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Does derivative cashflow support a countercyclical acquisition strategy?
-An empirical investigation of US oil and gas companies

Master thesis

by

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Abstract

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Five key words:	Financial Hedging, Derivative Cashflow, M&A, Economic Downturn, countercyclical investments
Purpose:	The purpose is to increase the understanding of how/if oil and gas companies use derivative cashflow to support their M&A activities.
Methodology:	The empirical methods used are Pooled OLS and a Fixed Effects models. The dependent variables are *Acquisitions* and *Tobin's Q.*
Theoretical perspectives:	This paper is built on the theoretical frameworks presented by Froot, Scharfstein and Stein (1993) and Shleifer and Vishny (1992)
Empirical foundation:	The empirical model in this paper is based on a dataset of 841 financial observations on individual US oil and gas companies. The time period of the data used is 2006-2016.
Conclusions:	The results from this study show that companies with medium debt capacity can effectively employ a countercyclical acquisition strategy based on derivative cashflow (highly significant), but this strategy destroys value of oil and gas companies (weakly significant).

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List of definitions

(1) Hedgers and non-hedgers

Companies that reported non-null derivative cashflows in the considered year. The term hedger is used interchangeably with the term "hedging company". Non-hedgers (or "non-hedging companies") are those with null values.

(2) Acquirers/Acquiring companies

"Acquirers/Acquiring companies" are defined as those companies that reported an *Acquisitions* (COMPUSTAT #129) fiscal year-end value that is positive.

(3) Sellers/Selling companies

"Sellers/Selling companies" are defined as those companies that reported an *Acquisitions* year-end negative value.

(4) Zero-net acquirers

"Zero-net acquirers" are defined as those companies that reported an *Acquisitions* value equal to 0 for the considered year.

(5) Countercyclical acquisitions/investments

Countercyclical acquisitions/investments are acquisitions/investments opportunities that arise only in industry-wide crisis periods.

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1. Introduction

Mergers and acquisitions have for a long time been a topic of interest both for companies as well as researchers all over the world. This is mainly due to the fact that mergers and acquisitions are among the most important investments for companies and due to their high level of complexity (Alexandridis, Chen and Zeng 2017). Mergers and acquisitions are often used by companies to grow inorganically in the same industry or as a tool to enter new industries and diversify the company. Albeit, diversifying company's operations is not always in the shareholders best interest, but it is often pursued anyways.

Mergers and acquisitions are a field which continues to experience growth. The magnitude of both mergers and acquisitions in size and frequency has been increasing since the beginning of the turn of the millennium. This makes new research on this topic more relevant than ever. Historically, these transactions have mostly been occurring in USA closely followed by Europe (Gaughan 2017).

Mergers and acquisitions are a very capital-intensive maneuver for almost any company and therefore typically require a significant amount of external financing (Elsas, Flannery and Garfinkel 2014). Mergers and acquisitions can be funded either by cash, stock, or a mix thereof. Coherently with the pecking order theory and Modigliani and Millers propositions this payment is often conducted in terms of debt combined with internally generated cash.

It is however known that external financing by debt is often costly in periods defined as 'bad times', e.g. the oil and financial crises in 2008. That could also be an explanation for the mergers waves' variation that has been observed over time. By looking at the US oil industry we can see from *Figure 1* and *Figure 2* that the oil industry experienced a slowdown in transactions in 2008 and 2015, which are also periods characterized by a decrease in the oil price Figure *3*. These periods were nevertheless also characterized as being costly in terms of external financing, most likely because companies were unable to pursue mergers and acquisitions due to the lack of funds. In the oil industry a procyclical strategy pattern seems to be predominant, i.e. with fewer acquisitions and lower volume of transactions in crisis periods as reported by Shleifer and Vishny (1992).

Shleifer and Vishny (1992) also argue that financially distressed companies are forced to sell their assets amidst an industry-wide crisis. This should seemingly favor a greater number of mergers and acquisitions, but this is not the case. The reason, according to Shleifer and Vishny (1992), is due to the low redeployability of assets in the oil industry.

It follows that the best acquirers in crises periods are those that can better deploy the productivity of the acquired assets, i.e. other firms in the same industry, but they are also the least likely to be acquirers because they all are equally impacted by the same state of the industry. Hence, assets and companies tend to be sold to outside deep-pocket investors at an illiquidity discount due to increased agency costs.

As such, if oil and gas companies were able to place themselves on the buy-side during industry-wide crisis they would be able to outmaneuver their competitors and acquire them at an illiquidity discount.

Interestingly, Froot, Scharfstein and Stein (1993) (FSS 1993) present a general risk manangement framework suggesting that companies that are financially constrained can benefit from employing a hedging strategy based on derivatives, if their investment opportunities are not correlated with their cashflow. They argue that this could help companies match their cashflow and their investment plan in times characterized by high external costs. For oil and gas companies it is however so that their capital expenditures needs to be correlated with their cashflow, hence, according to FFS (1993) they do not have clear benefits from a hedging strategy.

This is where we place the start of our research, as we witness a gap in assessing the oppurtunity of FSS (1993)'s risk manangement framework being employed as a strategic tool for companies, namely to place themselves on the buy-side in industry-wide crises where assets are characterized by low redeployability .

The purpose of this paper is to contribute to the empirical literature at the intersection between risk management and M&A. This is done by investigating whether it is possible for oil and gas companies to create a horizontal phase shift between the industry-wide cycle and the idiosyncratic cycle in order to fund acquisitions thanks to derivative cashflows when most of the other companies are facing financial constraints or distress. If we find this to be the case, we will further investigate whether companies pursuing this type of strategy are then characterized by a higher firm value. Even if it is not a first in the literature, this research is also pursued with the innovative usage of actual derivative cashflows instead of dummy variables to describe hedging activities. Our research questions are then:

1. *Does the derivative cashflows in interplay with the economic industry-wide status affect the level of (net) acquisitions of oil and gas companies?*
2. *Does derivative cashflows' usage for countercyclical acquisition strategy affect the firm value of oil and gas companies?*

2. Theoretical Background

In their seminal article, Modigliani and Miller (M&M) argue that in a simple world with perfect capital markets, no information asymmetry and no transaction costs, the hedging practices, hence risk management, should be irrelevant (Modigliani and Miller 1958) as investors should be able to create a portfolio with the level of risk at their own desire. However, since then, contemporary literature has provided evidence in support of the fact that companies have multiple reasons to hedge due to market frictions in the real world (Mayers and Smith 1982, Smith and Stulz 1985, FSS 1993).

FSS (1993) present a general framework for applying derivatives in risk management. The framework is based on the argument that if a company has higher costs associated with external financing than internal financing, they could benefit from risk management in periods characterized by costly external financing. The authors further argue that if a company does not hedge in these periods, they will experience volatility in their cashflow. Accordingly, simple accounting imply that this volatility will lead to either volatility in the externally raised funds or volatility in the amount invested by the company. Meaning that for a company to be able to execute its investment plan that would ensure growth, it is obligated to raise external funds in periods which are characterized by costly external financing. As such, according to the authors framework, companies would be able to increase firm value by employing risk management to ensure that their investment programs and financing policies are coordinated. Risk management would then provide the companies with contingent derivative cashflow and thereby decrease the volatility of cashflow and hence the need for costly external financing, ensuring that funds are available to execute the firm's investment plan.

In industries where funds required for investments remain constant while companies suffer from a decline in cashflow, companies could, ceteris paribus, benefit from hedging. This would increase firm value by ensuring that the company has the cashflow demanded by their investment plan.

FSS (1993) also argue that investment attractivity in the oil and gas industry varies along with the price of oil and gas. The argument is that as oil and gas prices decrease, the cashflow from the operations does as well. However, when the prices for oil and gas are low it is less attractive to acquire and explore new reserves. Thus, as cashflows decline, so does investments' attractivity, a process that creates a natural hedge for oil and gas companies. This is the reason why oil and gas company should not hedge aggressively, if at all.

In their paper, Shleifer and Vishny (1992) explore the value of sold assets in economic industry-wide crises with a specific focus on the potential buyers of said assets. Their paper seeks to clarify the cross sectional determinants of leverage by investigating debt capacity and its effect on the cost of asset sales. The authors highlight the fact that a company's debt capacity is related to the liquidation value of its assets. As such, they argue that if a company's assets have high redeployability, they are good candidates for debt financing as said assets could easily be liquidated at a high valuation to pay off creditors in case of distress. A redeployable asset is an asset that has a wide range of alternative uses, e.g. a commercial landplot that can be used for many different purposes.

However, Shleifer and Vishny (1992) also point out that most assets in the economy are highly specialized and, thus, they are not characterized by high redeployability. Examples are oil rigs and pharmacutical patents, which have no reasonable use besides their core functions. Therefore, such assets must be sold to someone that will employ them in the same way which utilize their core function i.e. best use. Shleifer and Vishny (1992) analyse at which price non-redeployable assets are sold in asset sales or liquidations relative to their value in best use, and they call that difference "asset illiquidity".

Shleifer and Vishny (1992) argue that the main reason for asset illiquidity is the general equilibrium aspect of asset sales. The authors continue by arguing that, as an industry- or economy-wide crises period materializes, companies become financially constrained or even distressed and are forced to sell off their assets. In industries characterized by low redeployability it is not possible for the distressed companies to sell their assets at the value in best use, as other industry buyers also will lack internal and external funds to acquire and operate the distressed companies' assets. However, even if an incumbent buyer managed to raise the needed funds, antitrust law regulation might prevent them from acquiring the assets from its competitors.

As a result of financial constraint and antitrust law incumbent buyers cannot buy the distressed company's assets and it then must be sold to an industry outsider - most likely a financial buyer. However, industry outsiders typically have poor knowledge of how to operate and employ the assets to its best use and they will likely suffer from agency cost as they must hire specialist to operate those assets. Also, they will fear overpaying as they lack the ability of valuing the assets properly. (Shleifer and Vishny 1992)

Shleifer and Vishny (1992) conclude their theory by arguing, based on the above, that as incumbent buyers cannot buy the distressed companies' assets and that industry outsiders suffer from additional costs, the asset will be liquidated at a lower value than its value in best use, resulting in the so-called illiquidity discount. Such illiquidity discount means that assets are cheaper in industry or economic-wide crises, and that makes asset illiquidity a potentially important cost of leverage (Shleifer and Vishny 1992).

3. Literature review

In this Section we are going to cover the empirical literature related to our hypotheses. In Section 3.1 we cover the most developed literature body that focuses on the usage of financial derivatives and its effect on firm value. In Section 3.2 we cover the studies that focuses on the usage of financial derivatives and its effect on financing costs. In Section 3.3 we focus on the body of literature that has been focusing on the usage of financial derivatives and its effect on firm investment activity. Finally, in Section 3.4 we cover studies that focus on liquidity discount as a result of fire sales.

3.1 Derivative usage and its effect on firm value

One of the most influential studies related to the effect of derivative usage on firm value is Allayannis and Weston (2001). Allayannis and Weston (2001) specifically test how the usage of derivatives affect firm value, using observations of 720 large firms – without any industry focus – over the period 1990-1995 and they find a significant hedging premium of about 5%. However, current literature does not agree unanimously on this. Some studies have found that the usage of derivatives have a significant positive impact on firm market value (MacKay and Moeller 2007, Allayannis and Weston 2001, Bartram, Brown and Conrad 2011) and vice versa (Guay 1999, Jin and Jorion 2006, Hentschel and Kothari 2001).

