulz (2011) and Bhagat and Bolton (2014) suggest that banks with incentive-aligning compensation structures took greater risks prior to the GFC and paid a price in terms of worse performance during the GFC. This does not seem to be the case in the oil-price collapse, since firms with classified boards lose more than unitary-board firms and suffer more from risk taking. Instead, my findings suggest that entrenched managers manage risk and make acquisitions in ways that are detrimental to outside shareholders.

Inside ownership positively influence *HPRs* in the collapse. This result is important, since previous studies come to conflicting conclusions. Brown et al (2011) summarize the empirical research on the inside ownership-performance relationship by concluding that, accounting for endogeneity, there appears to be no causal relationship between inside ownership and firm performance. One explanation may be the dearth of event studies on exogenous shocks. An exception is Lemmon and Lins (2003), who find that firms with greater managerial ownership suffered more from the AFC. In contrast, oil companies benefited from greater inside ownership. As for board classification, inside ownership mediates the impact of leverage on performance. Levered firms underperform in the collapse, but less so in firms with higher inside ownership.

One of the strongest empirical regularities in the inside ownership-performance literature is that the relationship is non-monotonic, with value increasing (decreasing) with ownership for modest (higher) ownership levels (e g, McConnell et al, 2008; Benson and Davidson, 2009). There is evidence of non-monotonicity in the collapse as well, but I find performance to be unequivocally better for larger ownership levels. Cui and Mak (2002) find a similar pattern for

their sample of high-R&D firms, motivating them to suggest that incentive alignment may play a greater role in high-uncertainty firms. My sample would certainly fit that same categorization as the oil industry is a high-risk one.

I find no relationship between board independence and performance. Policy makers typically consider board independence a key dimension of good governance (Bebchuk and Weisbach, 2009), but empirical evidence supporting any causal relationship with performance is limited (Brown et al, 2011). Black and Kim (2012) find board independence to be valuable, while Francis et al (2012) do not. Dowell et al (2011) find it to be associated with firm survival during the Internet shakeout, but only for the Internet firms experiencing the greatest financial distress. In contrast, I do not find the role for board independence to be a function of financial distress.

The next section explicates the oil-price collapse more in detail and summarizes findings from prior research on the effects of board classification, independence, and inside ownership on firm performance. Section 3 describes the data. Section 4 presents the results of the main empirical analysis and extensive robustness checks. Section 5 presents results for the event study of the OPEC policy change. Section 6 investigates the moderating effect of corporate risk taking. Section 7 concludes.

2. Institutional background and motivation

The Brent crude oil price (the international oil-price marker) fluctuated almost exclusively in the range of $100-120 from January 2011 to June 2014 (see Figure 1, Panel A). In fact, the oil price traded so stably that oil-price volatility fell to levels not seen since the early 1970s. The West Texas Intermediate (WTI, the US oil-price marker) price exhibited a similar pattern, albeit

in the range of $80-100/bbl.[1] The main concerns about the oil price in the first two quarters of 2014, before the collapse, were the downside risk related with possible weak oil demand from emerging economies and the upside risk of a major oil-supply disruption in the Persian Gulf region and the viability of OPEC's desired price range of $100-110/bbl were oil prices to increase substantially. After a short run-up in prices in early June 2014 prices began drifting downwards. The drop was initially modest, but accelerated from early October and, in particular, following the OPEC announcement on November 27, 2014 when the organization changed its policy objective from price targeting (abandoning its desired price range) to market-share stabilization. The oil-price curve did not flatten out until the second week of 2015, the oil price dropping 60% in the process.

[Insert Figure 1 about here]

Baffes et al (2015) suggest that the main causes of the collapse were (*i*) the global oil-supply glut, not least due to substantial supply additions from US shale oil and (less so) Canadian oil sands, (*ii*) OPEC's policy change, and (*iii*) slowing oil-demand growth, not least from China.[2] [3]

[1] The Brent-WTI price differential is an effect of the build-up of North American oil supply, but also due to weak infrastructure (lack of pipeline capacity) and the US crude-oil export ban dating back to the 1973 Arab oil embargo, which was lifted in late December, 2015. The price differential is cyclical due not least to US maintenance patterns, with the differential typically peaking in the October-November maintenance season.

[2] In 2011 to 2014 around 20,000 new shale wells were completed in the US and US crude oil production grew from just over 5 million barrels per day (MMbbl/d) in 2007 to around 9 MMbbl/d in 2014 (Deloitte Oil and Gas Reality Check 2015). This amounts to roughly half of US demand for petroleum products. The growth in Canadian oil sands production was more modest, growing by approximately 1 MMbbl/d over the period 2007 to 2014.

Baumeister and Kilian (2016) similarly explain the collapse by the global oil-supply glut and declining global real economic activity, but add a shock to global inventory demand for oil in the summer of 2014.

Pre-collapse market expectations suggested continued high oil prices. For example, both the World Bank and the Energy Information Agency (EIA) in July 2014 forecasted the 2015 Brent crude oil price to average $105/bbl. In their Short-Term Energy Outlook report from October 7, 2014 EIA had revised their forecast of the 2015 average price to $102/bbl, reduced to $83/bbl ($68/bbl) one month (two months) later. Goldman Sachs on October 26, 2014 revised their price forecast for Q1 2015 from $100 to $85. In the same week, CIBC World Markets maintained their 2015 Brent average price of $100. Moody's lowered their 2015 Brent oil price forecast in early December 2014, to $80/bbl. Forward curves were almost consistently upward sloping throughout the collapse. In fact, the upward slope of the forward curve even grew as the oil price fell (see Figure 1, Panel B).[4] For a systematic assessment of the underestimation of the oil-price collapse by policymakers and financial markets, see Baumeister and Kilian (2016); for a more entertaining narrative, see Damodaran (2014). The trading positions of WTI oil-futures traders provide another indication of investor expectations (see Figure 1, Panel C). Though

[3] OPEC officially announced its abandoning of price targeting on November 27, 2014, but several OPEC members de facto abandoned price targeting already in September/October. In particular, Saudi Arabia and Kuwait offered substantial price discounts to Asian crude buyers. Still, markets responded strongly to the official announcement, presumably since it marked a more irrevocable de jure policy change.

[4] The correlation between the Brent spot price and the spread between the 12-month and the 2-month Brent futures prices during the collapse was -0.92 and the regression coefficient in a regression of this futures spread on the spot price is -0.09, which means that a $1 reduction in the spot price increased the spread between the 12-month and the 2-month futures rates by 9 cents.

sensitive to oil-price changes, the net trading position (all long minus all short WTI oil-futures contracts on NYMEX) was consistently long, which implies a net speculation in increasing oil prices. Similar statistics for oil producers show the inverse pattern; the net hedging position was consistently short (more short than long futures contracts among producers), suggesting that producers on average continued to see a hedging need.

2.1. Corporate governance and firm performance

Entrenchment concerns the ability of incumbents to pursue private benefits without risking removal. Successful managerial entrenchment requires insulation from internal (board) and external (market) monitoring. I examine three key determinants of managerial entrenchment: board classification, the fraction of independent directors on the board, and inside ownership.

Board classification is "the key arrangement that protects incumbents from removal in US publicly traded companies" (Bebchuk and Cohen, 2005: 410) by making it more difficult and time-consuming to replace a majority of the board. Not least, poison pills are decided on by the board, so a classified board protects the effectiveness of the pill (Bebchuk et al, 2002; Danielson and Karpoff, 2006). The extant empirical evidence suggests that classified boards have a detrimental effect on firm value (e g, Rose, 2009; Guo et al, 2008; Faleye, 2007; Bebchuk and Cohen, 2005). Still, there is an active debate on the pros and cons of board classification (e g, Bebchuk, 2013; Cremers and Sepe, 2016). There is a scarcity of investigations of a causal relationship between board classification and performance, but Cohen and Wang (2013) investigate the market response to two Delaware court rulings that influenced the takeover protection provided by board classification, finding results consistent with board classification entrenching insiders. Masulis et al (2007) find that announcement-period returns

are lower for bidding firms with a classified board. On the other hand, Bates et al (2008) find that board classification does not influence announcement-period returns of target firms.

Director independence "seems to be considered somewhat of a 'silver bullet' for governance" (Misangyi and Acharya, 2014: 1683). Indeed, a common policy response to recent governance crises has been to adopt reforms designed to strengthen the independence of boards (Bebchuk and Weisbach, 2009). Although the previous literature analyzing the influence of independent directors on corporate performance is extensive, the literature is far from conclusive. Empirical evidence supporting any causal relationship between board independence and firm performance is limited. Using event studies on regulatory changes, Black and Kim (2012) find board independence to be valuable, while Duchin et al (2010) find the relationship between board independence and firm performance to depend on the level of information asymmetry. Francis et al (2012) find that board independence does not influence performance during GFC, whereas Dowell et al (2011) find it to be associated with firm survival during the Internet shakeout, but only for the Internet firms experiencing the greatest financial distress. Nguyen and Meisner Nielsen (2010) instead find that firms with independent boards fair better in face of sudden CEO deaths.

Inside ownership is the quintessential agency solution to align owner and manager interests (Jensen and Meckling, 1976). Still, there is a long-standing debate concerning how ownership motivates managers. Higher inside ownership is widely believed to be valuable for shareholders because it aligns the interests of insiders better with those of shareholders. At the same time, ownership exposes insiders to more risk relative to diversified shareholders and may increase incumbents' power relative outsiders (Stulz, 1988). A number of studies document a significant positive relationship between share ownership by corporate insiders and firm performance (e g,

Fahlenbrach and Stulz, 2009), while others find the revealed relationship to be non-monotonic (e g, Benson and Davidson, 2009; Kim and Lu, 2011) or non-existent (Himmelberg et al, 1999; Fahlenbrach and Stulz, 2011). Inside ownership is a main battle ground for debates on empirical strategies to overcome endogeneity (e g, Coles et al, 2012; Zhou, 2001; Himmelberg et al, 1999). Brown et al (2011) summarize the empirical research on the inside ownership-performance relationship by concluding that, accounting for endogeneity, there appears to be no causal performance-ownership relationship. One explanation may be the dearth of event studies on exogenous shocks. An exception is Lemmon and Lins (2003), who find that firms with greater managerial ownership suffered more from the AFC. Investigating performance effects of (possibly endogenous) changes in inside ownership, Fahlenbrach and Stulz (2009) find a positive and McConnell et al (2008) and Tong (2008) non-monotonic relationships.

To summarize, I hypothesize that greater board independence and inside ownership lead to better performance in the collapse, whereas I expect firms with a classified board to underperform.

3. Sample and data description

3.1. Empirical issues

The main challenge faced by any study of the value of corporate governance is endogeneity, where the firm's governance structure is chosen by managers or claim holders rather than being exogenously determined. Hence, it is difficult to make causal claims on the importance of governance. Fixed-effects and instrumental-variables methodologies are typical solutions, but these methodologies are heavily criticized for failing to solve the endogeneity problem for

governance variables (e g, Coles et al, 2012; Zhou, 2001). One of the most convincing remaining solutions is the event study.

One alternative is to study exogenous shocks to the firm's governance structure. However, such shocks are hard to come by and such event studies are far apart. In addition, the exogeneity of governance changes may be questionable. Such changes may reflect corporate misbehavior that uncovers the need for governance change, and the ensuing corporate response may reflect either the governance change or the firm's alteration of the misbehavior. I instead investigate firm performance in face of an exogenous external shock that is unrelated to the firm's governance structure, but where cross-sectional dispersion in governance structures may influence the market response to the shock. This approach holds the greatest potential to mitigate endogeneity, given that (*i*) the governance structure is predetermined, (*ii*) the shock is unrelated with the sample firms' governance structures, and (*iii*) the shock is unexpected by investors. My solution to (*i*) is to measure governance mechanisms prior to the shock, whereas the oil-price collapse fits restrictions (*ii*) and (*iii*) perfectly.

One potential endogeneity problem remains: cross-sectional dispersion in governance structures may reflect that different governance structures may be optimal for firms with different characteristics and the market response to the external shock may reflect these characteristics rather than the governance structure. This is an omitted-variables problem. Omitted-variables bias is a potent, but often overlooked problem in event studies where cross-sectional modeling refutes the use of fixed effects to account for time-invariant firm characteristics. I make extensive use of control variables in my robustness testing.

3.2. Timeline

My main event window is October 1, 2014 – January 13, 2015. I use a narrative strategy to identify it, since it is not clear-cut to timestamp the oil-price collapse. The Brent crude oil price peaked on June 19, 2014, at $115.5/bbl, while the WTI peaked on June 20 at $107.3. Ensuing price declines were initially very modest. On September 8 the Brent oil price dropped below $100. It was not until the second week of October that Brent slid below $90, thereby reaching a price level not seen since before 2011. The WTI also experienced the first really sizeable drop in the first two weeks of October. Looking at rolling 14-day price changes, the price decline did not really pick up speed until the first week of October and, in particular, following the November 27 OPEC announcement. The oil priced dropped by almost 9% on November 27. A close read of Financial Times news articles and commentaries on the oil price indicates that the first more significant worries about the price decline arose in mid-September; e g, on September 16 you could read that "Brent weakness is now a thing". However, news coverage on the oil price was modest throughout September and did not take off in earnest until October. October is also the first month when the terms "collapse" or "crisis" start being used. Similarly, the first Oil and Gas Journal weekly editorial to talk about the oil-price decline is from October 13.

As for the end of the collapse, the Brent (WTI) oil price bottomed at $45.7 ($45.9) on January 13, 2015, stayed flat for two weeks and then rebounded for four months. After this, the price entered a second decline phase that lasted until the end of January 2016. My focus is on the first decline phase, since I want to isolate as far as possible the market response to the oil-price decline rather than oil companies' responses to the decline. Extending the event window to include the second phase adds the problem that firms have room to adjust, which reintroduces the endogeneity problem that the event study is intended to counter. The number of oil rigs in

operation in the US (from the Baker Hughes rig-count statistics) provides the perhaps earliest indication of adaptation. The rig count fluctuated between 1,300 and 1,400 rigs over 2012 and 2013. In the early months of 2014 the rig count began increasing and continued to increase throughout the year. The number of rigs began dropping significantly in January 2015 and continued to fall throughout 2015, to around 500 rigs by the end of the year.

To conclude, I use October 1, 2014 – January 13, 2015 as my main event window. In the robustness testing I test slightly different event windows. Due to the substantial impact of the OPEC announcement, I also perform an event study of November 27.

3.3. Sample and main variables

I study US publicly traded companies primarily involved in the exploration and production (E&P) or refining and marketing (R&M) of crude oil and natural gas (SIC codes 1311 and 2911). I include firms with total assets of at least $1 million and non-negative book values of equity in 2013 and 2014. I exclude limited partnerships and trusts. It is also necessary that the firms have continuously listed stock prices over, at least, the period June 1, 2013 to January 13, 2015. The final test sample consists of 129 firms. Data on financial variables are obtained from Datastream and Capital IQ. Corporate-governance data are hand collected from proxy statements and 10-K filings from the SEC EDGAR database.

My primary performance measure is the buy-and-hold stock return (incl dividends and adjusted for stock splits etc) measured over the event window. I gather stock-price data from Capital IQ and adjust for dividends. I measure governance mechanisms as of the fiscal yearend closest to, but before June 1, 2014 (fiscal year 2013). In most cases this is December 31, 2013. It is important to stress that governance mechanisms are measured prior to the event window. Board

classification is measured with a dummy variable that takes the value one for firms with a classified board, while Board independence is measured with a dummy variable that takes the value one for firms with a majority of independent directors according to the definitions of independence used by NYSE or NASDAQ. Inside ownership, finally, is defined as the proportion of shares held by directors and officers.

3.4. Descriptive statistics

Table 1 presents definitions of main dependent and independent variables and summary statistics. Panel B shows holding period returns (*HPRs*) for the main event window, October 1, 2014 – January 13, 2015, and abnormal returns (*ARs*, in excess of the beta-adjusted market return) for the November 27 OPEC announcement. The average *HPR* is -40.6%. Over the same period the S&P500 index increased by 4.6%. The average *AR* for the OPEC announcement is -13.1%; no doubt, the OPEC policy change was a significant aspect of the oil-price collapse. All corporate governance variables are observed at the end of fiscal year 2013. Notably, 29% of the sample firms have a classified board. This is at par with the 32% reported for the S&P 1,500 index in 2014 (Larcker and Tayan, 2015), but above the 9% reported for S&P 500 (2015 Spencer Stuart Board Index). For the average board in the sample, 70% of the directors are independent. This compares with 84% for the S&P 500 in 2015 (2015 Spencer Stuart Board Index). The average fraction of shares held by directors and executives is 17%, which is well above the 5.1% average of the S&P 1,500 index in 2014 (data from Capital IQ). Many firms are small (median total assets of $991 million) with limited leverage (median of 23%). Pre-collapse stock-return volatilities were large, whereas market betas (estimated using the Scholes and Williams 1977 technique) were not. Capital expenditures in the fiscal year prior to the collapse were on average twice as large as operating cash flows whereas dividend payments were very

modest, consistent with lots of investment opportunities being in the money at the high oil prices prevailing prior to the collapse.

[Insert Table 1 about here]

4. Event study of the oil-price collapse

The founding assumptions of this section are that if the oil-price collapse came as a surprise to the stock markets, corporate governance is predetermined, and investors anticipate that the firm's governance structure influences how the shock will affect corporate performance, then an event study can help to identify a causal impact of governance on market value. I examine the relation between firm performance and corporate governance during the oil-price collapse by regressing *HPRs* during the collapse on corporate-governance variables and control variables observed before the collapse. I focus on the main event window, October 1, 2014 – January 13, 2015, which I refer to as HPR_{main} for short.

4.1. Pretesting

Theoretically, the market response should reflect cross-sectional differences in systematic risk or shocks to investor expectations over the event period, the key shock to expectations being the evolving oil-price deterioration. I begin by attempting to understand better the importance of market risk to cross-sectional dispersion in HPR_{main}. One possible explanation is a contrarian market response; if investors had exaggerated expectations on certain stocks prior to the collapse, then these stocks may have been hit harder by the collapse. Column (1) in Table 2 regresses HPR_{main} on the *HPR* over the pre-collapse period June 1, 2013 to May 31, 2014. The coefficient on past return is insignificant. A second possibility is that stock-market

developments are consistent with the capital asset pricing model or the Fama-French three-factor model. To account for this I regress HPR_{main} on the market-model beta, log market capitalization, and the book-to-market ratio (book value of equity to the market value of equity). Size and book-to-market are calculated as of end of May, 2014. Market beta is estimated on daily stock returns over the period June 1, 2013 – May 31, 2014 using the Scholes and Williams (1977) technique. Results are in Column (2). Market beta is insignificant, both when included separately (not tabulated) and together with market capitalization and book-to-market.[5] Book-to-market and market capitalization are both strongly positively significant, suggesting that large firms and value stocks performed better during the oil-price collapse.[6]

[Insert Table 2 about here]

An alternative explanation to dispersion in *HPRs* comes from the effect of the falling oil price on expected cash flows, where the value of investment opportunities falls with the oil price. The reduction in value of investment opportunities hurts the value of the firm, but the impact on the value of equity would be more severe with greater leverage. To test this explanation I include financial leverage (measured as interest-bearing debt to total assets). I also include a proxy for

[5] The result remains the same if I instead estimate beta on weekly data. Beta is also consistently insignificant if added to any of the models reported later. As an alternative, I adjust beta for mean reversion using the Blume (1975) adjustment, but with no impact on the (any) result.

[6] As an alternative to including book-to-market and market capitalization, I first estimate an augmented market model where I include the three factors of the Fama-French model: the excess market return and the returns on the size (SMB) and value (HML) factors. I then estimate HPR_{main} as a function of the factor betas. The factor betas all come out insignificant. The data are from Kenneth French's data library (http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html).

expected cash flow, namely operating cash flow to total assets in the fiscal year prior to the collapse.[7] Results are in Column (3). Leverage is strongly significant and negative, consistent with the idea that levered equity loses more in a crisis; operating cash flow is insignificant.

4.2. The role of corporate governance

In this section I explore the impact of board classification, board independence, and inside ownership on *HPRs* in the oil-price collapse. Again, my focus is on HPR_{main}. I include book-to-market, market capitalization, and leverage as control variables. Results are in Table 2. Columns (4) to (6) report regression results including one governance mechanism at a time, while Column (7) contains the full model, which I refer to as the base-model specification. Note that following convention all significance levels reported in the tables are two-sided, whereas my hypotheses are one-sided; for clarity, in the text I report results from one-sided significance tests. The coefficient on inside ownership is positive and statistically significant, consistent with the incentive effect of ownership predicted by agency theory. In terms of economic significance, a one standard deviation increase in inside ownership resulted in a 6.7% greater HPR_{main}. The coefficient on board classification is significantly negative. The negative sign is consistent with the entrenchment effect of board classification. The effect is also economically significant, with a *HPR* during the oil-price collapse roughly ten percentage points lower than for firms with a unitary board. Board independence, finally, comes out insignificant.[8]

[7] Cash flow tend to be strongly persistent, motivating including it as a proxy for expected cash flow.