For example, the widest study in terms of observations, to our knowledge, is the article by Bartram, Brown and Conrad (2011), who find weak impact of hedging activities on the firm value by using a large sample of 6,888 nonfinancial firms. More recently, Lechner and Gatzert

(2018) find – by studying 160 companies in 2009-2013, without any specific focus on industries in Germany – a significant positive impact of Enterprise Risk Management on shareholder value. Other studies regarding the hedging premium, or the lack thereof, have been industry focused. Overall, it strikes the fact, that by looking at previous studies those focused on industries whose core business is extracting or producing primary commodities (namely gold and oil) hedging does not have a meaningful impact on the firm value, or it even entails a hedging discount. Worth to be highlighted, Phan, Nguyen and Faff (2014) find evidence in support of hedging discount in periods of upward oil price trend and some evidence in support of hedging premium in periods of decreasing prices.

3.2 Derivative usage and its effect on financing costs

In more recent academic literature scholars have tested the theory presented by FSS (1993) in terms of the exact channels through which the usage of financial derivatives tends to increase firm value. For example, both Campello, et al. (2011) and Chen and King (2014) examine whether the use of financial derivatives have a positive effect on cost of debt. Campello, et al. (2011) study the implications of hedging for financing and investment. They find that hedging can reduce the chance of negative realizations and thereby the cost of financial distress, arguing that this in theory should ease firm access to credit. They find that hedgers pay lower interest spreads and are less likely to have capital expenditure covenants in their loan agreements, allowing them to invest more. Further supporting this Chen and King (2014) find by examining the impact of hedging on cost of public debt that hedging is associated with a lower cost of debt. They argue that this is caused by lower default risk, lower agency cost related to risk shifting and under investment and less information asymmetry.

3.3 Derivative usage and its effect on firm investment activity

The body of literature examining the effect of financial hedging on investment activity remains fairly undiscovered. Though some studies have examined if companies' usage of financial derivatives correlates with measures of investment intensity. For example, Gilje and Taillard (2016) examine how an exogenous shock in basic risk in the oil and gas industry affects investments. They find that firms affected by a basis risk shock reduce investments, have lower firm value, sell assets and reduce debt. In terms of investment activity, they examine this by measuring the impact of having access to effective hedging instruments on firm investment policies.

Furthermore, another study has examined more directly the effect of financial derivate usage on investment strategy (Jankensgård and Moursli 2019). Jankensgård and Moursli (2019) test the argument presented by Froot, Scharfstein and Stein (1993), that corporate hedging supports corporate investment when internal cashflows are volatile and external financing costly by using actual derivative cashflow. The authors found that results support the theory, more precisely they found that on average an extra dollar in derivatives cashflow translated into one more dollar in capital expenditure. Moreover, they find that the relation of derivative cashflow and investment is stronger for firms with high external financing cost.

Alexandridis, Chen and Zeng (2017) also focus on how financial hedging supports corporate investments, namely M&A rather than capital expenditures, because they deem that M&A is the most important form of corporate investment, due to its higher capital intensity. The study examines the impact of financial hedging on the likelihood of undertaking acquisitions as well as the associated financing choice. The authors first present evidence that the use of financial derivative increases the likelihood of a firm to engage in M&A. Subsequently, they argue that financial hedging acts as a vehicle for firms to mitigate financing restrictions as it reduces cost of borrowing as well as increases the accessibility to capital.

3.4 Asset fire sales and its imposed liquidity cost

Pulvino (1998) tests empirically the model of asset illiquidity that was presented by Shleifer and Vishny (1992). Pulvino (1998) more specifically investigates if capital constraints cause airlines to liquidate their assets at a discount compared to the value of best use. Pulvino (1998) uses a large data sample of commercial aircraft transactions to conduct his investigation. Pulvino (1998) argues that the illiquidity discount is an indirect bankruptcy cost.

Differently from previous studies Pulvino (1998) estimates liquidation discounts by examining the price of the liquidated assets and comparing it to the average market price. The results of his paper show that whether an airline is financially constraint or not is significant in determining the price received for a sold aircraft. More specifically the author finds that airlines with low debt capacity sell their aircrafts at a 14% discount to the average market price. The author also finds that this discount is only present when the airline industry is depressed, supporting the Shleifer and Vishny (1992) model. By investigating aircraft buyers, Pulvino (1998) further finds that financially constraint airlines receive lower prices on the liquidated aircrafts as financially institutions are lower-value user of aircrafts than airline. This is evident especially during industry wide recessions. Finally, the author argues that these results have important implications for firms' capital structure as they suggest a benefit of limiting the financial leverage to maintain spare debt capacity allowing firms to be on the buy side in industry recessions.

Another study is carried by Brown (2000), who tests the theory of asset illiquidity presented by Shleifer and Vishny (1992) on Real Estate Investment Trusts (REIT). Brown (2000) examines the effect of the decline in commercial values that occurred in the late 1980s and early 1990s. The analysis is conducted by comparing the effect of the decline in real estate value of highly leveraged owner-managed properties against the not-highly leveraged owner-managed properties. The highly leveraged properties are represented by mortgage REITs and the not-highly leveraged properties by equity REITs.

Brown (2000) finds, by comparing these two groups of properties during the decline period, that (1) the book value of mortgage loans held by mortgage REITs declines significantly whereas the book value of real estate equity positions held by Equity REITs increases. As such, mortgage REIT's are net sellers of highly leveraged assets and equity REITs are net purchasers; (2) despite of an industry-wide crisis mortgage REITs loans are seldomly reorganized and for that reason most defaulted loans were foreclosed. Finally, (3) total mortgage REITs' stock returns are more negative than the total equity REITs' stock returns.

The results presented by Brown (2000) suggest that the decline in commercial property values during the period resulted in a sale of real estate obtained by lenders, due to foreclosed loans, at value below best use value. These findings are in line with Shleifer and Vishny (1992)'s model and the results in Pulvino (1998).

Coval and Stafford (2007) test Shleifer and Vishny (1992)'s model in the setting of the capital markets, by investigating transactions in open-ended mutual funds caused by capital flows from 1980 to 2008. More specifically their paper investigates the cost of asset fire sales in equity markets. The paper is focused on assets held by open-ended mutual. The focus is primarily on holdings which are specialized investments, e.g. merger arbitrage. Coval and Stafford (2007) argue that a distressed mutual fund would be forced to sell its holdings quickly if capital is withdrawn. The reason for this is that open-ended mutual funds are highly dependent on outside capital to fund their investments and that their capital is immediately demandable. Accordingly, this quick selling of their holdings would bring prices below their fundamental value in spite of equity market being highly liquid.

4. Hypotheses development

In this Section, after expanding on the illiquidity assets discount opportunity in the oil industry (Sections 4.1, 4.2) we are going to develop the core argument of our first hypothesis (Section 4.3) and second hypothesis (Section 4.4), coherently to the theoretical background and empirical findings exposed in the previous Sections.

4.1 Illiquidity asset discounts in the oil industry

In the corporate world, the optimal strategy is generally 'state-dependent', meaning that it depends much on the economic- or industry-wide situation. When downturn scenarios occur, it is evident that some companies become financially constrained or distressed. As we have already mentioned earlier, the oil industry is particularly subjected to the movements in the oil prices. In fact, in the oil industry oil reserves are used as collaterals and as its crisis periods are characterized by low oil prices, by definition it follows that oil reserves have reduced market value due to the low spot oil price (see also Section 5.4 for a definition of oil-crisis years). Hence, debt capacity is also reduced.

Obviously, it is possible that the debt capacity is drastically reduced even in companies with high spare debt capacity, depending on the severity of the price downturn. Nonetheless, it is plausible to expect that differences in leverage among companies persist and so companies that are more leveraged and more financially constrained in non-crisis periods, are reasonably going to remain relatively so in crisis periods. Which could lead to financial distress.

As we have seen in Section 2, one reasonable outcome for oil companies that are facing financial distress in crisis periods is for them to liquidate their assets. But that does not come discount-free as assets in the oil and gas industry are characterized by a low redeployability. Hence, they suffer of illiquidity discount (Shleifer and Vishny 1992). A central determinant in deciding whether the assets are sold to a buyer within the industry or to an outside buyer depends on the buyers' abilities to fund the payment (Shleifer and Vishny 1992, Pulvino 1998). Given that deals in economic crises are usually funded with cash and debt, as equity becomes very expensive, we can also rank debt and cash reserves as first priority funds' sources, coherently to the pecking order theory.

In industry-wide crisis periods, bids to the distressed selling firm's assets are low because, de facto, there are very few incumbent companies or investors that can afford, with short notice, to buy those illiquid assets. Hence, bids are much lower and mostly won by deep pocket financial investors because – ceteris paribus – all the oil companies are facing financial constraints, or even distress, caused by the same conditions that are generating distress in the selling company (Shleifer and Vishny 1992, Pulvino 1998). For other oil companies, that results in a lack of internal as well as external funds to pursue assets' expansion with.

This argument does not preclude the existence of an incumbent company (i.e. strong competitor to the selling oil company) with spare debt capacity, or cash reserves, that can afford to buy those assets. In that case, being one of the very few incumbent companies among the bidders together with other financial investors bidding for the highly specialized assets can be a huge opportunity. Worth to be noted is that the more candidate-buyers there are, the higher the prices given that there would be higher interest in those assets. As we have introduced previously, we call those investment opportunities that arise only in industry-wide crisis periods as countercyclical.

4.2 Seizing the illiquidity discount opportunity

As Shleifer and Vishny (1992) argue, the best acquirers in crisis periods, i.e. those that can better deploy the productivity of the acquired assets, are other firms in the same industry, but they are also the least likely to be acquirers because they all are amidst crisis periods equally impacted by the state of the industry. In the oil industry a procyclical strategy pattern seems to be predominant, i.e. with fewer acquisitions and lower volume of transactions in crisis periods (Shleifer and Vishny 1992, Figure *1*, Figure *2*).

In this setting, from a corporate strategic perspective, it arises the interest on how to reap the benefits of purchasing oil production assets in downturn cycles. Given the high cost of equity in downturn cycles, oil companies could succeed in this via two ways, namely (1) by increasing the cash inflows in downturn cycles, and (2) by increasing debt capacity (differently said, by lowering external financing needs and costs) (FSS 1993). Generally, an instrument that helps in achieving a less volatile cashflow and hence a less costly external financing, in times when additional funding is needed to proceed with the investment plan, is the contingent cashflow of financial derivatives (FSS 1993) – obviously if the positions are cleverly set. Normally, as FSS (1993) argue, there is likely no need for oil companies to hedge for decreasing the volatility in the cashflow, because revenues are correlated to investment opportunities, thus in downturn there are lower investment opportunity needs.

But the usage of derivative cashflow we want to investigate is an opportunity overlooked by FSS (1993), namely investing the extra cashflow generated by derivatives in acquiring discounted illiquid assets, rather than in capital expenditures. Alexandridis, Chen and Zeng

(2017) find that acquirers with financial hedging programs are more likely to undertake M&A activities and that financial hedging can improve a firm's debt capacity and reduce its borrowing cost, and to use also more cash in their deals. This is substantially a different strategy compared to the one that FSS (1993) present. It is important to highlight that in those crisis periods capital expenditures keep the same level of lower necessity discussed by FSS (1993). Hence, focusing on this possible countercyclical acquisition strategy is even more interesting, because it could – supposedly – create additional capital in the worst-case scenario, or allow to deploy that contingent cashflow to fund strategic acquisitions if the downturn is idiosyncratically sustainable.

What we are interested in is whether it is possible for oil companies to create a horizontal phase shift between the industry-wide cycle and the idiosyncratic cycle in order to fund acquisitions thanks to derivative cashflows when most of the other companies are facing financial constraints or distress (H1), and, successively, if companies pursuing this type of strategy are then characterized by a higher firm value (H2).