[8] Replacing board independence by the proportion of independent directors changes nothing (results not tabulated).

Whether independent directors are in majority on the board or not seems to be of no relevance to performance. One explanation may be that regulations such as the NYSE and NASDAQ listing requirements have made independent-director majority a norm rather than a value-added feature of good governance. As an indication, 81% of the sample firms have a majority of independent directors, but only 56% of the firms are listed on NYSE or NASDAQ. It may be that only more extreme degrees of independence influence performance. An alternative, but less recognized board structure that has grown in importance in parallel with the proliferation of independent directors is supermajority board independence where the CEO is the only insider on the board.[9] In Column (8) I replace the board independence dummy with an indicator variable taking the value one when all directors except the CEO are independent. As for board independence, supermajority board independence is insignificant.

A number of previous studies have found the relationship between inside ownership and performance to be non-monotonic, with a positive (negative) value impact at low (high) ownership levels (e g, Benson and Davidson, 2009; Kim and Lu, 2011). I test this in several ways. Firstly, I separate between high and low inside ownership stakes, with the cutoff set to 5%. Results are in Column (9). My results also seem to be non-monotonic, with the coefficient for high levels of inside ownership being significantly positive, whereas the relationship is insignificant for low ownership levels. This non-monotonicity remains if the cutoff is instead set to 10% or to median inside ownership of 7.8%, whereas a cutoff of 1% results in all ownership levels being significantly positive (not tabulated). I refrain from including squared inside ownership due to multicollinearity; the correlation between inside ownership and its

[9] This is not the only possible interpretation of supermajority board structures; Adams et al (2005) alternatively interpret supermajority board independence with the CEO as the only insider as an indicator of CEO power.

square is 0.95 and the variance inflation factors for inside ownership and its square are 12 and 16. Each of inside ownership and its square are significant when included alone, but both turn insignificant when combined in the same model (not tabulated); if I do include both terms the result is a U pattern that reaches a minimum at an inside ownership level of 7.4%. Secondly, I replace inside ownership by its logarithm (not tabulated). Now, inside ownership turns insignificant, whereas remaining results remain unchanged. This suggests that the positive ownership-performance relationship is driven by firms with large inside ownership. In a second step I add the square of log inside ownership with results in Column (10) (multicollinearity is no longer an issue: the correlation between log inside ownership and its square is 0.8 and the variance inflation factors are 3). The level term is negative, but insignificant and the square term significantly positive. The estimated pattern reaches a minimum at an inside ownership level of 2.3%. My results contrast the inverted U pattern found in most prior studies that find a curvilinear relationship. However, they are consistent with Cui and Mak (2002), who find a U pattern for their sample of high-R&D firms. Their motivation of a U rather than in inverted-U pattern is that incentive alignment may play a greater role in high-uncertainty firms. My sample would definitely fit that same high-risk categorization. In conclusion, performance in the oil-price collapse is an increasing function of inside ownership, at least for most ownership levels. I continue to use the inside ownership level in my base specification, though the squared term would work just as well as an approximation; the choice of measure of inside ownership does not influence the results for board classification or independence.

Since the definition of the event period is not clear-cut I re-estimate the base model by setting the beginning and end of the collapse to September 15, 2014 and December 31, 2014. Results are in Panel B, Columns (1) to (3). Classified board remains significantly negative, inside ownership significantly positive, and board independence insignificant. Results continue to

remain unchanged if the event window is moved further, e g, to September 1 and December 15 (not tabulated). In fact, experimentation by stepwise moving event dates one day at a time back or forth by several weeks suggest that results are insensitive to the exact dating of the event window (not tabulated).

4.3. Robustness to corporate governance mechanisms

The key, lingering problem in an event study is that of omitted-variables bias. One possibility is that my results pick up the effect of excluded governance mechanisms. To test this I add a range of alternative governance variables that target ownership, board composition, and CEO incentives, all measured as of fiscal year 2013. Results are in Table 3, Panel A. Column (1) adds the logarithm of board size, a dummy variable taking the value one if the CEO also holds the position as chairman, and outside blockholdings, measured by the proportion of outstanding shares held by unaffiliated holders of 5% or more.[10] Results remain unchanged relative the base specification and none of the added governance mechanisms are significant. In Column (2) I replace outside blockholdings by institutional blockholdings, defined as the total fraction of shares held by institutional investors above a 5% threshold. Again, results remain unchanged, and institutional blockholdings come out insignificant. As yet another measure of insider control, I define a dummy variable that takes the value one when the firm has an outside blockholder owning at least 5% of the shares. Results are in Column (3) and remain unchanged.

[10] A larger board may potentially be more supportive in a resource-dependence sense, but may also monitor less efficiently due to free-riding problems. Since governance is costly, the incentives to invest in monitoring may be greater for blockholders. CEO-chairman duality permits the CEO to effectively control the board's agenda and the information flow to other board members, but may also enable execution of strategic decisions in a timelier manner by establishing clear lines of authority and responsibility within the firm.

[Insert Table 3 about here]

As an alternative I include a set of variables that target CEO incentives. I include the fraction of shares owned by the CEO. When doing this, I recalculate inside ownership as the proportion of shares held by directors and officers excluding the CEO (ensuing results are insensitive to whether I define inside ownership including or excluding CEO ownership). As a complement I add the proportion of variable (performance-sensitive) CEO pay, measured as (Total CEO compensation – CEO base salary)/Total CEO compensation, averaged over 2012 and 2013. Finally, I add the value of option awards received by the CEO as a proportion of total CEO compensation and averaged over 2012 and 2013.[11] Results are in Columns (4) and (5). Inside ownership is still significant and positive, whereas board classification remains significantly negative. In addition, CEO ownership is also significantly positive. Interestingly, the coefficients on CEO ownership and the ownership of remaining insiders are virtually identical, so there is no point in separating the two insider categories. In addition, CEO variable pay is significant and negative. The negative sign may seem surprising, considering that variable pay just like direct ownership should fill an incentive-aligning role. The correlation between CEO ownership and CEO variable pay is a strongly significant -0.66, but excluding CEO and inside ownership from the model does not change the result on CEO variable pay, so the explanation is not multicollinearity. The negative sign is consistent with recent studies of banks during the GFC (e g, Fahlenbrach and Stulz, 2011; Bhagat and Bolton, 2014). Bhagat and Bolton (2014) and Fahlenbrach and Stulz (2011) suggest that negative bank performance during GFC was a result of banks with better incentive alignment taking greater risk pre-crisis. To assess the

[11] Results remain unchanged if I instead measure compensation for 2013 alone.

viability of this line of argumentation I sort my sample firms on the median CEO variable pay and compare pre-collapse risk levels. Firms with above-median variable pay had greater leverage, higher market beta, and lower book-to-market (not tabulated). Greater leverage and lower book-to-market were in turn related with worse performance during the collapse.

4.4. Robustness to financial policy

The oil-price collapse not only reduced the value of investment opportunities, but also reduced the value of and cash flows from oil producers' assets in place, not least oil reserves. Assets in place are essential in the industry as collateral for credit-based financing and risk management. This means that financially constrained companies could be hurt more by the collapse than less constrained peers. Lamont (1997) found such an effect in the oil-price collapse in 1986, whereas Andrén and Jankensgård (2015) found financially constrained oil companies to benefit more than unconstrained peers from the oil-price increases over the period 2005 to 2008. It is unlikely that omitted proxies for financial constraints explain my results, since firm size, book-to-market, and leverage are already in the model, but I add operating cash flow, cash holdings, and dividends paid, all measured relative to total assets and as of fiscal year 2013, on the assumption that firms that generate greater cash flow, hold more liquid reserves, or pay dividends are less dependent on credit markets. Results are reported in Column (1) of Table 3, Panel B. Results remain unchanged while none of the added variables come out significant.

4.5. Robustness to operating characteristics

Omitted-variables bias may derive from structural differences across sample firms. The single-industry focus means that I automatically control for industry-specific effects. Still, important structural operating differences could remain. Here, the transparency and homogeneity of the

US oil industry comes in handy. I focus on two dimensions of operating characteristics: diversification and operating efficiency.

The petroleum value chain encompasses a range of activities involved in transforming crude oil and gas into a range of end-products. Upstream, the value chain involves exploration for and appraisal of reserves, development of wells, and production of hydrocarbons (collectively referred to as the Exploration and Production (E&P) segment). Downstream, we instead find the Refining and Marketing (R&M) segment, comprising activities such as oil refining and gas processing, as well as the marketing stage involving distribution and sale of refined petroleum products to end users. In-between, we have the midstream segment comprising marketing services (e g, commodity-price structuring, contract administration, and nomination services) and infrastructure (e g, gathering, treatment, compression, transportation, and storage) that link production and processing. Operations are highly capital intensive and the benefits of economies of scale are widely acknowledged. Accordingly, most companies are pure plays. I define a pure play as a company that generates at least 90% of its revenues within a single four-digit SIC code. Using that definition, 88% of my sample firms are pure plays, of which 94% belong to the E&P segment, while remaining pure plays are in R&M. The other prominent strategy in the petroleum value chain is vertical integration (12% of the sample), although the details of integration vary. Upstream-integrated companies typically integrate up- and midstream activities (production, drilling, and marketing services), whereas downstream-integrated players focus on mid- and downstream activities (transportation, refining, and marketing). A few companies (the oil majors like Chevron and Exxon Mobil) integrate the entire petroleum value chain. No company in the sample is completely unrelatedly diversified, though one company has more extensive operations (10% of sales) outside of the petroleum value chain, in petrochemicals and chemicals production.

I test a range of diversification measures, all measured as of fiscal yearend 2013. I follow Mitton (2002) in defining (*i*) a pure-play dummy variable taking the value one if the firm generates more than 90% of its revenues from the same four-digit SIC code and (*ii*) the number of segments in which each firm operates, with segments defined at the three-digit SIC level. SIC-code data are from Capital IQ and Compustat, complemented with my own assessment of the firms' 10-K segment reporting. Since SIC codes are blunt measures of relatedness and classifications are a bit arbitrary I also use the R^2 from the market model (estimated on daily stock returns for the period June 1, 2013 – May 31, 2014 using the Scholes and Williams 1977 technique). The advantage with R^2 is that it measures diversification in the true correlation sense of the term. Further, I introduce two industry-specific measures of operational integration (with all variables converted to mmboe): (*i*) upstream integration, measured as Total hydrocarbon production/(Total hydrocarbon production + Total refining throughput capacity), and (*ii*) downstream integration, measured by Total refining throughput capacity/(Total refining throughput capacity + Refined-petroleum-product sales).[12] Yet another aspect of diversification is the degree of specialization on oil vs gas. Gas prices tend to follow a different process than oil prices, thereby allowing diversification possibilities. The correlation between WTI crude oil prices and Henry Hub gas prices over the period January 2011 to May 2014 was a mere 9%, but during the collapse the correlation was 77%. Notably, gas prices did not follow the oil price down until after the OPEC announcement, but after that fell almost 1:1 with the oil price. I introduce horizontal diversification, measured as Proven gas reserves/Total proven hydrocarbon reserves. Results are in Table 3, Panel B, Columns (2) to (6). Results are robust to operational

[12] One of the advantages of working with a single country is that reporting regulations are uniform for the sample firms, e g, on how to estimate and certify oil and gas reserves.

diversification; the weakest significance level for board classification (inside ownership) is p = 3% (p = 2%) in one-sided tests. Board independence is consistently insignificant. Diversification is valuable in the collapse, as HPR_{main} is lower for pure plays and increasing with the number of segments.