4.3 Hypothesis 1: derivative cashflow and acquisitions

From the theoretical background exposed in Section 2 and the empirical evidence presented in Section 3, it is apparent that a consolidated understanding of the role of hedging in supporting countercyclical acquisitions is missing. And, by starting from the existing literature, following a mere deductive reasoning, the conclusion regarding what to expect in the oil industry regarding possible countercyclical acquisition strategies supported by derivative cashflow, seems to be open to an uncertain outcome.

Firstly, as we have seen in Section 3, Chen and King (2014) find that hedging reduces the cost of debt coherently with a reduction in bankruptcy risk, agency cost, and information asymmetry. In their study the absolute level of leverage of the hedging companies compared to the non-hedgers is not specified, but Jankensgård and Moursli (2019), whose focus is on the oil industry, demonstrate that there is a "stronger connection between investment and derivative cashflow in highly leveraged firms". That would lead us to find that, despite hedges reduce the cost of external financing, hedging oil companies still have higher leverage on average. So, it is not excluded that the findings in Chen and King (2014) are coherent with Jankensgård and Moursli's (2019), but we cannot reject the opposite either because of lack of information.

Furthermore, since we are looking at oil companies that pursue acquisition activities supported by derivative cashflow, it is interesting to look at what we might expect from studies focused on M&As activities and the hedging profile of the company pursuing acquisitions. Interestingly, Alexandridis, Chen and Zeng (2017) find that companies that hedge are more likely to engage in M&As. Hence, we shall find that hedging oil companies have greater acquisition activities compared to the non-hedgers. And given that hedging companies are likely to pursue acquisition by also using spared debt capacity (Alexandridis, Chen and Zeng 2017), we shall witness an increased leverage in hedging oil companies. But, as Jankensgård and Moursli (2019) already showed, leverage levels in the oil industry for companies that hedge are already higher than non-hedgers' one.

The outcome of our research is open to different outcomes due to the lack of sufficient related literature at the best of our knowledge, as those empirical studies are complementary to each other and not exhaustive. Hence, our first null and alternative hypotheses are:

$H_0$1: The derivative cashflows in interplay with the economic industry-wide status do not affect the level of (net) acquisitions of oil and gas companies.

H_A1: The derivative cashflows in interplay with the economic industry-wide status affect the level of (net) acquisitions of oil and gas companies.

In the above hypothesis, by "economic industry-wide status" we mean the situation in which the oil industry is faring, namely if it is a crisis year whose proxy is the oil price, as discussed in Section 5.4. As we have previously highlighted, in the oil industry most often investments are positively correlated to revenues (FSS 1993), and it follows that debt capacity decreases in crisis periods. This analysis of M&A activities and derivative cashflows differentiated between *crisis and non-crisis periods* is quite essential to account for the countercyclical aspect of M&A activities that we are most interested in. Those M&A activities we are interested in arise only after a crisis period has started, and they are characterized by an asset illiquidity discount, making them very appealing from a corporate perspective (on the buy-side), but also challenging to be pursued due to the potential lack of funds.

Given that the role played by debt capacity in pursuing countercyclical investment strategies is pivotal in the observation and ability to opinionate regarding the future acquisition activities of the company (Alexandridis, Chen and Zeng 2017, FSS 1993, Pulvino 1998, Shleifer and Vishny 1992), we will further investigate the results by looking at subsamples to determine the acquisition activities of the companies at different debt capacity levels.

Despite expecting, according to our reasoning, evidence in rejecting our null we might find that derivative cashflows in crisis periods do not affect acquisition activities in the oil industry. This lack of effect would be reasonable considering the observation brought forward by FSS (1993) that in the oil industry derivative cashflow is unnecessary. Another reason according to which we could fail to find evidence in rejecting our null hypothesis is that oil companies de facto already pursue this countercyclical strategy at large, so that there are no companies in such a situation of being distressed and forced to fire-sale their assets and they are all equally non-distressed. But, since we witness procyclical acquisitions in the oil industry (Shleifer and Vishny 1992), even though their study is a bit dated compared to the time period we are going to analyze, this counterargument is less compelling.

4.4 Hypothesis 2: countercyclical acquisition strategy and firm value

Finally, in our second hypothesis we are going to focus on the effect that a countercyclical acquisition strategy, if found to be supported by derivative cashflows in H1, has on the firm value of the companies that pursue it. Following the footprint of Bouwman, Fuller and Nain (2009) who find that acquirers buying during high-valuation markets have lower long-run abnormal stock and operating performance than those buying during low-valuation markets, we also investigate how those oil hedging companies that pursue acquisitions in crisis periods are valued, by the proxy of Tobin's Q as in Allayannis and Weston (2001). This is even more relevant given the ultimate interest on the firm value by the academic community and by professionals, given that the success of acquisitions depends most on the timing of the acquisitions and on how the business cycle develops afterwards.

As in FSS (1993), ceteris paribus, the usage of derivatives should not positively affect firm market value for oil and gas companies. But we will test whether it can affect the firm value when the companies use the derivative cashflows for a purposefully countercyclical acquisition strategy. Our interest is on whether successful capitalization on countercyclical investment opportunities enacted by derivative cashflows can capture the best traits of the outsider's and of the insider's characteristics (Shleifer and Vishny 1992), namely, the purchase of a target at low price by an efficient operator. For this reason, we shall expect higher different valuation between different acquisition strategy approaches.

Hence, our second null and alternative hypotheses are:

$H_0$2: derivative cashflows' usage for countercyclical acquisition strategy do not affect the firm value of oil and gas companies.

H_A2: derivative cashflows' usage for countercyclical acquisition strategy affect the firm value of oil and gas companies.

Hedging can reportedly be seen as a form of trading risk off against return. But the usage of derivative cashflow to fund countercyclical acquisitions is a strategy in its own right, directly aimed at outmaneuvering competitors. As we have seen in the development of the first hypothesis, even if companies with additional derivative cashflow will not pursue acquisitions or pay down debt, it is hard to see a disadvantage in having an extra buffer in downturn periods, when every other competitor is going to struggle. If we align our expectations to Bouwman, Fuller and Nain (2009)'s findings, we shall find a positive effect of pursuing this countercyclical strategy.

The counterargument to our alternative hypothesis is that it remains more valuable to pursue classic procyclical acquisition and investment strategies in the oil industries, rather than relying on derivative cashflow. In fact, given that countercyclical investment opportunities (or industry-wide crisis periods) are relatively low probability events, hedging companies could give away too much of the upside in normal times, while "waiting" for the downturn. Or simply, excessive cash could tamper the firms' valuation, possibly due to the widely spread practice of oil investors to explicitly seek exposure to the oil price for balancing their portfolios. Consequently, hedging would erode more value over time than the value seized with the countercyclical acquisition of discounted assets.

This strategy could even be a riskier strategy, due to the high level of specialization and discipline required in order to successfully execute this strategy and because it is broadly based on the assumption that oil prices follow a mean-reverting pattern. That pattern cannot possibly be taken for granted in the long run, given the political influence exerted by OPEC+ members and as proxy field of other political hostilities.

5. Methodology

In this Section we are going to explain the methodology used in our paper. In Section 5.1 we expose the empirical framework, followed by the explanation of potential endogeneity problems in Section 5.2. in Section 5.3 we address our data collection and selection process in. Finally, in Section 5.4, we elaborate on the issue of selecting the proper crisis year in our model, given the centrality of this aspect in our hypotheses.

5.1 Empirical framework

For answering our research questions, we initially conduct a univariate analysis with unequal variances of our panel data where we test if the means of our dependent variables *Acquisitions* and *Tobin's Q* are significantly different between firms with derivatives cashflow and firms without derivative cashflow. Along to the common practice in studying the hedging premium, the univariate analysis is done to get a preliminary understanding of our data and to see if there is basis for a deeper econometric analysis of H1 and H2.

We continue our empirical analyses by employing a multivariate test based on our baseline regression (Eq.1) for Hypothesis 1 and our baseline regression (Eq.1) for Hypothesis 1. The empirical multivariate analysis of hypothesis 1 is testing whether our main explanatory variables, derivative cashflow, significantly affects our dependent variable, acquisitions, in crisis periods. And for hypothesis 2 is testing whether the countercyclical acquisition strategy, represented by the 3-way factorial interaction term, has an impact on firm value (*Tobin's Q*).

All company-specific variables in Eq. 1 and Eq. 2, which are not already a ratio, are scaled by total assets to increase comparability between companies of different size and to account for outliers, while the *totalassets* variable is then included as control variable. Additionally, we include several relevant control variables, in both equations, which we will cover in more details in Section 6. To decide on the included control variables in the equations we collected all relevant control variables used in the contemporary literature, checked that the variables were lowly correlated (Table *1*), and proceeded in running regressions with a trial-and-error forward proceeding, substantiated by economic intuitions, before deciding on our baseline regressions (Eq. 1 and Eq.2). In both equations α_j is the firm-specific fixed effect and $v_{j,t}$ is the error term.

Equation (1)

$$\begin{aligned} Acquisitions_{scaled} &= \beta_0 + \beta_1\, Der\ CF_{scaled\,j,t-1} + \beta_2 Y_{crisis_{t-1}} + \beta_3 Y_{crisis_{t-1}} \cdot Der\ CF_{scaled\,j,t-1} \\ &+ \beta_4 \log(TobinsQ)_{j,t-1} + \beta_5 \log(totalassets)_{j,t-1} + \beta_6 leverage_{j,t-1} + \beta_7 Cash_{scaled_{j,t}} \\ &+ \beta_8 Operating\ CF_{scaled_{j,t-1}} + \beta_9 Capex_{scaled_{j,t}} + \beta_{10} Zscore_{j,t-1} + \alpha_j \\ &+ v_{j,t} \end{aligned}$$

Equation (2)

$$\log(TobinsQ)_t = \beta_0 + \beta_1 Acquisitions_{scaled\,j,t} + \beta_2 Der\ CF_{scaled\,j,t} + \beta_3 Y_{crisis_t} + \beta_4 Acquisitions_{scaled\,j,t} \cdot Der\ CF_{scaled\,j,t} + \beta_5 Y_{crisis_t} \cdot Der\ CF_{scaled\,j,t} + \beta_6 Y_{crisis_t} \cdot Acquisitions_{scaled\,j,t} + \beta_7 Y_{crisis_t} \cdot Acquisitions_{scaled\,j,t} \cdot Der\ CF_{scaled\,j,t} + \beta_8 \log(totalassets)_{j,t} + \beta_9 leverage_{j,t} + \beta_{10} ROA_{scaled_{j,t}} + \beta_{11} Capex_{scaled_{j,t}} + \beta_{12} Zscore_{j,t} + \beta_{13} avgOilPrice_{j,t} + \alpha_j + v_{j,t}$$

We conduct our empirical analyses of our hypotheses by running a series of Pooled OLS (POLS) regressions of Eq.1 and Eq.2. Initially we conduct regular POLS regressions. However, a regular POLS regression does not consider the potential effects of heteroskedasticity or serial correlation in our data sample. Therefore, we use a White-test to test for the potential violation of the homoskedasticity assumption required for valid inference of our results. We find that our data does not suffer from heteroskedasticity (Table 10 Panel B). However, as serial correlation is still a potential threat to our analysis, we choose to employ cluster robust standard errors as a tool to account for this. As a result, we precedingly run POLS regressions with cluster robust standard errors for both equations.

Nevertheless, POLS do also have its limitations as it ignores the time dimension and the information in the fixed effect term, α_j, therefore we continue our empirical analysis by estimating models using the Fixed Effects method with cluster robust standard errors. We conducted a Hausmann test to choose between the Random Effects method and the Fixed Effects (Table *11* Panel B).

5.2 Endogeneity

Endogeneity refers to a problem in a regression where one or more of the explanatory variables are correlated with the error term which will induce a bias in the estimated regression. In general, there are three endogenous problem areas: omitted variables, selection problem and reverse causality. In our paper we however only address the omitted variables bias and the selection problem.

To tackle the potential endogeneity problem, we initially minimize the omitted variable bias by adding several control variables, based on contemporary literature as well as our own discovery of control variables relevant in explaining our two dependent variables. By comparing Table 11 column 1 and column 3 for hypothesis 1 and Table *17*, column 1 and 5 for hypothesis 2 we see that after adding the control variables the results of the main explanatory variables become more significant and the coefficients are slightly changed.

Also, we use a fixed effects model which reduces the risk of endogeneity as it eliminates the endogeneity caused by the time invariant components.

Given our focus on the countercyclicality of our research questions, an important challenge in establishing the causal effects of crisis periods in relation to acquisitions and endogenous corporate activities is to assess the exogenous nature of the oil price shock. We further discuss this issue in subsection 5.4, by addressing it separately per each crisis over the period considered, by also motivating which year we are going to consider as crisis year in our model.

Lastly, we have faced some limitations regarding the selection bias. In fact, as we will see in the next section, we set few restrictions on how companies have been selected for having more balanced data (subsection 5.3). But we are also focusing on financially distressing periods and several companies have filed for bankruptcies over the two crisis periods considered. Hence, the resulting sample on U.S. oil companies is not a perfectly random sample from the population, but it was unfeasible to take the bankruptcy status into consideration with the means at our disposal.

5.3 Data collection and selection

By the very nature of our research, the data set we are going to employ in our empirical study needs to encompass at least a crisis period. In the intent of having more consistent results, we opted for a time span that includes two crisis periods, with the exogenous shocks happening in 2008 and 2014. The decided time span is 2006-2016. We are going to further explain the definition of the crisis year in our model in the next Section 5.4.

For our research, we were able to gain access to a very exclusive database, which holds a register of the commodity derivative cashflows of oil and gas companies, as well as their financial information. This data has been gathered and provided to us by professor and supervisor Håkan Jankensgård (Lund University, Department of Business Administration). We further expanded the data set for year 2016 with all the needed financial information by applying the same methodology, because we expected to obtain more significant results by considering the acquisition activities in 2016.

The financial data has been collected in COMPUSTAT and the respective item numbers will be specified in Section 6. As minimum requirements for companies with non-zero production of oil and gas to be considered, their total assets need to be larger than 1MUSD and their market capitalization needs to be available in COMPUSTAT. The derivative cashflows of those respective companies were then collected. In most cases, derivate cashflow is calculated as the difference between total and unrealized derivative gain or loss (GL). In other cases, derivative cashflow can be directly obtained because the realized and unrealized GLs are reported on separate lines in net income. In other cases, the derivative cash settlement is disclosed in Item 7a of the firm's quarterly report.

In its totality, the data set over the period 2006-2016 has 2,913 year-firm observations, for a total of 422 oil and gas companies. Given some irregularities in the data set, we further take the following steps in treating the data to obtain the final data set for our regressions: (1) to have a more equilibrated panel data, we considered companies that had an observation (be it disclosed or not) for every year between 2006 and 2016 included, but two years. The two-year exception has been done to avoid excessive data loss due to too stringent parameters, and at the same time to better account for missing data in the database, or, especially if the data missing is at the end of the selected period, for the fact that some companies have been dissolved, liquidated or outrightly purchased, hence, to partially smooth the selection bias; (2) we further assumed the year in which hedges have not been disclosed as a non-hedging year, which we deem economically reasonable, given the requirements in disclosing derivative positions; (3) when only total gains and losses (GL) is disclosed in the dataset, we consider the value in total GL as realized GL, which we deem plausible from an economic perspective, given that either the unrealized GL is already accounted for, or simply there is no unrealized GL; (4) any other missing value, e.g. in *Acquisitions* line item, has been assumed to be equal to 0. We deem it economically reasonable because COMPUSTAT is quite a comprehensive database and the metrics used are widely covered, hence we deem more plausible to be a 0 rather than a glitch in COMPUSTAT database.

That leaves us with a total of 841 firm-year observations.

5.4 Crisis periods definition

To have reliable and significant results both from a statistical and an economic perspective, the choice of the crisis year in our model is of the utmost importance, given that our hypotheses focus on the countercyclical aspect of acquisitions. The crisis years in our model are in fact 2008, 2009, 2015 and 2016. In the following paragraph we are going to expand on the reasons we weighted in our decision to choose such years in a consistent way.

Generally speaking, crisis periods are prolonged periods of time in which there is industry-wide distress, and companies have higher probability of defaulting and to sell assets at large discount (Shleifer and Vishny 1992). As we have seen in Section 4, the distress level of oil companies is tightly linked to the oil price.

Our study covers two oil crises that stretches – separately – over five years. We deemed it necessary to find a better definition of a year to be defined as "crisis" in our model, especially in relation to the dependent variable in H1, i.e. *Acquisitions*, because it is true that acquisitions' (or sales') announcements in distressed periods can be announced fairly quick after the shock, as the recent pandemic-induced shock has shown (Reuters 2020). But the effective date in which the acquisition is carried out and, hence, accounted for, can be quite delayed compared to the announcement date. It is therefore plausible to assume that acquisitions are manifested in the financial statements with some delay, simply due to accounting practices.

Therefore, it is essential to define as precisely as possible the date of the shocks. We opted for the structural breaks' methodology, specifically a supremum Wald test (sup-Wald) with unknown break date. We also use a White-test to test for the potential violation of the homoskedasticity assumption required by the sup-Wald. As reference price, we chose the WTI oil prices, which we collected from Thomson Reuters. We then calculated the structural breaks on the auto-regressed (1-month) end-on-month WTI nominal oil price, separately on two periods (i.e. 2007-10 and 2010-17). That is because the sup-Wald test only finds one break at a time, but we know that the shocks were in 2008 and 2014 (Baumeister and Kilian 2016). Results show that the breaks occurred on July 2008 and on October 2014, with significance at the 1% level in both cases.

We further took into account the number of annual bankruptcies the oil industry witnessed, as a proxy for crisis periods. In fact, if we were to look at the number of deals that are procyclical in the oil industry (Shleifer and Vishny 1992), as we report in *Figure 1* and *Figure 2* for the period 2000-2018 based on Thomson Reuters' data, we would be falling for a selection bias, because liquidated bankrupted companies are not accounted for, unless of course all the liquidated assets were bought by US companies – but that is difficult to be assumed.

5.4.1 First crisis: 2008-2009

Regarding the first crisis taken into consideration, there were reported more bankruptcies in 2009 than in 2008 (Jones Day 2010). However, we argue that 2008 is appropriate to be defined as a crisis year too, despite lower amount of bankrupted companies. In fact, this crisis started early in July at the latest and it seems reasonable to assume the time period was short, but long enough before the end of the year – or the drop of the price severe enough – to have crisis-related distress in 2008 and that those repercussions witnessed in 2008 stretched over in 2009 (Figure *1*, Figure *2*). A further consideration is that the shock was demand-driven, and so even less predictable (Baumeister and Kilian 2016). For this reason, we identify the first shock as exogenous. Arguably, that left many companies completely off-guard, because, since investment opportunities are positively correlated to the oil price, they were expecting and investing by basing their forecast on an upward trend driven by fast-rising demand (Baumeister and Kilian 2016). Nonetheless, we run a robustness check by excluding 2008 for hypothesis 1.

5.4.2 Second crisis: 2014-2016

For this crisis, 2015 witnessed an increase of the 379% in bankrupted oil companies compared to 2014 (CNN Business 2016), meaning that despite the shock being located in 2014, year 2014 cannot be defined as crisis year, and it is reasonable because there were only two months after the oil started to drop until the end of year. The decreasing trend lasted for around 10 weeks and the low price persisted throughout 2015.

So, even if 2014 was overall a difficult year for US oil companies and can generally be defined as the start of the 3-year crisis it is more significant to include only 2015 and 2016 as the crisis years, which offer a clearly identifiable exogenous shock to the cost of external financing, by means of financially distressed firms that have bankrupted.

Linked to this issue, in Section 6.2 we will further elaborate on the decision to lag our variables *derivative cashflow* and the *crisis year* relatively to the dependent variable of our hypothesis 1, *Acquisitions*.

6. Variables definitions and descriptive statistics

In this Section, for each variable in the models presented in Equations 1 and 2, we are going to define it, provide an interpretation coherently to the previous literature, look at its descriptive statistics, and discuss its expected coefficient sign in each hypothesis.

The following variables have been scaled by end-of-year total assets to mitigate the effect of outliers, and because we are interested in the proportional change compared to the size of the company, given that we then include firm size as a separate control variable: *Acquisitions, derivative cashflow, cash holdings, operating cashflow, capital expenditures*.

Any use and description of our independent variables, unless explicitly specified, is consistent with prior literature on the use of hedges in the oil industry (Allayannis and Weston 2001, Jin and Jorion 2006).

As a final introductory remark, by looking at *Table 2*, it is apparent that the data set is unbalanced, given that we allowed two years to be missed, for a maximum of 81 companies per year. Mostly, the missing year is either 2006, 2015 or 2016, with only one observation missing in 2007.

6.1 Dependent Variables

6.1.1 Acquisitions

This is COMPUSTAT line item #129 and our dependent variable in hypothesis 1. This item represents the net cash outflow of funds relating to acquisition of a company in the reported year. Consequently, it assumes a negative value when the companies face a cash inflow larger than the cash outflow due to sold assets or equity. To further mitigate concerns about outliers this variable is also winsorized at the 98.5 and 1.5 percentiles for hypothesis 1.

In hypothesis 2, we expect its coefficient sign to be ambiguous, depending on the interaction terms, as we will see in the following paragraphs.

By looking at Table *2* we can notice that the number of acquirers is fairly constant at around 20% of the companies, per year. There are far fewer sellers, maximum two per year over the period analyzed. Most of the companies do not pursue any acquisition. In Table *3* we can also see that acquisitions are positively skewed, and the 75^{th} percentile is still 0. Lastly, in Table *4* we can see that on average hedgers have higher acquisition expenses.

6.1.2 Firm value (Tobin's Q ratio)

In the literature, Tobin's Q ratio is the mostly used proxy for firm value. We calculate it as book value total liabilities added to the market value of equity, divided by the book value of total assets.

In hypothesis 1, this variable is lagged, because we deem that corporate strategists pursue acquisitions only after they have some strengthening feedback on their key metrics, reflected on the firm value. We expect its sign to be positive, meaning that the higher the firm value, the more activities they pursue. Interestingly, we might witness a negative coefficient sign, if we consider that companies with higher Tobin's Q might be so because virtuous and, hence, pursuing expansions in a more organic way. As we will see in Section 7.1, there is no significance in hypothesis 1 for this variable, but we decide to include it nonetheless because it is a customary variable in the literature.

In hypothesis 1, we expect Tobin's Q coefficient's sign to be positive, meaning that a higher firm value allows higher acquisition activities, even though the issue is more articulated, and it is tackled in the second hypothesis.

In hypothesis 2, we invert the variables' role and we have Tobin's Q ratio as our dependent variable. The focus will be on how the interplay between derivative cashflows, acquisition activities, and economic-wide status affects the firm value. In one of the robustness checks, we also substitute our dependent variable *TobinsQ* with the variable *market-to-sales*, calculated as market capitalization scaled by annual sales (Allayannis and Weston 2001).