The E&P segment tends to be more risky than the R&M segment, given its direct exposure to commodity prices; refining and processing are exposed to crack spreads (the spreads between refined and crude oil and gas prices) rather than crude prices, and crack spreads are typically less volatile than crude prices. The exposure to crude prices in the R&M segment is rather indirect, through the impact on wholesale and retail petroleum demand and the crack spreads. I include a dummy variable that takes the value one for firms that have a majority of their sales in the E&P segment and zero for firms that are dominant in the R&M segment. Since output prices are given and the efficient use of scale is important, I also include the operating-profit margin (earnings before interest, taxes, depreciation, and amortization (EBITDA) to sales), which is a key productivity measure in the oil industry. To further capture potential differences in operating characteristics I also include the reserves-to-production ratio (Total proven hydrocarbon reserves to Total hydrocarbon production), investment intensity (capital expenditures to total assets), and market share (the firm's sales revenues in 2013 to total sample revenues in 2013). Results are in Column (7). The significance of board classification increases when including these operating characteristics, whereas the significance of inside ownership drops to p = 6% (one-sided test). Including the operating-profit margin leads to a loss of observations, since some of the companies are in an exploration phase and are not generating any sales revenues. To maintain sample size I as an alternative include return on assets (EBITDA to total assets); now, inside ownership regains its higher significance (Column 8).

My final test of robustness to omitted variables adds oil betas to the main specification. Oil betas are estimated using the methodology of Jorion (1990) by augmenting the market model with log changes in oil (Brent) prices; the coefficient on changes in oil prices measures the firm's exposure to oil-price changes.[13] Results are in Column (9). All results remain robust.

To summarize the omitted-variables testing, board classification (inside ownership) is systematically negatively (positively) related with HPR_{main}. Both results are consistent with what agency theory would have us believe. There is an equally strong lack of relationship for board independence. These results even hold if I add in all variables included in the robustness sections in a single model, though such a model is not really relevant from a degrees-of-freedom viewpoint (results not tabulated, but board classification (inside ownership) has *p*-values of 3% (4%)).

4.6. Other robustness checks

To guard against the influence of outliers, I winsorize all non-binary variables (at the 1st and 99th percentiles). Results for the governance variables remain unchanged.

An alternative to using *HPRs* is to use market-adjusted cumulative abnormal market-adjusted returns (*CARs*). *CARs* are calculated as the product sum of daily market-adjusted returns over the event period. Board classification comes out strongly significantly negative and inside ownership weakly significantly positive.

[13] Results remain unchanged if oil prices are measured using the WTI.

As an alternative model specification, I employ a variation of Bertrand et al's (2002) methodology, where the focus is on relative responsiveness to the oil-price collapse. Let HPR_{vw} be the value-weighted average HPR_{main} for all sample firms excluding firm *i*. Bertrand et al propose using HPR_{vw} as a measure of firm *i*'s predicted performance, which they include as an explanatory variable in their modeling. The advantage of this test specification is that it purges out the industry shock, in the form of the general industry sensitivity to the oil-price collapse, thereby isolating the firm-specific effect of the collapse. Results for the base model augmented with HPR_{vw} are in Column (10); results remain unchanged. I also estimate robustness models similar to Table 2 with the addition of HPR_{vw}. Results are virtually identical, so they are not tabulated. HPR_{vw} comes out insignificant in all specifications. The results remain identical if I instead specify the dependent variable as the spread between firm *i*'s actual and predicted performance ($HPR_{main,i} - HPR_{vw,i}$).

5. Event study on the OPEC policy change

In this section I turn to announcement effects of the November 27 OPEC announcement. I compute cumulative market-adjusted abnormal returns for November 26-28 (stock markets were closed on November 27, Thanksgiving Day), using the market model to calculate expected returns. The WTI fell by 10.2% and Brent by 8.7% over November 26-28, while the average *AR* was -13.1% (t = -11.90). This suggests that investors responded harshly to the announcement, in spite of the de facto OPEC policy change preceding the de jure announcement. A number of studies show that OPEC announcements influence oil prices (e g, Loutia et al, 2016), though typically not as severely as this particular announcement. The *AR* for firms with a classified (unitary) board was -20.3% (-10.3%) with the difference being strongly significant (t = 4.39), whereas firms with a majority (no majority) of independent board

members had *ARs* of -15.19% and -4.05% (t = 4.18) and firms with inside ownership above (below) 5% had *ARs* of -15.64% and -11.42% (t = 1.89).

Table 4, Panel A reports multivariate regression results. I include the same core control variables as before: book-to-market, log market capitalization, and leverage. Added separately, each of the governance variables come out significant with board classification and board independence (inside ownership) having a negative (positive) impact on *ARs* (Columns 1-3). Including all variables (Column 4), board independence loses its significance, so its independent effect seems to be picking up the effect of the other two governance variables rather than capturing a unique effect of independence on performance. Replacing board independence with supermajority independence does not change this result (Column 5).

[Insert Table 4 about here]

I test the robustness of the results on the OPEC announcement to potential omitted variables bias in a fashion similar to what I do for *HPRs*. Table 4, Panel B presents representative results. Board classification is strongly significantly negative and board independence insignificant throughout the testing. Inside ownership is significantly or weakly significantly positive (one-sided tests) in most models. As for control variables, the logarithm of board size is the only additional governance variable that comes out significant (and positive) (Column 1). Most diversification proxies (pure-play dummy, number of three-digit SICs, downstream integration, and horizontal diversification) are significant, as are the operating-performance proxies (operating profit margin and return on assets). *ARs* are less negative for more diversified and better-performing firms (Columns 3-5). Results are robust to estimation of market-adjusted

return (ordinary or Scholes & Williams 1977 betas) and to estimating expected returns using the Fama-French 3-factor model.

To summarize, board classification is the only test variable that consistently and robustly influences the impact of the OPEC announcement on corporate performance, and the effect is strongly significantly negative. As for *HPRs*, firms with a classified board performed worse than unitary-board firms. Inside ownership is predominantly significant, with a positive impact on performance.

6. Moderating effects of corporate governance

My results on board classification and inside ownership are consistent with the detrimental downsides of entrenchment. Yet, a lingering question is why firms with a classified board and low inside ownership fared worse during the collapse. Two prime sources of agency conflicts are differences between insiders and outsiders in risk attitudes and desires for corporate growth. In this section I explore if differences in risk taking or empire building could explain differences in performance. Since board independence is consistently insignificant throughout the previous testing I do not analyze it further here.

Agency models typically assume that managers are excessively conservative because they cannot fully diversify the risk of firm-specific human capital, and an important role of incentive alignment is to encourage corporate risk taking (e g, Jensen and Meckling, 1976). Agency conflicts also derive from differences in growth incentives between managers and outside shareholders (Jensen, 1986). Whereas insiders may derive private benefits from growth and empire building, only growth with expected return in excess of the cost of capital is value-

adding to shareholders. Jensen (1986) notes that acquisitions are a primary method by which managers invest in empire building. If, as suggested by Johnson et al (2000) and Mitton (2002), the agency problem is aggravated during a crisis and risk taking or acquisitions are central sources of the agency problem, then we would expect board classification and inside ownership to moderate the performance-risk taking and performance-acquisition relationships.

The collapse altered the riskiness of the oil industry. The oil price traded so stably during the years prior to the collapse that oil-price volatility fell to low levels not seen since the early 1970s. This changed drastically with the collapse. Figure 2, Panel A shows annualized volatility from a GARCH (1, 1) process fitted to the first-differenced WTI oil price series and from rolling 1-year standard deviations updated daily from May 20, 1987 to March 31, 2016. Volatility fluctuated around 17% over the first half of 2014. By October volatility had increased to 25% and by early December to over 50%. We see even more drastic increases in distress risk. Oil reserves represent a substantial part of corporate assets in the industry and as the oil price falls, so do asset values and the probability of default (*PD*) accordingly increases. The distance-to-default measure uses the Merton (1974) model to estimate the probability that ownership becomes worthless, i e, that the equity call option ends up out of the money. I obtain *PDs* from Capital IQ, where Capital IQ's *PD* model is a proprietary implementation of the Merton (1974) model. The mean *PD* as of May 31, 2014 was 0.93%. By January 13, 2015 it had increased to 14.05% (see Figure 2, Panel B).

[Insert Figure 2 about here]

To assess whether the quality of governance moderated the risk taking-performance relationship I follow a two-step procedure. I begin by testing the performance implications of

different risk-taking measures to identify measures that mattered to performance during the collapse. Then I run models where I interact these key measures with board classification and inside ownership. We saw in the pre-testing that leverage and book-to-market significantly influenced *HPRs*, whereas beta did not. In addition, I test stock-return volatility, with volatility calculated as the standard deviation in daily stock returns over June 1, 2013 to May 31, 2014.[14] I also test *PD* as of May 31, 2014. Columns (1) and (2) of Table 5 report regression models of HPR_{main} on my base-model specification augmented with volatility and *PD*.

[Insert Table 5 about here]

Three risk-taking measures are significantly related with HPR_{main}: leverage, book-to-market, and *PD*. Classified-board firms and firms with inside ownership below five percent had significantly lower *PD* prior to the collapse, while there are no pre-collapse differences in leverage or book-to-market between unitary- and classified-board firms, nor between firms with inside ownership below and above five percent. In step 2 I re-estimate the models for these key risk-taking measures, this time augmented with interaction terms between risk taking, board classification, and inside ownership (Columns 3 to 5). The interaction terms between board classification and each of the three risk-taking measures are significantly negative. Greater leverage and *PD* are related with worse performance in the collapse and board classification amplifies the effects. The moderation effects of board classification are economically significant; a one-standard deviation increase in leverage (*PD*) reduces HPR_{main} of unitary-board firms by 10.6% (4.7%), whereas it reduces the performance of classified-board firms by

[14] I also test idiosyncratic volatility, measured as the residual standard deviation from the market and Fama-French models, but with near-identical results.