By looking at Table *4* we notice that the Tobin's Q mean of the non-hedgers is higher than the one of the hedgers (1.875 vs. 1.48 of the hedgers'), and we will test this difference statistically in Section 7 as introductory analysis for hypothesis 2. This would confirm a hedging discount, as proven in previous literature (see Section 3).

6.2 Derivative Cashflow

Derivative cashflow (*derCF*) is our main independent variable. This is the "Realized Gain (Loss)" item, whose collection methodology has been described in Section 5.3. It represents the cash settlement of outstanding commodity hedge contracts on oil and gas. Using the size of the derivative cashflow is quite unique in the literature, and only recently been tested by Jankensgård and Moursli (2019). We exclude derivatives tied to foreign exchange and interest rates. In the former case because US oil and gas companies typically have a negligible exposure to foreign exchange risk. In the latter because they are not necessarily used for hedging (Jankensgård and Moursli 2019).

We decide to lag *derCF* compared to *Acquisitions* because we deem that the additional cashflow from derivatives is not a secured source of cash and it needs more time to be recognized by creditors as an effective diminishing source of volatility and financial distress. Only then, we expect corporate strategists to pursue acquisitions, with some delay.

On the contrary, in the model for hypothesis 2, *derCF* is not lagged. We deem that realized derivative cashflow are normally available to investors throughout the year on at least a quarterly basis. Hence, we expect markets to acknowledge that information in a timely fashion.

By looking at *Table 2*, we can observe that the percentage of companies using financial derivatives are slightly changing over time, starting from 50% in 2006, reaching its peak in 2014 at 67.90%, and dropping again in 2015-2016. Worth to be noted, excluding years 2006, 2007, 2015 and 2016 (years with fewer observations), the percentage is fairly stable at around 66%.

6.2.1 Expectations on the coefficient sign

Based on previous research and theories exhibited above as well as our observations in Section 4, we do not exclude any possible outcome.

Firstly, intuition suggests that if we find the coefficient of the derivative cashflow to be *positive* that will mean that oil companies use the additional cash inflow and the likely increased debt capacity to finance acquisitions.

Secondly, if we find that the coefficient of the derivative cashflow is *negative* that would likely mean that derivative cashflow is mostly used for capital expenditures (Jankensgård and Moursli 2019), or to meet debt repayments rather than finance acquisitions at illiquidity discount. If that would be the case, we will also check whether a crisis period would just worsen the situation rather than prove that the hedgers pursue countercyclical acquisition strategy, by looking at the interaction term. So, if negative it means that oil companies – on average – hedge as a last resort to avoid suboptimal investments rather than to have a proactive aggressive financing tool in support of a countercyclical acquisition strategy of illiquid assets.

Overall, in hypothesis 1, when *derCF* is considered by itself and not as part of the interaction term, we expect it to be negative. A deeper discussion will follow in the coming Sections.

In hypothesis 2, this will be similarly interpretable to the studies focused on firm value, covered in Section 3. If positive, this is evidence in support of a hedging premium; if negative, of a hedging discount. We expect the latter, according to most of the studies in the oil industry. In our hypothesis this coefficient is important but, we are most interested in the sign of the interaction term as we are looking at the countercyclical activities (see paragraph 6.4).

6.3 Crisis Years

The arguments considered in defining a crisis year has been described in Section 5.4 and they are 2008, 2009, 2015 and 2016. In our model, crisis years are dummy variables. We also lagged this variable because as we have noticed in Section 5.4 the actual reporting of acquisitions in the financial statements is de facto delayed compared to announcement dates, and also partly because we deem there is some delay attributable to the decision making process by the corporate strategists.

In hypothesis 1, we expect its coefficient to have a negative sign as we have seen that acquisitions are procyclical activities in the oil industry (Shleifer and Vishny 1992), meaning that in crisis periods – on average – acquisition activities decline.

Similarly, in hypothesis 2, we expect the coefficient sign of the crisis year in its own to be negative. A deeper argument will follow regarding its interaction with *derCF* and *Acquisitions.*

6.4 Interaction terms

In hypothesis 1, the interaction term is between the crisis year and *derCF*, and we expect its sign to be positive and larger than the sum of the absolute values of *derCF*'s and *Ycrisis*' coefficients. This coefficient is pivotal in interpreting our results because it addresses the direction of the combined impact of derivative cashflows and crisis periods, as codified in the H1 model. That means that, even if we expect *derCF* and *Ycrisis* taken singularly to have a negative impact (paragraphs 6.2, 6.3), we believe that the combined effect of the interaction term increases the level of acquisitions in the following period.

In hypothesis 2, the interaction term there is a three-way factorial interaction term with two continuous variables, namely *Acquisitions*, *derCF,* and one dummy, *Ycrisis*. This is of more complicated numerical interpretation and we will focus on this in Section 7. For the time being we are limited to observe that if we expect a positive effect, the coefficients should be overall positive.

6.5 Other Control Variables

6.5.1 Firm's size

We decide the proxy to firms' size to be the logarithm of the end-of-year total assets (COMPUSTAT item #6). The effect of the firms' size is ambiguous but still important as larger firms, ceteris paribus, are less likely to pursue acquisitions than smaller firm. Hence, we expect the coefficient to be negative in hypothesis 1.

This variable is also lagged, because – similarly to the arguments for which we lagged *TobinsQ* – we deem that corporate strategists pursue acquisitions only after they have some reassuring key metrics, that are reflect on the balance sheet generally as total assets.

Conversely, in hypothesis 2, the effect of firms' size is ambiguous but still important as larger firms, ceteris paribus, are more likely to hedge than smaller firm but less likely to pursue acquisitions.

By also looking at Table *4*, we see that hedgers' sales average is 2,305.37 MUSD, compared to 1,697.37 MUSD of the non-hedgers'. Similar proportions exist by looking at total assets, with hedgers' total assets average almost 1.5 times of the non-hedgers' one.

6.5.2 Leverage

As it is recurrent in the literature that capital structure may be related to acquisition activities, we also include this variable as a proxy to external financing costs. We calculate it as end-of-year total liabilities divided by total assets. As in the case of those metrics regarding overall corporate performance (i.e. Tobin Q's ratio and total assets), we decide to lag this variable.

In hypothesis 1, we expect the sign to be ambiguous given the contrasting results regarding capital structure. In fact, the usage of leverage increases marginal tax benefit as well as distress cost. Hence, we will expect a positive sign if companies use debt capacity to pursue acquisitions, but also expect a positive sign in distress companies (that are likely to sell off).

In hypothesis 2, we expect its sign to be ambiguous, as in hypothesis 1, given that leverage increases marginal tax benefit as well as distress cost.

By looking at Table *4* we can notice that the hedgers have a slightly higher leverage (0.613 vs. 0.542 of the non-hedgers'), and it is consistent with theories that suggest that hedging companies can increase their leverage by reducing the volatility of their cashflow via derivatives. Lastly, in Table *6* we also provide some statistics on the yearly level of leverage, divided by acquisition and hedging profiles, for a total of six profiles. This is useful to see the distribution of acquisitions and sales over the year. We also confirm that the largest group is constituted by companies that have 0-net acquisitions, and that hedgers tend to have higher mean leverage throughout the years.

6.5.3 Cash holdings

This is COMPUSTAT item #162. In hypothesis 1, we expect its coefficient to be negative, given that when pursuing acquisitions is more likely to use excess cash at hand (pecking order theory). This is not lagged, because we see – for the same reason why we expect the sign to be negative – to be mutually exclusive to contemporaneous acquisitions activities. This is not completely symmetrical though, given that in case of negative acquisitions, companies are more likely to also have lower cash holdings, due to their distressed situation.

In hypothesis 2, we exclude this variable in our baseline model as it has been in previous studies (Allayannis and Weston 2001, Jin and Jorion 2006).

By looking at Table *4* we can see that non-hedgers have quite higher cash holdings' average, which substantiate the argument that derivatives' contracts are often put in place instead of keeping cash holdings.

6.5.4 Profitability

In hypothesis 1, we use operating cashflow as a proxy for profitability. It is defined as cashflow from operations, obtained from the statement of cashflows (COMPUSTAT item #308), less the derivative cashflow, divided by total assets, as in Jankensgård and Moursli (2019).

Consistently to other performance measures in our model, this variable is lagged. We expect its coefficient sign to be positive in hypothesis 1. As a side note, we tested this variable in a not lagged version, and we get highly significant coefficient instead: but we exclude it on the basis of economic significance. Interestingly, that might be an indicator of endogeneity, by arguably suggesting that companies are likely to boost their profitability with acquisitions.

In hypothesis 2, we substitute operating cashflow with ROA, as a more appropriate proxy to profitability that is widely used in the literature that looks at firm value (Allayannis and Weston 2001, Jin and Jorion 2006) and we expect its coefficient to be positive, and it is not lagged relatively to Tobin's Q ratio, conformingly to common practice in the literature.

By looking at Table *4*, we notice that hedgers have higher operating cashflow average compared to non-hedgers (.122 and .084, respectively), which is somehow interesting because we have adjusted the metric *operatingCF* by subtracting the derivative cash flow, and still hedgers seem to be more profitable than non-hedgers.

6.5.5 Capital expenditures

Capital expenditures is a proxy for investment opportunities, which, by excluding acquisition activities in its account (COMPUSTAT item #128), is a fair representation of investments aimed to organic growth. In hypothesis 1, we expect the sign to be negative, due to opportunity costs between acquisitions and capital expenditures.

In hypothesis 2, we expect this variable to be positive, given that the more the investment opportunities a company has aimed at organic growth, the more valuable it is.

Capital expenditures in hedging companies is higher compared to the non-hedging companies (Table *4*, .238 and .187 respectively), which, at a very simple level of analysis, confirms the idea that derivative cashflows can be used to sustain capital expenditures.

6.5.6 Altman Z-score

The use of this variable in a hedging-related research question is less common in the literature, but yet present (Bartram, Brown and Conrad 2011, Campello, et al. 2011). Accordingly, we use it as a proxy for financial distress, after confirming it has low correlation with *leverage* (Table *1*). It is calculated according to the original Altman's Z-score formula.

In hypothesis 1, we decide to lag it, for similar reasons along which we lagged other company status-related metrics. Moreover, we expect its coefficient to be positive, meaning that the higher the score, the less financially constrained the companies are, hence the more likely to purse inorganic expansion.

In hypothesis 2, Altman Z-score is not lagged, and we expect a positive coefficient sign as well.

By looking at Table *4* we can see that hedgers' Z-score mean is much lower than non-hedgers' Z-score mean (1.061 and 6.304, respectively), confirming previous findings that oil companies hedge more the more distressed are.

6.6 Debt capacity

As we have highlighted in Section 4, part of our attention is directed towards the level of financial distress faced by the company. An example of proxy for financial distress could be the level of leverage. But, as Pulvino (1998) notes, a company with severe debt overhang but a large cash balance can rely on those internal funds without being obliged to access external capital markets. For controlling this possible scenario, we consider the current ratio (equal to current assets divided by current liabilities), because companies with high current ratios are unlikely to be facing liquidity crises or capital constraints, regardless of leverage ratio (Pulvino 1998). We then define companies' *debt capacity* by combining two indicators, namely current ratio and leverage. Companies with low debt capacity are those that have their leverage ratio above the leverage median of the sample, and the current ratio below the current ratio median (N = 290). Companies with high debt capacity are those that result having leverage below the leverage median and the current ratio above the current ratio median (N = 290). All the remaining companies are defined as having medium debt capacity (N = 260). This subgrouping allows us to corroborate both hypotheses, and to have more insights on the impact of debt on acquisitions.

7. Empirical analysis and Discussion

In this Section, we are going to start by discussing the results for hypothesis 1 (Section 7.1) and we will continue with the discussion of the results for hypothesis 2 (Section 7.2). For each hypothesis we will start with univariate analyses, and then proceed with multivariate analyses. We then finish this section by having an overall discussion on the countercyclical acquisition strategy in the oil industry (Section 7.3) and research shortcomings (Section 7.3.1).

7.1 Hypothesis 1: derivative cashflow and acquisitions

In this Section, we are going to test our first hypothesis whether derivative cashflow affects acquisitions depending on the economic industry-wide status.

7.1.1 Univariate Analyses: tests of difference in sample means

In this subsection, we test our main hypothesis that the use of derivatives do not affect acquisition activity, by comparing the acquisition value means by looking at the hedging profile and by looking at the leverage level of the oil companies, both in the whole period and in the crisis periods. The use of the univariate analysis is introductory, but it is useful in motivating the starting point of our research. In all the univariate tests, the null hypothesis is that there is no difference between the means of the two subgroups considered. Hence, rejections of the tests of difference's null hypotheses are going to be in favor of H_A1.

7.1.1.1 Difference in acquisitions means between hedgers and non-hedgers in crisis periods

Given that we are interested in the countercyclicality of the acquisition strategy applied by oil and gas companies, we test our hypothesis by looking at those years which we have identified as crisis years in the oil industry i.e. 2008, 2009, 2015 and 2016. As we have seen in Section 5.4 these years happen to be mostly defined by the level of the oil price. By looking at Table *7* column 3 we see that hedging oil companies have higher acquisition values than the non-hedging ones, in any period considered. Yet, the difference is significant at the 5% level only when we analyze the whole period. Despite we are most interested on the difference in the counter periods, we will challenge this simple analysis in the multivariate setting in Section 7.1.2.

7.1.1.2 Difference in acquisitions means among companies with low and high leverage

Furthermore, Table *8* shows the results of testing the hypothesis that the leverage ratio – either low or high – does not affect acquisition activities. For this test we represent leverage as a dummy variable, 0 identifies lowly leveraged companies, 1 identifies highly leveraged companies, and the defining threshold is the median leverage of all observations. In column 3 we can see that we have highly significant results, at a 1% significance level, meaning that on average companies with higher leverage are more likely to pursue acquisitions. The results are also significant at a 1% significance level when the same test is carried out by focusing on the observations in the non-crisis periods (Table *8*). This means that in non-crisis periods highly leveraged companies pursue more acquisitions than lowly leveraged companies on average (respectively 0.025 and 0.012). In crisis periods, the difference is smaller and not significant.

7.1.1.3 Difference in derivative cashflow means among companies with low and high leverage

Lastly, we test the hypothesis that the leverage level does not affect the derivative cashflow. This is done by comparing the derivative cashflow means between highly and lowly leveraged companies (Table *9*). We find that there is a negative statistically significant difference, at a 1% level, meaning that highly leveraged companies are more likely to have higher derivative cashflow. Results are also significant at a 1% level when we test this hypothesis in crisis periods (Table *9*).

Overall, the above analysis provides evidence against the univariate nulls, arguing in favor of our alternative hypothesis that derivatives cashflows in interplay with crisis periods affect acquisition activities.

7.1.2 Multivariate Analysis

The above univariate test is a simple analysis which does not consider the potential effects of control variables as well as specific year effects. Therefore, in this subsection we will control for the above-mentioned control variables that potentially could affect our dependent variable, *Acquisitions*, by testing our hypothesis in a multivariate setting. As discussed in Section 5.1 we analyse hypothesis 1 by employing our baseline regression Eq.1. In order to account for any problem caused by heteroskedasticity, serial correlation and time invariant variables, we test our hypothesis using both a Pooled OLS (POLS) and a Fixed Effects model with cluster robust standard errors.

7.1.2.1 Pooled OLS

Table *10* column 2 shows the POLS regressions including cluster robust standard errors. Our main explanatory variables used to test the hypothesis is *derivative cashflow, crisis year and the interaction between those two variables.* By inspecting the results, we initially find that the regression returns insignificant results for derivative cashflow as well as for the interaction term. This suggest that derivative cashflow on average does not affect the amount spent on acquisitions. Looking at the *Ycrisis* variable we find that being in a crisis year has a negative effect on the amount spent on acquisitions, at a 5% significance level. Specifically, the coefficient shows that being in a crisis year lowers the amount spent on acquisitions by 0.013 on average.

By viewing Table *10* column 2 we also observe that the control variables Cash and Capex are significant. Especially interesting is it that the control variable *capex* on average affects *Acquisitions* negatively by 0.71 when increased by 1. This was however expected as many acquisitions could exclude the possibility of undertaking additional capex investments, since acquisitions are very demanding in terms of a company's available funds.

7.1.2.2 Fixed Effects

However, as mentioned earlier POLS do not account for the effect of time invariant variables in the sample data. Hence, to control for any potential effects of unobserved firm characteristics, which might induce a bias in our POLS estimates, we proceed with a Fixed Effects model including cluster robust standard errors. We decide on the Fixed Effects model by employing a Hausmann test. Table 11 panel B shows the results of the Hausmann test which supports a rejection of the null, at a 1% significance level.

Initially, as we compare the results from the POLS regression Table *10*, Panel A, column 2 to the Fixed Effects Table 11, Panel A, column 2 we see that all our explanatory variables, except from Tobin's Q ratio and *OperatingCF*, are now significant and have changed coefficients. This is particular evident by viewing the derivative cashflow as its coefficient increased its negative impact on acquisitions from 0.041 to 0.2. Also, derivative cashflow is now significant at a 1% significance level. This suggests that the POLS model suffered from a negative bias. The interaction term between crisis year and derivative cashflow is also now significant with a positive increase in its coefficient suggesting a positive bias in the POLS model. All in all, this suggests, as we expected, that the POLS model induced a very significant bias, positive and negative, in our estimates. This indicates that firm specific time invariant effects are an important element to consider in our analyses.

Table 11, Panel A shows the Fixed Effects regressions of our hypothesis both with and without cluster robust standard errors.

When comparing the Fixed Effects regressions with and without cluster robust standard errors, we see that the standard errors from the regression with cluster robust standard errors are different. This indicates that the regression, excluding cluster robust standard errors suffered from either serial correlation or homoskedasticity. The coefficients remain unchanged as homoskedasticity and no serial correlation are not needed to obtain consistency and unbiasedness. Therefore, moving forward we will interpret the results from the Fixed Effects regression including cluster robust standard errors when testing our hypotheses.

The results from the Fixed Effects model is improved compared to the POLS model. Particularly improved is the derivative cashflow coefficient, as we now see a significant negative relationship between derivative cashflow and acquisitions, at a 1% significance level. This suggests that as a company's cashflow from derivatives increases the amount spent on acquisitions decreases. Specifically, the coefficient shows that an increase in derivative cashflow of 1 lowers the amount spent on acquisitions on average by 0.219. Furthermore, we observe that the year crisis variable remains significant at a 5% significance level. Albeit with a more negative coefficient. Interestingly, the interaction term between year crisis and derivative cashflow is now highly significant with a positive coefficient of 0.266. This suggests that the effect of derivative cashflow on acquisitions is dependent of being in a crisis year. We also observe that all control variables, except from *TobinsQ* and *OperatingCF*, are now significant.

Summarizing we find that derivative cashflow on average, over the sample period, has a negative effect on acquisitions. However, when considering being in a crisis year we observe that derivative cashflow has a positive effect on acquisitions. This is highly interesting as these results are in favour of our hypothesis that *derivative cashflows in interplay with the economic industry-wide status affect the level of acquisitions (net) of oil and gas companies.*

7.1.2.3 Debt capacity subsamples analysis

To further strengthen our analysis of the hypothesis we expand our multivariate analysis by dividing the sample into three subsamples. This is done by looking at different financial distress levels as we highlighted our doubts concerning capital structure and the usage of derivatives in the hypothesis development. The subsamples are determined by the level of debt capacity, respectively low, medium, and high, as defined in paragraph 6.6.

Table 12 shows the results from our regression on the three subsamples. We can see that *derCF* and the interaction term between derivative cashflow and crisis year are only significant in the low and medium debt capacity subsamples.

In spite of significance, our focus will be on comparing all subsamples as the economic interpretation is highly relevant here. By inspecting Table 12 we see that for the subsample with low dept capacity the derivative cashflow variable has a coefficient of -0.246, which is higher than the derivative cashflow coefficient for medium debt capacity of -0.921. Even if insignificant, the coefficient of derivative cashflow for firms with high debt capacity is positive at 0.154, which is interesting. For all three subsamples we observe that the effect of being in a crisis year is having a negative effect on the amount spent on acquisitions, which is in line with our main analysis. When viewing the interaction term, we observe that the effect of derivative cashflow in a crisis year is positive only for the subsamples with low and medium debt capacity. However, the magnitude of the effect on the amount spent on acquisitions is significantly more positive for companies with a medium debt capacity (0.818). Interestingly, we also see that for firms with medium debt capacity an increase in leverage also support the amount spent on acquisitions, even though the leverage coefficient is not significant.

The above analysis suggests that, on average and in non-crisis periods, companies with high debt capacity have their acquisition activities positively affected by the level of derivative cashflow. However, during crisis periods, we find that firms with medium debt capacity are those that have their acquisition activities positively affected by the level of derivative cashflow, de facto being those able to pursue a countercyclical acquisition strategy according to our findings.

As we have observed in Section 4.3, existing empirical studies are complementary and do not specifically address our research question. Comparing the above results to the contemporary literature is then quite interesting. In contradiction to Alexandridis, Chen and Zeng (2017)'s results, we find that on average the usage of financial derivative in oil and gas companies does not increase M&A activity, as we find that an increase in derivative cashflow has a negative effect on the amount spent in acquisitions. However, in line with Alexandridis, Chen and Zeng (2017), we find that derivative cashflow in crisis periods has a positive impact on M&A activity. This could be, as Alexandridis, Chen and Zeng (2017) argue, due to financial hedging acting as a vehicle for firms to mitigate financing restrictions, as it reduces cost of borrowing as well as increases the accessibility to capital. Albeit in periods characterized by costly external financing.

Both Campello, et al. (2011) and Chen and King (2014) examine whether the use of financial derivatives have a positive effect on cost of debt. We find that companies with medium debt capacity are more capable of reaping the benefits deriving from additional derivative cashflows. We argue that the explanation of this relies on the fact that highly leveraged companies are likely forced to use their derivative cashflow to maintain their loans in crisis periods. Hence, they cannot use the extra cashflow to pursue acquisitions. However, whereas companies with medium debt capacity have a better optimized capital structure and their loan maintenance is not dependent on additional derivative cashflow in crisis periods. Therefore, the additional cashflow received allows them to pursue a countercyclical investment strategy. We argue that this is in line with both Campello, et al. (2011) and Chen and King (2014) as this could be a explained by less volatile cashflow that lowers the cost of external financing which enables companies to fund their acquisitions through debt financing where others cannot.

7.1.2.4 Robustness checks

To test the robustness of our baseline regression we proceed in this subsection by exploring whether our results are robust towards the choice of the dependent variable, the chosen set of control variables, the defined crisis years as well as without lagged variables.

We test our choice of dependent variables by employing a different proxy for acquisitions. As a different proxy we use investment activities, which is the sum of both activities and capital expenditures to capture the explanation power of the derivative cashflow for the overall investments, i.e. also expanded to investments oriented towards organic growth.