(20.2%) 12.4%. The average *PD* as of May 31, 2014 was 1.2% (0.4%) among firms with a unitary (classified) board, consistent with the notion that greater incentive alignment leads to greater risk taking The moderation of board classification on *PD* is large enough to eliminate this between-group difference. Consistent with the Fama-French model, higher book-to-market led to better performance in the collapse. Board classification strongly mitigates this beneficial effect. Again the mediation is economically significant; a one-standard-deviation increase in book-to-market increases the HPR_{main} of unitary-board firms by 6.2%, whereas it reduces the performance of classified-board firms by 21.0%. The interaction term between inside ownership and leverage is weakly significant and inside ownership attenuates the negative impact of leverage on performance. The other interaction terms come out insignificant. Unsurprisingly, more risky companies fair worse in times of crisis. More strikingly, board classification substantially worsens this weaker performance, whereas inside ownership seem to have a mitigating effect, at least on leverage. This suggests that insider expropriation in times of crisis is an increasing function of corporate risk taking.

I hypothesize that greater desire for acquisitions is accompanied by greater misbehavior in firms with entrenched insiders. I begin by regressing performance on acquisition propensity, using acquisition spending to total assets in fiscal year 2013 as a proxy for managerial desires to make acquisitions at least partly financed with cash. Column (6) of Table 5 shows that acquisitions influence HPR_{main} strongly significantly negatively. Column (7) adds interaction terms between board classification, inside ownership, and acquisition spending. The interaction term with board classification is strongly significantly negative. It is also economically significant; a one-standard-deviation increase in acquisition spending reduces HPR_{main} by 5.0% (24.1%) for firms with a unitary (classified) board. This is a strong indication that entrenched

insiders' incentives for empire building are value destroying. The interaction term between acquisition spending and inside ownership is insignificant.

An alternative interpretation is that acquisition spending in 2013 does not proxy for acquisition incentives, but rather captures the expected performance of recently made acquisitions. In that case, acquisitions made during fiscal year 2013 fell significantly in value during the collapse, and the value reduction was stronger for firms with classified boards. The acquisitions made in 2013 were undertaken during a period when forward oil prices were high. As oil prices fall, it is natural that the expected performance of these investments decline substantially. Importantly, expected performance declines substantially more in classified-board firms. This is not explained by differences in acquisition propensities in 2013, as both average acquisition spending in 2013 and the proportion of firms that made cash-financed acquisitions were the same in classified- and unitary-board firms. Rather, it is consistent with an overinvestment interpretation where entrenched managers influence the performance of acquisitions negatively. This result provides a nice complement to Masulis et al (2007), who show that acquirer with more antitakeover provisions experience significantly lower announcement-period returns.

In summary, the entrenchment costs of board classification are increasing in corporate risk taking and acquisition spending. This is consistent with agency-theoretic predictions, where insider-outsider differences in risk attitudes and growth incentives are key sources of agency conflicts. There is also evidence of a relationship between inside ownership and leverage, where the negative effect of leverage on performance is attenuated by greater incentive alignment.

7. Conclusion

This paper seeks to make a contribution to the study of the relationship between the quality of corporate governance and firm performance in times of crisis. My identification comes from a natural experiment consisting of the oil price collapse of the autumn of 2014. This shock enables me to identify how investors view the aggregate effect of board classification, board independence, and inside ownership on firm value for affected US oil companies.

Firms with classified boards suffered during the collapse. On the contrary, the greater the ownership level of insiders, the better the firm sustained the crisis. These results suggest an entrenchment interpretation where insider expropriation increases in times of crisis, consistent with agency costs being countercyclical. An important source of value destruction is that classified boards aggravate the effects of corporate risk taking and acquisitions on performance. Whether measured by leverage, value of growth opportunities, or probability of default, risk taking was punished during the collapse and particularly so in firms with classified boards. Inside ownership mediates the impact of leverage on performance; levered firms underperform in the collapse, but less so in firms with higher inside ownership. As for board independence, it seems to be of no relevance to firm performance during the collapse.

The findings contribute causal evidence to the ongoing policy debate on what constitutes good corporate governance. The appropriation of firm value by entrenched insiders seem to be more severe, and good governance consequently more valuable during the crisis. The evidence is consistent with the view that the ownership structure plays an important role in determining incentives of insiders to expropriate outside shareholders during times of crisis. It is also consistent with the strong entrenchment effect of board classification.

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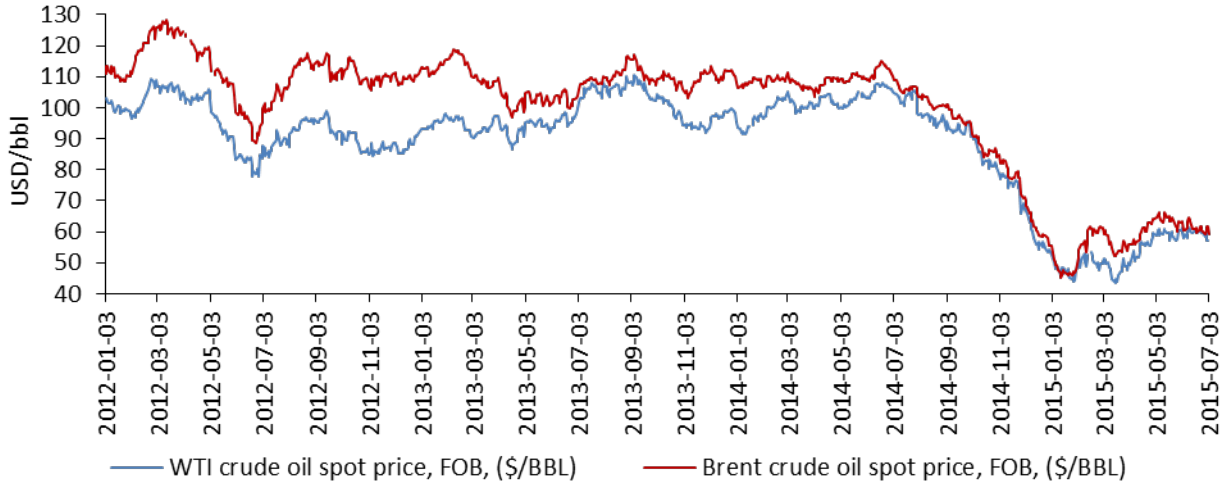
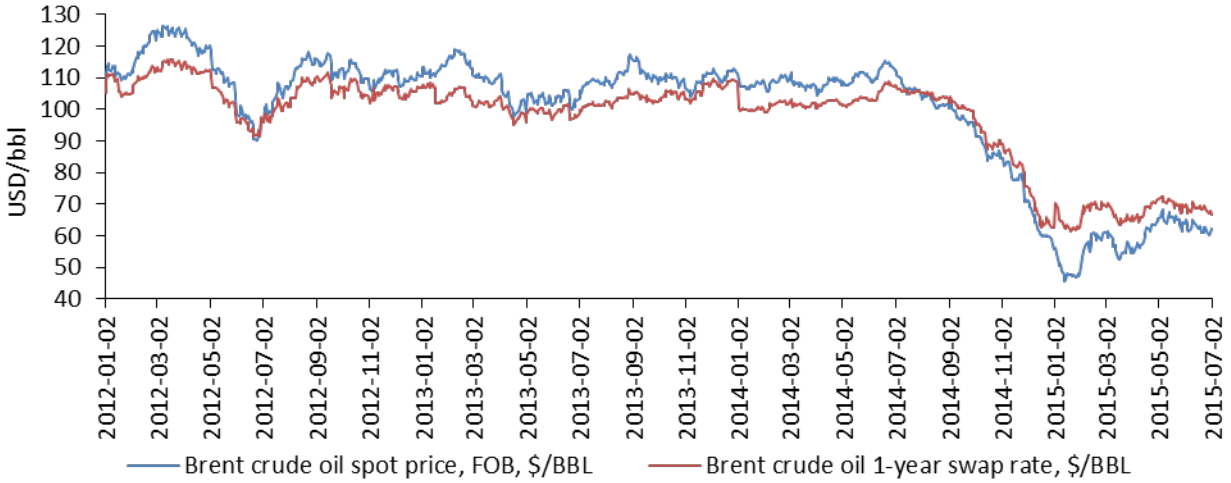
Panel A. Brent and West Texas Intermediate (WTI) crude oil prices, 2012-2015