To test our choice of control variables we introduce the variable unrealized derivative cashflow as one of the robustness regressions to see whether this would change our results. Finally, we test whether the baseline regression in robust towards the defined periods of crisis time by also including 2014 and by excluding 2008 in two separate checks, as discussed in Section 7.1.2.4.

We see by inspecting Table *13* that the coefficients remain unchanged as well as significant in spite of all three robustness checks, which supports that our baseline regression is robust.

7.2 Hypothesis 2: countercyclical acquisition strategy and firm value

In this Section we test our hypothesis 2 whether derivative cashflows' usage for countercyclical acquisition strategy affect the firm value of oil and gas companies. As in the case of hypothesis

1, we start by testing differences of sample means using a univariate analysis, and we then continue with the multivariate analysis in paragraph 7.2.2.

7.2.1 Univariate Analyses: tests of difference in sample means

In this subsection, we test our main hypothesis that acquisition activities do not affect firm value, by comparing the Tobin's Q ratio means. The tests are three, by looking (1) at the acquisition profiles, (2) at the leverage levels and (3) at the hedging profile of the oil companies, both in the whole period and in the crisis periods. Rejections of the tests of difference's null hypotheses are going to support our H_A2.

7.2.1.1 Difference in firm value among acquisition profiles in crisis periods

Given that we are interested in the firm value, when also considering the economic industry-wide status, we test our second hypothesis by looking at those years which we have identified as crisis years in the oil industry. By looking at Table *14* we can see that the firm value is always higher for companies that do not pursue acquisitions or not sell in all periods and subperiods. Nonetheless, the difference between the two means is smaller in crisis periods, albeit at a 10% significance level instead of the 1% as in the other two cases. This might highlight that in normal times there are clear advantages for those that do not pursue acquisitions, but that the economic industry-wide status is very important in determining the firm value.

7.2.1.2 Difference in firm value between hedgers and non-hedgers in crisis periods

Furthermore, Table *15* shows the results of testing the hypothesis that the hedging profile does not affect firm value. The results clearly show that, in this simple setting, hedgers in the oil industry suffer of a hedging discount. In crisis periods the spread increases. Results are all statistically significant at a 1% level.

7.2.1.3 Difference in firm value between lowly leveraged and highly leveraged companies in crisis periods

Lastly, in Table *16* we show the results of testing the hypothesis that the leverage ratio – either low or high – does not affect the firm value. These results are the least consistent when confronted to each other. We can see that by analyzing the whole period, the most leveraged companies have a slightly higher *TobinsQ* on average, but only statistically significant at the 10% level. Further, in crisis years the companies most leveraged have clearly a higher firm value and this result is highly significant. Lastly, in non-crisis periods, companies with higher leverage tend to have a lower firm value on average, even though it is not significant.

Overall, the above analysis provides evidence against the univariate nulls, arguing in favor of our alternative hypothesis that acquisitions and derivative cashflows in interplay with crisis periods affect firm value. In what measure this happens is going to be addressed in greater in detail in the next paragraph.

7.2.2 Multivariate Analysis

In this Subsection, we are going to test hypothesis 2 by employing the model and the method presented in Section 5.1. We have already highlighted and discussed the limitations of the pooled OLS methodology in the previous Section 7.1. In the following paragraph 7.2.2.1 we focus on the Fixed Effects model because we are interested on the effects of invariant firm characteristics. We also focus only on the results from the Fixed Effects regressions with cluster robust standard errors to account for serial correlation and homoskedasticity issues. We then include a discussion of the results and how they compare to those found in the literature and theory presented in Section 6. We conclude with the related robustness checks in paragraph 7.2.2.3.

7.2.2.1 Fixed Effects

In the following analyses we have produced five variants of the H2 baseline model (Eq.2) at an increasing level of complexity, in order to corroborate the results for hypothesis 2. In Table *17*, Column 1 shows the results of the baseline model with period fixed effects control. In Column 2 we control for period fixed effects but also include the interaction term between *Acquisitions* and *derCF*. In Column 3, we drop the period fixed effects control and we introduce the crisis year dummy. In model 4 we further introduce two interaction terms, namely one between *Ycrisis* and *derCF*, and the other between *Ycrisis* and *Acquisitions*. Lastly, the most relevant for testing our hypothesis 2 and the one presented in Section 5.1 is the model 5 in Table *17*, in which there is a 3-way factorial interaction term among *Ycrisis*, *derCF* and *Acquisitions*.

Before addressing the discussion on the three main independent variables and respective interaction terms – which are the core of the interpretation of this hypothesis – we reserve a short analysis of the control variables.

By looking at Table *17*, we can see that the leverage coefficient is consistently positive and highly significant at the 1% level, in the range of 0.261 and 0.294, meaning that the higher the leverage, the more shareholders are rewarded. Despite our ambivalent expectations, our results are clear in determining a positive relation between firm value and leverage, which is aligned in sign to Jin and Jorion (2006)'s results, even though they did not find any significance. To further assess the impact of debt structure and financial distress, we will look at debt capacity subsamples in subsection 7.2.2.2. Nonetheless, even if the leverage coefficient is positive, it is contemporaneously corrected by the Altman's Z-score variable. In fact, the Z-score coefficient is consistently positive and significant at the 1% level in all models, meaning that the less likely to default a company is, the higher the firm value, counterbalancing the positiveness of the leverage coefficient.

Regarding firm's size variable, its coefficient is also consistently negative and significant at the 1% level in all models in Table *17*. This is somehow unexpected, in the sense that in the literature is less clear what impact firm's size has on Tobin's Q ratio (Jin and Jorion 2006), but the negative impact is still not excluded, as in Phan, Nguyen and Faff (2014). It supports the idea that investors reward mostly smaller companies. Alternatively, given that a hedging discount is recurrently found in the oil industry and that smaller companies tend to hedge less, this finding could simply reflect this relationship.

ROA's coefficient is, as expected, positive, but not significant in any of the five models in Table *17*. Finally, as predicted in Section 6, capital expenditures' coefficient sign is positive, significant at the 1% level and in the range between 0.426 and 0.550.

As anticipated, the main independent variables in these models are *derCF* and *Acquisitions.* We can see in Table *17* that *derCF* coefficient is positive in models 1-3 and only significant in model 3 at a 5% level. This suggest a hedging premium based on the actual derivative cash flow, but these are also rough models. As we have seen in the literature review section, previous empirical studies tend to find either insignificant results or hedging discounts in the oil industry, with the exception of Phan, Nguyen and Faff (2014) who additionally find a hedging premium in case of declining oil prices. The same coefficient becomes negative and insignificant in models 4 and 5 when the interaction terms are added to the baseline models.

Similarly, the coefficient of the *Acquisitions* variable is negative and insignificant over models 1-4, but it becomes significant at the 10% level in model 5. That is arguably because the variables when considered on their own are biased and they do not properly capture the complex dynamics of their relationships with the firm value. In fact, the interaction terms are all significant but one, and it is important to highlight that in all the three models with interaction terms (models 4-5), the two main variables interact with the economic industry-wide status, i.e. *Ycrisis* dummy variable. This means that the economic industry-wide status affects quite importantly how derivative cash flows and acquisition activities affect the valuation of oil companies, on average. This is precisely what we are looking for in our hypothesis 2, and the focus of the remaining discussion.

By looking at the 2-way interaction terms between a continuous variable and the *Ycrisis* dummy variable in models 4 and 5 (Table *17*), the interpretation is straightforward and there are some interesting observations to make. In case of the interaction term *Ycrisis* × *derCF*, the coefficient is positive and statistically significant at a 5% level in both model 4 and 5. They are also fairly close to each other, respectively 1.277 and 1.385. That means that, even if we found the standalone *derCF* coefficient to be negative and statistically insignificant (respectively -0.187 and -0.212) and the standalone and highly significant *Ycrisis* coefficients being respectively -0.203 (0.029) and -0.206 (0.029), the overall combined effect of *derCF* (as a proportion of total assets) and the crisis period on the firm value in a crisis period is positive, signaling a hedging premium in crisis periods as found in Phan, Nguyen and Faff (2014). Namely, in model 5, 1.385 is much greater than the sum of -0.212 and -0.206, even considering that the two negative coefficients are not statistically significant, because their standard errors are relatively small.

In case of the interaction term *Ycrisis* × *Acquisitions*, the coefficient is positive in both model 4 and 5, and statistically significant at a 10% level only in the latter (0.688). This means that, when an oil company is hit by an industry-wide crisis, ceteris paribus, the more acquisitions it pursues the more value the company gains. Hence, taking into consideration also the negative coefficients of the non-interacted *Acquisitions* and *Ycrisis* variables, the compounded effect of the three coefficients is around 0, meaning that in crisis years, acquisitions activities seem to leave unchanged the value of the company. But it is important to highlight that the base case is that acquisitions destroy value, so by leaving unchanged *TobinsQ* in crisis periods is de facto a gain.

In model 5 (Table *17*) two important interaction terms are still left to be analysed, namely *derCF* × *Acquisitions*, and *Ycrisis* × *Acquisitions* × *derCF*. Given that these two terms have, at least, two continuous variables, their interpretation becomes more complex. We can initially say that the interplay between derivative cashflow and acquisitions in crisis years has a greater and negative impact on the firm value than the positive impact that the interplay between derivative cashflow and acquisitions has when the economic industry-status is not taken into consideration. In both cases, the interaction terms are statistically significant at a 5% level, so we can more confidently proceed drawing some conclusions by employing the support of graphical representations and by looking at the marginal effects. Specifically, we compute simple slopes, i.e. the slopes of the dependent variable on the independent variables when the interaction term's variables are held constant at different combinations of high and low values.

Graphical interpretation

In order to have a visual representation of the main trends of our main independent variables, we decided to visualize the slopes at values in which *derCF* and *Acquisitions* are equal to: one-, two-, three- standard deviations increase and decline, and 0. The total combinations are 49 as reported in Table *18*. After computing the simple slopes, we then compute and test their difference from 0 among all pairs of the slopes. This is a simplified method by UCLA (2016) adapted from the article by Dawson and Richter (2006).

In the case of *Acquisitions* × *derCF* in model 5 (Table *17*), the coefficient is 34.874. We calculate the coefficients of the slopes and their significance in Table *19*. We then visualize those simple slopes in Figure *4*.

In the case of the 3-way interaction term *Ycrisis* × *Acquisitions* × *derCF* in model 5 its coefficient is -67.509. The process is similar to the one for the 2-way interaction term for continuous variables, but by having the additional *Ycrisis* dummy variable, the results of this coefficient are compared to the base case in which the year is non-crisis (Table *20*). We then visualize the simple slopes in Figure *5*.

As a simple guide to the figures, by looking at Figure *4* and Figure *5* we can see that holding *derCF* constant and positive, the more the amount spent on acquisitions the higher the firm value (slopes with *derCF* equal to 0.052, 0.093, 0.134). Conversely, holding *derCF* constant and negative (slopes with *derCF* equal to -0.112, -0.071, -0.030), the more acquisitions a company pursues the lower the firm value.

In crisis years (Figure *5*) by holding derivative cashflow constant and positive (slopes with *derCF* equal to 0.052, 0.093, 0.134), the more acquisitions a company pursues the lower the firm value. In case the *derCF* is held constant but negative (slopes with *derCF* equal to -0.112, -0.071, -0.030), the more acquisitions the company pursue, the higher the firm value. But this slope, as can be recognized by looking at the scenarios in Table *20*, it loses significance when acquisitions are positive.

The overall interpretation is that – economically – the more a company sells in a crisis year, the more the value that the company loses. This result is reasonable, given that selling assets in a crisis year is a negative signal to the investors (signaling hypothesis).