Panel B. Brent spot and 1-year forward prices, 2012-2015



Panel C. Net trading positions of oil investors and oil producers, 2012-2015

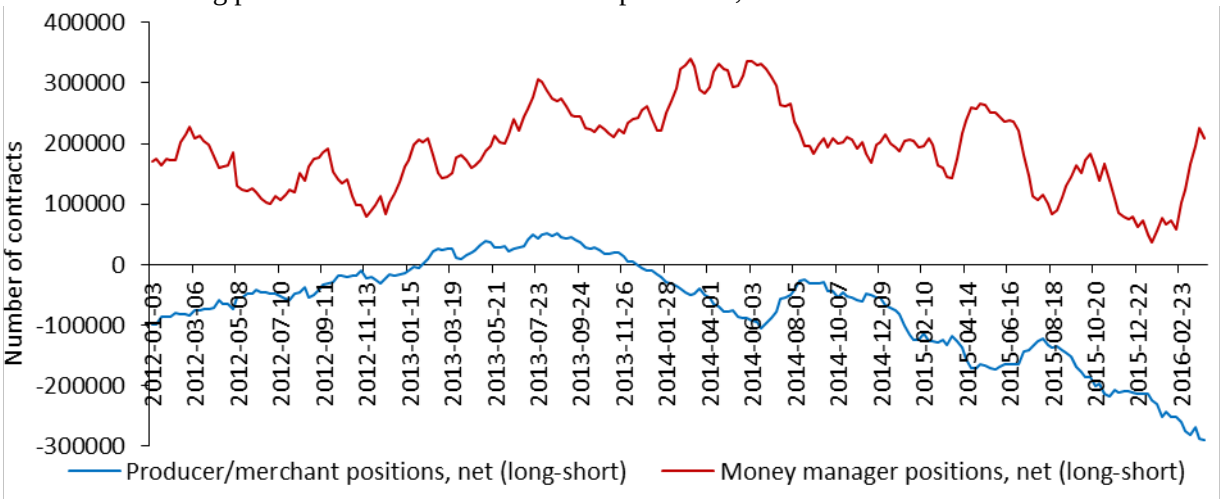
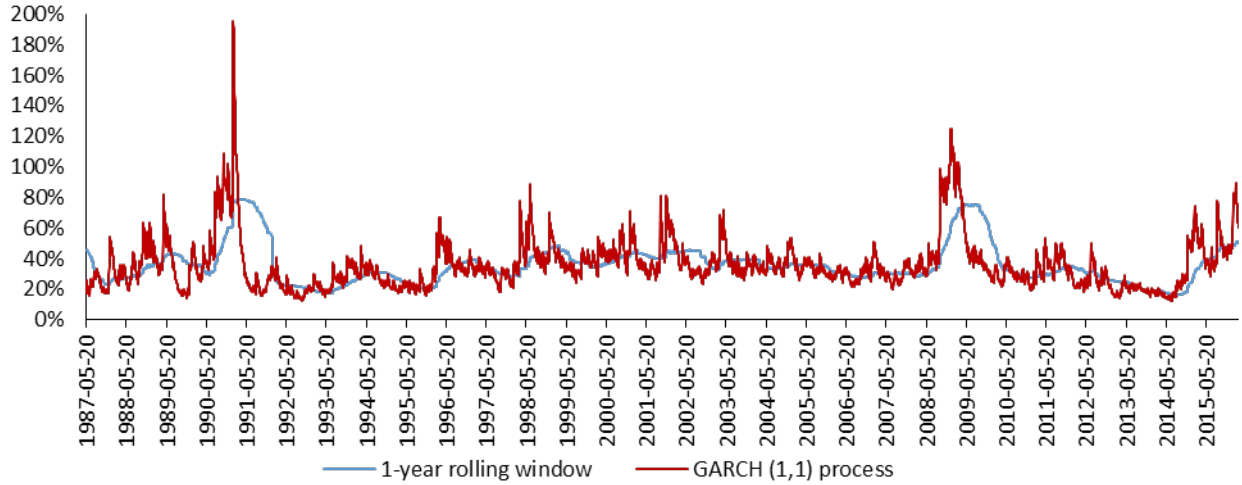


Fig. 1. Spot and forward crude oil prices. Panel A: daily spot West Texas Intermediate (WTI) and Brent crude oil prices from 1987 to 2016. Panel B: spot and 1-year forward Brent prices. Panel C: weekly net trading positions in WTI oil futures of oil investors and oil producers.

Panel A. Oil-price volatility, 1987-2016



Panel B. Average probability of default, June 2014-January 2015

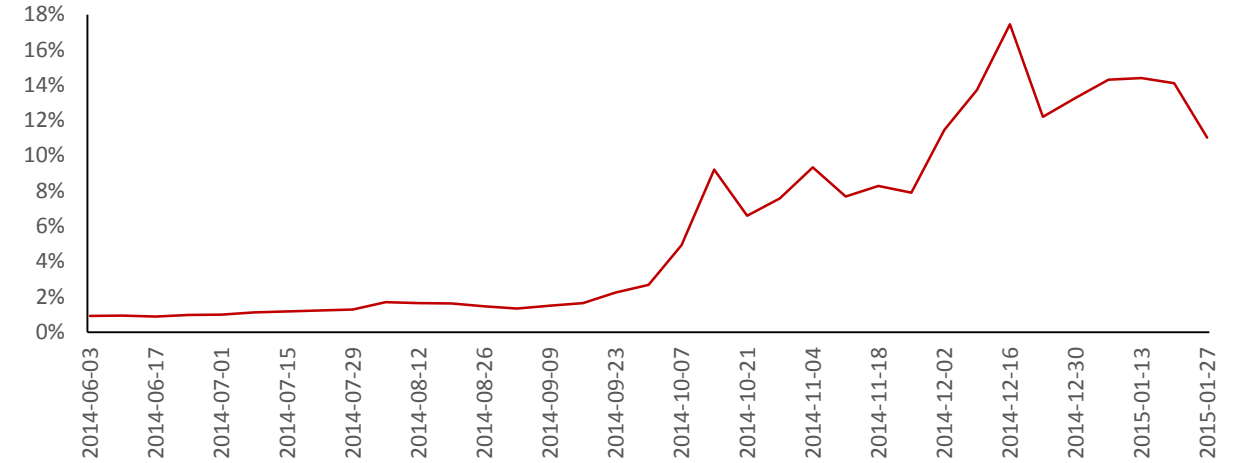


Fig. 2. Annualized crude-oil-price volatility. Panel A: annualized volatility of daily Brent crude oil price changes estimated using a GARCH (1,1) process fitted to the first-differenced WTI oil price series from May 20, 1987 to March 31, 2016 and measured by standard deviation calculated over rolling 1-year windows updated weekly. Panel B: sample-average probability of default (from Capital IQ's proprietary distance to default model), June 2014-January 2015, weekly data.

Table 1

Definitions and summary statistics for the principal dependent and independent variables.

Panel A defines each variable. Panel B provides summary statistics for the sample of oil companies. All variables except performance variables, market capitalization, and the book-to-market ratio are measured as of the most recent fiscal yearend prior to June 2014 (fiscal year 2013).

Panel A: Principal variables	
Variables	Description
Performance variables	
HPR	Buy-and-hold return including dividends
AR	Daily stock return adjusted for market return
Governance variables	
Classified board	1 if firm has classified board
Board independence	Proportion of independent board members
Supermajority board independence	1 if CEO is the only insider board member
CEO-chairman duality	1 if CEO holds position as chairman
Board size	Number of board members
Inside ownership	Proportion of ownership by executives and directors
Outside blockholdings	Proportion of ownership by outside owners owning ≥5%
Institutional blockholdings	Proportion of ownership by institutional owners owning ≥5%
Variable CEO compensation	Proportion of variable to total CEO compensation
Options-based CEO compensation	Proportion of option awards to total CEO compensation
Other variables	
Total assets ($mm)	Book value of total assets, in $ million
Market capitalization ($mm)	Market value of equity, in $ million
Book-to-market ratio	Ratio of book value of total assets – book value of equity + market value of equity to total assets
Leverage	Ratio of book value of interest-bearing debt to total assets
Operating cash flow	Ratio of operating cash flow to total assets
Investment intensity	Ratio of capital expenditures to total assets

Table 1 (*continued*)	
Cash holdings	Ratio of cash holdings to total assets
Dividends	Ratio of cash dividends to total assets
Operating profit margin	Ratio of earnings before interest, taxes, depreciation and amortization (EBITDA) to sales
Return on assets	Ratio of EBITDA to total assets
Acquisitions	Ratio of cash acquisitions to total assets
#Segments	Number of SIC 2-digit segments
Pure play	1 if ≥90% of sales come from the same 4-digit SIC
Market model R^2	From market model estimated on daily data over June 1, 2013-May 31, 2014 using Scholes/Williams (1977) estimator
Upstream integration	Ratio of total hydrocarbon production to (total hydrocarbon production + total refining throughput capacity)
Downstream integration	Ratio of total refining throughput capacity to (total refining throughput capacity + refined-petroleum-product sales)
Horizontal diversification	Ratio of proven gas reserves to total proven hydrocarbon reserves
E&P	1 if majority of sales are in the Exploration & Production segment
Reserves-to-production ratio	Ratio of total proven hydrocarbon reserves to total hydrocarbon production
Market share	Firm's share of total-sample sales
Oil beta	From market model augmented with log oil prices on daily data over June 1, 2013-May 31, 2014 using Scholes/ Williams (1977) estimator
Market beta	Estimated on daily data over June 1, 2013-May 31, 2014 using Scholes/Williams (1977) estimator
Volatility	Annualized standard deviation over June 1, 2013-May 31, 2014
PD	Probability of default from Capital IQ's distance-to-default measure

Panel B: Descriptive statistics			
	Mean	Median	Std dev
Firm performance			
HPR_{main} [Oct 1, 2014 - Jan 13, 2015]	-0.406	-0.411	0.214
AR [Nov 26-28, 2014]	-0.131	-0.116	0.409
Number of firms	129	129	129
Governance variables			
Classified board	0.287	0.000	0.454
Board independence	0.696	0.750	0.237
CEO-chairman duality	0.550	1.000	0.499
Board size	7.023	7.000	2.734
Inside ownership	0.170	0.078	0.219
Outside blockholdings	0.207	0.169	0.175
Institutional blockholdings	0.147	0.108	0.159
Variable CEO compensation	0.643	0.801	0.336
Options-based CEO compensation	0.117	0.000	0.209
Other variables			
Total assets ($mm)	11,713	991	40,345
Market capitalization ($mm)	13,677	769	51,011
Book-to-market ratio	0.801	0.513	1.945
Leverage	0.250	0.227	0.199
Operating cash flow	0.073	0.105	0.130
Investment intensity	0.188	0.164	0.149
Dividends	0.006	0.000	0.015
Operating profit margin	0.071	0.114	0.183
Market beta	0.726	0.882	1.749
Volatility	0.712	0.405	1.174

Table 2

Relation between firm performance and corporate governance during the oil price collapse

Panel A: Regression results for buy-and-hold returns over Oct 1, 2014 – Jan 13, 2015. Panel B: Regression results for buy-and-hold returns over alternative event windows. Variables are defined in Table 1. All regressions include constant term (suppressed). All variables except market capitalization are measured as of fiscal year 2013; market capitalization (incl in calculation of book-to-market ratio) measured on May 3, 2014.

Panel A: HPR_{main}	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
HPR [June 1, 2013 - May 31, 2014]	0.012									
	(0.029)									
Market beta		-0.007	-0.007							
		(0.005)	(0.004)							
Book-to-market ratio		0.027***	0.023***	0.020**	0.030***	0.021**	0.029***	0.030***	0.029***	0.024**
		(0.007)	(0.009)	(0.009)	(0.008)	(0.009)	(0.009)	(0.009)	(0.009)	(0.010)
Log(Market capitalization)		0.032***	0.034***	0.038***	0.049***	0.041***	0.051***	0.053***	0.051***	0.047***
		(0.007)	(0.008)	(0.006)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.009)
Leverage			-0.447***	-0.432***	-0.453***	-0.427***	-0.443***	-0.435***	-0.436***	-0.405***
			(0.117)	(0.118)	(0.111)	(0.123)	(0.109)	(0.110)	(0.111)	(0.116)
Operating cash flow			0.125							
			(0.197)							
Classified board				-0.099**			-0.086**	-0.089**	-0.084**	-0.076*
				(0.042)			(0.043)	(0.042)	(0.043)	(0.044)
Inside ownership					0.003**		0.003**	0.003**		
					(0.001)		(0.001)	(0.001)		
Board independence						-0.078	0.004		0.004	-0.010
						(0.066)	(0.074)		(0.074)	(0.072)
Supermajority board independence								-0.049		
								(0.038)		
Inside ownership < 5%									-0.006	
									(0.015)	
Inside ownership > 5%									0.003**	
									(0.001)	
Log(Inside ownership)										-0.027
										(0.016)
Log(Inside ownership)^2										0.016**
										(0.006)

Table 2 (*continued*)										
R^2 adjusted	-0.007	0.096	0.195	0.224	0.253	0.210	0.262	0.271	0.271	0.254
N	129	129	129	129	129	129	129	129	129	129

Panel B: Alternative *HPRs*	(1)	(2)	(3)
	Sep 15, 2014 - Jan 13, 2015	Oct 1, 2014 - Dec 31, 2014	Sep 15, 2014 - Dec 31, 2014
Book-to-market ratio	0.033***	0.030***	0.034***
	(0.007)	(0.009)	(0.007)
Log(Market capitalization)	0.059***	0.047***	0.055***
	(0.007)	(0.008)	(0.008)
Leverage	-0.419***	-0.459***	-0.446***
	(0.106)	(0.149)	(0.109)
Classified board	-0.075*	-0.090**	-0.081**
	(0.042)	(0.042)	(0.041)
Inside ownership	0.003**	0.003**	0.003**
	(0.001)	(0.002)	(0.002)
Board independence	0.004	0.007	0.005
	(0.073)	(0.078)	(0.077)
R^2 adjusted	0.320	0.247	0.298
N	129	129	129

Table 3

Robustness of relation between firm performance and corporate governance during the oil price collapse
Regression results for buy-and-hold returns over Oct 1, 2014 – Jan 13, 2015. Panel A: Regression results for Model (7) in Table 2 augmented with additional governance variables. Panel B: Regression results for Model (7) in Table 2 augmented with additional corporate characteristics. Variables are defined in Table 1. All regressions include constant term (suppressed). All variables except market capitalization are measured as of fiscal year 2013; market capitalization (incl in calculation of book-to-market ratio) measured on May 3, 2014.

Panel A. Omitted governance variables	(1)	(2)	(3)	(4)	(5)
Book-to-market ratio	0.030***	0.030***	0.029***	0.030***	0.029***
	(0.010)	(0.010)	(0.010)	(0.008)	(0.008)
Log(Market capitalization)	0.043***	0.042***	0.044***	0.068***	0.058***
	(0.009)	(0.009)	(0.009)	(0.011)	(0.013)
Leverage	-0.445***	-0.460***	-0.436***	-0.400***	-0.383***
	(0.113)	(0.114)	(0.110)	(0.105)	(0.111)
Classified board	-0.097**	-0.101**	-0.098**	-0.092**	-0.100**
	(0.045)	(0.044)	(0.044)	(0.045)	(0.046)
Inside ownership	0.003**	0.003**	0.003**		
	(0.001)	(0.001)	(0.001)		
Board independence	-0.005	-0.010	-0.001	0.053	0.062
	(0.074)	(0.073)	(0.075)	(0.073)	(0.073)
Log(Board size)	0.081	0.082	0.085		0.016
	(0.064)	(0.063)	(0.064)		(0.011)
Outside blockholdings	-0.000				-0.001
	(0.001)				(0.001)
CEO-chairman duality	0.033	0.035	0.034		0.016
	(0.041)	(0.039)	(0.039)		(0.038)
Institutional ownership		0.001			
		(0.001)			
Outside blockholdings ≥5% dummy			-0.048		
			(0.051)		
Inside ownership excl CEO				0.003**	0.003**
				(0.001)	(0.001)
CEO ownership				0.003**	0.003**
				(0.001)	(0.001)
Variable CEO compensation				-0.272**	-0.279**
				(0.123)	(0.119)
Options-based CEO compensation				-0.058	-0.070
				(0.091)	(0.089)
R^2 adjusted	0.257	0.259	0.263	0.315	0.315
N	129	129	129	129	129

Table 1

Definitions and summary statistics for the principal dependent and independent variables.

Panel A defines each variable. Panel B provides summary statistics for the sample of oil companies. All variables except performance variables, market capitalization, and the book-to-market ratio are measured as of the most recent fiscal yearend prior to June 2014 (fiscal year 2013).

Panel A: Principal variables	
Variables	Description
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Governance variables	
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Institutional blockholdings	Proportion of ownership by institutional owners owning ≥5%
Variable CEO compensation	Proportion of variable to total CEO compensation
Options-based CEO compensation	Proportion of option awards to total CEO compensation
Other variables	
Total assets ($mm)	Book value of total assets, in $ million
Market capitalization ($mm)	Market value of equity, in $ million
Book-to-market ratio	Ratio of book value of total assets – book value of equity + market value of equity to total assets
Leverage	Ratio of book value of interest-bearing debt to total assets
Operating cash flow	Ratio of operating cash flow to total assets
Investment intensity	Ratio of capital expenditures to total assets

Table 1 (*continued*)	
Cash holdings	Ratio of cash holdings to total assets
Dividends	Ratio of cash dividends to total assets
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Return on assets	Ratio of EBITDA to total assets
Acquisitions	Ratio of cash acquisitions to total assets
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Pure play	1 if ≥90% of sales come from the same 4-digit SIC
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Upstream integration	Ratio of total hydrocarbon production to (total hydrocarbon production + total refining throughput capacity)
Downstream integration	Ratio of total refining throughput capacity to (total refining throughput capacity + refined-petroleum-product sales)
Horizontal diversification	Ratio of proven gas reserves to total proven hydrocarbon reserves
E&P	1 if majority of sales are in the Exploration & Production segment
Reserves-to-production ratio	Ratio of total proven hydrocarbon reserves to total hydrocarbon production
Market share	Firm's share of total-sample sales
Oil beta	From market model augmented with log oil prices on daily data over June 1, 2013-May 31, 2014 using Scholes/ Williams (1977) estimator
Market beta	Estimated on daily data over June 1, 2013-May 31, 2014 using Scholes/Williams (1977) estimator
Volatility	Annualized standard deviation over June 1, 2013-May 31, 2014
PD	Probability of default from Capital IQ's distance-to-default measure

Table 2

Relation between firm performance and corporate governance during the oil price collapse

Panel A: Regression results for buy-and-hold returns over Oct 1, 2014 – Jan 13, 2015. Panel B: Regression results for buy-and-hold returns over alternative event windows. Variables are defined in Table 1. All regressions include constant term (suppressed). All variables except market capitalization are measured as of fiscal year 2013; market capitalization (incl in calculation of book-to-market ratio) measured on May 3, 2014.

Panel A: HPR_{main}	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
HPR [June 1, 2013 - May 31, 2014]	0.012									
	(0.029)									
Market beta		-0.007	-0.007							
		(0.005)	(0.004)							
Book-to-market ratio		0.027***	0.023***	0.020**	0.030***	0.021**	0.029***	0.030***	0.029***	0.024**
		(0.007)	(0.009)	(0.009)	(0.008)	(0.009)	(0.009)	(0.009)	(0.009)	(0.010)
Log(Market capitalization)		0.032***	0.034***	0.038***	0.049***	0.041***	0.051***	0.053***	0.051***	0.047***
		(0.007)	(0.008)	(0.006)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.009)
Leverage			-0.447***	-0.432***	-0.453***	-0.427***	-0.443***	-0.435***	-0.436***	-0.405***
			(0.117)	(0.118)	(0.111)	(0.123)	(0.109)	(0.110)	(0.111)	(0.116)
Operating cash flow			0.125							
			(0.197)							
Classified board				-0.099**			-0.086**	-0.089**	-0.084**	-0.076*
				(0.042)			(0.043)	(0.042)	(0.043)	(0.044)
Inside ownership					0.003**		0.003**	0.003**		
					(0.001)		(0.001)	(0.001)		
Board independence						-0.078	0.004		0.004	-0.010
						(0.066)	(0.074)		(0.074)	(0.072)
Supermajority board independence								-0.049		
								(0.038)		
Inside ownership < 5%									-0.006	
									(0.015)	
Inside ownership > 5%									0.003**	
									(0.001)	
Log(Inside ownership)										-0.027
										(0.016)
Log(Inside ownership)^2										0.016**
										(0.006)

Table 2 (*continued*)										
R^2 adjusted	-0.007	0.096	0.195	0.224	0.253	0.210	0.262	0.271	0.271	0.254
N	129	129	129	129	129	129	129	129	129	129

Panel B: Alternative *HPRs*	(1)	(2)	(3)
	Sep 15, 2014 - Jan 13, 2015	Oct 1, 2014 - Dec 31, 2014	Sep 15, 2014 - Dec 31, 2014
Book-to-market ratio	0.033***	0.030***	0.034***
	(0.007)	(0.009)	(0.007)
Log(Market capitalization)	0.059***	0.047***	0.055***
	(0.007)	(0.008)	(0.008)
Leverage	-0.419***	-0.459***	-0.446***
	(0.106)	(0.149)	(0.109)
Classified board	-0.075*	-0.090**	-0.081**
	(0.042)	(0.042)	(0.041)
Inside ownership	0.003**	0.003**	0.003**
	(0.001)	(0.002)	(0.002)
Board independence	0.004	0.007	0.005
	(0.073)	(0.078)	(0.077)
R^2 adjusted	0.320	0.247	0.298
N	129	129	129

Panel B. Other omitted variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Book-to-market ratio	0.030***	0.027***	0.028***	0.027***	0.027***	0.027***	-0.133***	0.023**	0.021**	0.028***
	(0.010)	(0.009)	(0.009)	(0.010)	(0.010)	(0.010)	(0.043)	(0.010)	(0.010)	(0.009)
Log(Market capitalization)	0.052***	0.042***	0.044***	0.042**	0.037***	0.038***	0.023**	0.033***	0.048***	0.050***
	(0.010)	(0.008)	(0.008)	(0.017)	(0.008)	(0.008)	(0.009)	(0.009)	(0.008)	(0.007)
Leverage	-0.400***	-0.418***	-0.432***	-0.431***	-0.354***	-0.360***	-0.363***	-0.297**	-0.462***	-0.433***
	(0.128)	(0.102)	(0.106)	(0.112)	(0.109)	(0.104)	(0.122)	(0.135)	(0.111)	(0.111)
Classified board	-0.084*	-0.084**	-0.091**	-0.086**	-0.078**	-0.071*	-0.099***	-0.074*	-0.092**	-0.082*
	(0.045)	(0.041)	(0.042)	(0.042)	(0.039)	(0.039)	(0.038)	(0.039)	(0.043)	(0.043)
Inside ownership	0.003**	0.003**	0.003**	0.003**	0.003**	0.003**	0.002	0.003**	0.003**	0.003**
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Board independence	-0.005	0.018	0.022	0.003	0.031	0.027	0.057	0.033	-0.003	0.006
	(0.074)	(0.067)	(0.069)	(0.074)	(0.073)	(0.073)	(0.072)	(0.070)	(0.075)	(0.074)
Operating cash flow	0.033									
	(0.166)									
Dividends	0.090									
	(1.074)									
Cash holdings	0.131									
	(0.154)									
Pure play		-0.223***								
		(0.061)								
#Segments			0114***							
			(0.038)							
Market-model R^2				0.247						
				(0.390)						
Upstream integration					0.011	-0.001				
					(0.075)	(0.076)				
Downstream integration					0.277***	0.272***				
					(0.094)	(0.094)				
Horizontal diversification						0.000				
						(0.000)				
E&P							-0.199***	-0.249***		
							(0.068)	(0.075)		
Operating profit margin							0.001*			
							(0.000)			

Panel B. Other omitted variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Book-to-market ratio	0.030***	0.027***	0.028***	0.027***	0.027***	0.027***	-0.133***	0.023**	0.021**	0.028***
	(0.010)	(0.009)	(0.009)	(0.010)	(0.010)	(0.010)	(0.043)	(0.010)	(0.010)	(0.009)
Log(Market capitalization)	0.052***	0.042***	0.044***	0.042**	0.037***	0.038***	0.023**	0.033***	0.048***	0.050***
	(0.010)	(0.008)	(0.008)	(0.017)	(0.008)	(0.008)	(0.009)	(0.009)	(0.008)	(0.007)
Leverage	-0.400***	-0.418***	-0.432***	-0.431***	-0.354***	-0.360***	-0.363***	-0.297**	-0.462***	-0.433***
	(0.128)	(0.102)	(0.106)	(0.112)	(0.109)	(0.104)	(0.122)	(0.135)	(0.111)	(0.111)
Classified board	-0.084*	-0.084**	-0.091**	-0.086**	-0.078**	-0.071*	-0.099***	-0.074*	-0.092**	-0.082*
	(0.045)	(0.041)	(0.042)	(0.042)	(0.039)	(0.039)	(0.038)	(0.039)	(0.043)	(0.043)
Inside ownership	0.003**	0.003**	0.003**	0.003**	0.003**	0.003**	0.002	0.003**	0.003**	0.003**
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Board independence	-0.005	0.018	0.022	0.003	0.031	0.027	0.057	0.033	-0.003	0.006
	(0.074)	(0.067)	(0.069)	(0.074)	(0.073)	(0.073)	(0.072)	(0.070)	(0.075)	(0.074)
Operating cash flow	0.033									
	(0.166)									
Dividends	0.090									
	(1.074)									
Cash holdings	0.131									
	(0.154)									
Pure play		-0.223***								
		(0.061)								
#Segments			0114***							
			(0.038)							
Market-model R^2				0.247						
				(0.390)						
Upstream integration					0.011	-0.001				
					(0.075)	(0.076)				
Downstream integration					0.277***	0.272***				
					(0.094)	(0.094)				
Horizontal diversification						0.000				
						(0.000)				
E&P							-0.199***	-0.249***		
							(0.068)	(0.075)		
Operating profit margin							0.001*			
							(0.000)			

Table 3 (*continued*)										
Return on assets								0.194**		
								(0.093)		
Reserves-to-production ratio							-0.001	-0.001		
							(0.001)	(0.001)		
Investment intensity							-0.425***	-0.247		
							(0.157)	(0.164)		
Market share							-0.362	-0.535		
							(0.387)	(0.437)		
Oil beta									0.039*	
									(0.023)	
HPR_{vw}										-3.229
										(2.907)
R^2 adjusted	0.248	0.336	0.302	0.260	0.342	0.349	0.460	0.357	0.268	0.259
N	129	129	129	129	129	129	116	129	129	129

Table 4

Event study on OPEC policy-change announcement

Regression results for stock returns over Nov 26-28, 2014 adjusted for expected returns from the market model estimated over June 1, 2013-May 31, 2014 using the Scholes and Williams (1977) technique. Panel A: Regression results for Model (7) in Table 2 augmented with additional governance variables. Panel B: Regression results for Model (7) in Table 2 augmented with additional corporate characteristics. Variables are defined in Table 1. All regressions include constant term (suppressed). All variables except market capitalization are measured as of fiscal year 2013; market capitalization (incl in calculation of book-to-market ratio) measured on May 3, 2014.

Panel A	(1)	(2)	(3)	(4)	(5)
Book-to-market ratio	-0.002	0.002	-0.002	0.000	0.002
	(0.002)	(0.003)	(0.002)	(0.003)	(0.003)
Log(Market capitalization)	-0.007*	-0.004	-0.004	-0.001	-0.001
	(0.003)	(0.005)	(0.004)	(0.004)	(0.004)
Leverage	-0.239***	-0.245***	-0.227***	-0.235***	-0.238***
	(0.050)	(0.050)	(0.055)	(0.049)	(0.048)
Classified board	-0.087***			-0.077***	-0.084***
	(0.018)			(0.018)	(0.018)
Inside ownership		0.001**		0.001*	0.001**
		(0.001)		(0.001)	(0.000)
Board independence			-0.074**	-0.039	
			(0.031)	(0.033)	
Supermajority board independence					-0.029
					(0.019)
R^2 adjusted	0.293	0.236	0.234	0.319	0.323
N	129	129	129	129	129

Panel B	(1)	(2)	(3)	(4)	(5)
Book-to-market ratio	0.001	-0.001	-0.000	0.001	0.011
	(0.003)	(0.003)	(0.003)	(0.003)	(0.018)
Log(Market capitalization)	-0.007	-0.008	-0.003	-0.005	-0.008*
	(0.005)	(0.005)	(0.0049	(0.004)	(0.004)
Leverage	-0.228***	-0.265***	-0.227***	-0.229***	-0.167***
	(0.052)	(0.051)	(0.048)	(0.045)	(0.061)
Classified board	-0.082***	-0.072***	-0.077***	-0.070***	-0.078***
	(0.019)	(0.020)	(0.018)	(0.018)	(0.017)
Inside ownership	0.001*	0.001	0.001*	0.001*	0.000
	(0.000)	(0.001)	(0.000)	(0.001)	(0.000)
Board independence	-0.044	-0.026	-0.034	-0.041	-0.042
	(0.034)	(0.034)	(0.032)	(0.036)	(0.034)
Log(Board size)	0.060**				
	(0.029)				
Outside blockholdings	-0.001				
	(0.001)				
CEO-chairman duality	0.020				
	(0.019)				
Operating cash flow		0.078			
		(0.138)			
Dividends		1.140***			
		(0.043)			

Table 4 (*continued*)					
Cash holdings		-0.073			
		(0.075)			
Pure play			-0.069***		
			(0.019)		
Upstream integration				0.040	
				(0.047)	
Downstream integration				0.129***	
				(0.046)	
Horizontal diversification				0.000***	
				(0.000)	
E&P					-0.042*
					(0.021)
Operating profit margin					0.000***
					(0.000)
Reserves-to-production ratio					0.001*
					(0.075)
Investment intensity					-0.265***
					(0.075)
Market share					0.216
					(0.172)
R^2 adjusted	0.337	0.326	0.347	0.388	0.491
N	129	129	129	129	129

Table 5

Governance, corporate risk taking, and acquisitions

Regression results for buy-and-hold returns over Oct 1, 2014 – Jan 13, 2015. Regression results for Model (7) in Table 2 augmented with risk measures and interaction terms between risk factors and governance variables. Variables are defined in Table 1. All regressions include constant term (suppressed). All variables except market capitalization are measured as of fiscal year 2013; market capitalization (incl in calculation of book-to-market ratio) measured on May 3, 2014.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Book-to-market ratio	0.030***	-0.063	0.032***	0.028***	-0.071	0.030***	0.029***
	(0.009)	(0.044)	(0.006)	(0.009)	(0.045)	(0.009)	(0.009)
Log(Market capitalization)	0.050***	0.030***	0.044***	0.049***	0.031***	0.052***	0.049***
	(0.007)	(0.009)	(0.078)	(0.008)	(0.009)	(0.007)	(0.007)
Leverage	-0.445***	-0.578***	-0.476***	-0.532***	-0.591***	-0.441***	-0.428***
	(0.110)	(0.117)	(0.103)	(0.152)	(0.115)	(0.110)	(0.110)
Volatility	-0.156						
	(0.168)						
PD		-3.581***			-2.518		
		(1.142)			(1.951)		
Acquisitions						-0.548**	-0.678***
						(0.255)	(0.128)
Classified board	-0.086**	-0.127***	-0.016	0.041	-0.109**	-0.077*	-0.092**
	(0.043)	(0.042)	(0.065)	(0.078)	(0.047)	(0.042)	(0.044)
… × Book-to-market ratio			-0.140**				
			(0.060)				
… × Leverage				-0.480**			
				(0.223)			
… × *PD*					-4.179**		
					(1.934)		
… × Acquisitions							-2.619***
							(0.982)
Inside ownership	0.003**	0.003*	0.004**	0.000	0.003	0.003**	0.003**
	(0.001)	(0.002)	(0.002)	(0.002)	(0.002)	(0.001)	(0.001)
… × Book-to-market ratio			-0.003				
			(0.002)				
… × Leverage				0.011*			
				(0.006)			
… × *PD*					-0.025		
					(0.054)		
… × Acquisitions							0.039
							(0.029)
Board independence	-0.001	0.001	0.021	-0.022	-0.009	-0.007	-0.001
	(0.075)	(0.077)	(0.077)	(0.076)	(0.080)	(0.074)	(0.076)
R^2 adjusted	0.258	0.344	0.287	0.321	0.338	0.281	0.284
N	129	112	129	129	112	129	129

Corporate governance and firm performance: Evidence from the oil price collapse of 2014-15

NICLAS ANDRÉN

This paper analyses how board classification, board independence, and inside ownership affects US oil-company performance using the oil price collapse of the autumn and winter of 2014 as a natural experiment. Firms with classified boards suffered during the collapse. An important source of value destruction is that classified boards aggravated the impact of corporate risk taking on performance. On the contrary, the greater the ownership level of insiders, the better the firm sustained the crisis. The performance-ownership relationship seems to be non-monotonic. In particular, inside ownership mediates the impact of leverage on performance. As for board independence, it seems to be of no relevance to firm performance.

JEL classification: G14, G30, G32, G34

Keywords: Corporate governance, board classification, inside ownership, board independence, entrenchment, performance

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