Gauging the results

To have a better grasping of what those interactions entail for *TobinsQ*, we are going to gauge the economic significance of our results, by looking at one-standard-deviation decline and increase in both *Acquisitions* and *derCF* in case of a crisis year. These one-standard deviation slopes in Figure *6* and Figure *7* are the same that can be found in Figure *4* and Figure *5*. We chose to focus on one-standard deviation because it simplifies its understanding and because it is common practice focusing on one-standard-deviation movements.

In Figure *6* we see that, ceteris paribus, pursuing an additional one-standard deviation acquisitions and a positive *derCF* (1 st.d.) provides a 0.114 hedging premium (Table *21*, Table *22*) compared to a negative *derCF* (-1 st.d). This is the baseline period and companies with positive *derCF* (green line) witness a higher increase of firm value compared to those that have negative *derCF* (blue line). All results in base periods are significant at a 1% level.

Consequently, we can arguably reckon the uncertainties surrounding the results in the literature regarding hedging premium or discount in the oil industry. Studies have normally used derivative dummies, instead of *Acquisitions* nor *derivative cashflow* as explanatory variables. But by looking at this graph, we see that – almost unsurprisingly – a negative *derCF* determines a hedging discount (blue line at *Acquisitions* 0), and a positive *derCF* determines a hedging premium (green line at *Acquisitions* 0). In crisis years (Figure *7*), this gap is further spread. So, by looking at our results, it appears that levelling the studies on derivative dummies limit the explanatory power of the usage of hedging contracts in explaining hedging premiums or discounts.

However, our interest is on countercyclical acquisition strategy. Consequently, we switch our attention towards the one-standard deviation increase in *Acquisitions* (0.0928) and discuss the focus of our research. By looking at Figure *7*, we see that there is an opposite trend compared to the results found in the baseline period. Specifically, compared to the same example above, we see that on average a company with one standard deviation increase in acquisitions that has a one-standard deviation increase in *derCF* faces a drop of -0.397 in *TobinsQ* (statistically significant at the 5% level, Table *23*); whereas companies with one standard deviation increase in acquisitions that has a one-standard deviation drop in *derCF* faces a slight increase in *TobinsQ* of 0.004, even though the latter is statistically insignificant (Table *23*).

Considered the coefficients together, we find that a company with positive *derCF* and *Acquisitions* has a *TobinsQ* almost unchanged, whereas a company that has a negative *derCF* and positive *Acquisitions* has a higher *TobinsQ* net change, even though not statistically significant.

Overall, given that our hypothesis 2 assumes a positive derivative cashflow in order to support a countercyclical M&A strategy by definition (i.e. the case we just gauged), we see by looking at the above results that companies with positive derivative cashflow on average (namely, with one-standard deviation increase) do witness a positive change in their firm value, but it is lower than the change witnessed by those companies pursuing acquisitions with negative *derCF*.

The above result might be justified by the fact that, as observed in previous literature and in our hypothesis development, oil and gas companies that hedge are mostly in distress. Hence, it is likely that they cannot afford to expand inorganically without losing value to the investors. In order to challenge this interpretation, we are going to look at the results at different levels of debt capacity.

7.2.2.2 Debt capacity subsamples analysis

For better understanding the dynamics of value creation or destruction, we expand our multivariate analysis by dividing the sample into three subsamples by looking at different debt capacity levels, given that financial distress has been a key point in our previous analyses and in previous literature too.

Table *24* shows the results from our regression on the three subsamples. We can see that the same results from the general regression are overall confirmed in sign as well. What strikes most is that, first, the 3-way interaction term is significant only in the high debt capacity companies at the 5% level and, secondly, the higher the debt capacity, the worse the impact of the interaction terms they have on *TobinsQ*, with the impact most negatively accentuated in those companies with high debt capacity.

In this model we further add the cash variable, even though in the literature is rarely considered, because we want to see how it affects the companies at different level of debt capacity given that cash is integral part of our definition of debt capacity. We see that it is positive in all of them, but statistically significant and much higher (1.180) only in case of low debt capacity. That is utterly expected, given the marginal benefit of cash in distressed companies.

Overall, according to our results, investors penalize companies that pursue inorganic expansions when they have high debt capacity. That is a finding coherent with studies on the agency costs of free cash flow (Jensen 1986) and the empire building hypothesis. Hence, the lower valuations of those companies are unsurprising (Harford 1999).

In economic terms, we can draw the conclusion that companies with high debt capacity lose more value than their peers when they pursue this countercyclical acquisition strategy in crisis periods.

In Section 7.3 we are going to discuss these findings by also considering the results for hypothesis 1.

7.2.2.3 Robustness checks

In this paragraph, we test the baseline regressions presented in the last subsection to investigate whether the conclusions are robust to alternative specifications of the model. The results are reported in Table *25*.

In model 1 we substitute our main dependent variable with the market-to-sales ratio, as in Allayannis and Weston (2001). The coefficients mostly lose significance, but signs are preserved. Except in *Acquisitions*, but its robust standard error is also quite high.

In model 2, we control for unrealized derivative cashflow as additional variable. We also substitute ROA with *operatingCF* variable. This model, oddly enough, capture more significance compared to our baseline model: all variables and interaction terms have significant results. Nonetheless, we decided to not consider this model as our baseline model because that would entail that unrealized derivative cashflow plays an important part in a company valuation. But we are not decisively opinionated in that regard to consider it as a baseline model, due to lack of further information on how investors operate.

In model 3 we substitute the *Acquisitions* variable with a variable that include all net spending on investment, resulting in the sum of *Acquisitions* and *capex*, to particularly capture the interaction of capital expenditures with crisis years and derivative cash flow too.

The absence of a robustness check on a lagged *derCF* variable might not meet a possible interest on it, but we decided to exclude it on the basis that the market will likely account for those disclosures on a quarterly basis, hence, this would be economically insignificant.

We see by inspecting Table *25* that the coefficients' signs remain mostly unchanged as well as significant in spite of all three robustness checks, which supports that our baseline regression is fairly robust.

7.3 Final discussion

In this section we will discuss the results of the hypotheses analyzed in the previous Sections 7.1 and 7.2 with regards to theories, empirical findings and economic intuition.

As argued in Section 4, testing the possibility of a countercyclical acquisition strategy via derivative cashflows (H1) and its effectiveness in creating shareholder value (H2) were problematic in terms of what to expect as an outcome in our results.

We started from the consideration that in the oil and gas industry there were promising candidates in successfully pursuing such a strategy, because the industry is characterized by procyclical acquisitions, and that leaves open the opportunity to witness meaningful changes.

The reasons why expectations were ambiguous by only looking at the existing literature, is that (1) debt levels in the oil industry are very high (Jankensgård and Moursli 2019); (2) derivatives in the oil industry are used by the most highly leveraged companies; (3) for inorganic expansion, companies need to rely on internal funds or debt financing in crisis years because equity is very expensive (debt becomes even costlier in crisis years); (4) hedgers are more likely to undertake M&A activities (Alexandridis, Chen and Zeng 2017).

Starting from hypothesis 1, we obtained results in Section 7.1.2 that provide evidence in favor of our alternative hypothesis that derivative cashflows positively affect the level of (net) acquisitions of oil and gas companies in crisis periods.

We argue that FSS (1993)'s main argument that companies can benefit from pursuing a risk management strategy with derivative cashflow used for stabilizing cashflow volatility is also valid for oil and gas companies. But with a little twist, namely by using that additional derivative cashflow for *acquisition investments* rather than for stabilizing capital expenditure. This is somehow contrasting to the observations presented by FSS (1993) that oil and gas companies cannot benefit from a derivative strategy program as their investment opportunities are correlated with companies' cashflow. Hence, against FSS (1993)'s observation that "there is no need for hedging in the oil industry" we find that it is not a need, but an interesting possible strategy that so far might have been overlooked. As such, our results should be viewed as a contribution to their theory. It is important to highlight that our observations do not exclude the contingent cashflow being used both for directly funding the acquisitions and for reducing the volatility in cashflow and, hence, reduce the cost of external financing, or a combination of the two depending on the individual capital structure.

The countercyclical acquisition strategy in its essence is presented by Shleifer and Vishny (1992), without the additional derivative cashflow element. They propose that distressed companies sell off at an illiquidity discount in industry-wide crisis periods. This argument is successively confirmed in the empirical literature starting from the seminal article by Pulvino (1998), which shows that the illiquidity discount is significant and can be reaped by outside investors, as incumbent companies, ceteris paribus, would also be financially constrained during industry-wide crises. An aspect of the Shleifer and Vishny (1992)'s theory has already been slightly expanded by Brown (2000), who finds that it is also possible for incumbent companies to seize the illiquidity discount opportunities, if they have the funds available.

As such, our results add an extra dimension to the Shleifer and Vishny (1992) theory too, by finding evidence suggesting that incumbent oil and gas companies can also seize the opportunity presented by illiquidity discounts by relying on contingent derivative cashflows to lower the cost of external financing. That allows for the best user of the assets to be the one that can also afford to buy the assets.

Since debt levels in the oil industry are very high and many studies had a focus on the capital structure of the companies that use derivatives and that pursue acquisitions, albeit studying those aspects separately, our focus has also been drawn towards debt capacity. As explored in 7.1.2.3, to address this supposed tendency of hedging oil and gas companies being more leveraged than otherwise, we divided our sample into three subsamples accordingly. Our results from that analysis suggests that companies with medium debt capacity are those who are most capable of pursuing a countercyclical acquisition strategy by relying on positive contingent cashflow to lower the cost of external financing.

Furthermore, in relation to FSS (1993) our results are supportive of their theory as the authors argue that the companies experiencing external costs of financing higher than internal ones are those most likely to benefit from a derivative-based risk management strategy. Specifically, we argue that this is the case for both the companies with low and medium debt capacity in crisis periods. However, we deem that only the companies with medium debt capacity can seize the benefits of a countercyclical acquisition strategy. That is because companies with low debt capacity would have to use the contingent cashflow on maintaining their current loans, as argued in Section 7.1.2.

Hence, overall, our results in Section 7.1.2. provide evidence based on FSS (1993)'s theory that companies with medium debt capacity can employ a countercyclical acquisition strategy based on derivative cashflow to seize the benefits presented by the illiquidity discount, similarly to what only the financial deep pockets investors generally tend to being able to afford (Shleifer and Vishny 1992).

Consequently, as it appears that a countercyclical acquisition strategy based on derivative cashflows is a viable and interesting option in the corporate strategists' arsenal, the natural following interest is on whether this strategy creates value for the shareholders. We assessed this in hypothesis 2, Section 7.2.

Since the beginning of our enquiry one of the biggest concerns in finding confirmatory results of a positive impact of such strategy on the firm value was the widely spread practice for oil investors to explicitly seek exposure to the oil price for balancing their portfolios. That is because the strategy we have depicted is intrinsically dependent upon the intense and purposefully usage of derivatives in order to create a horizontal phase shift between the company's business cycle and the general industry's business cycle. Hence, the concern was about the expectations' disappointments of the average investor in case oil companies pursue such a strategy. That could also lead investors to doubt about the efficacy of such a strategy, given that countercyclical investment opportunities (or industry-wide crisis periods) are relatively low probability events, and hedging companies could give away too much of the upside in normal times, while "waiting" for the downturn. That turned out to be the case despite the encouraging results found in Bouwman, Fuller and Nain (2009).

From the analysis conducted for hypothesis 2 we cannot pinpoint specific reasons for which there is 'countercyclical acquisition discount'. We also have to reckon the limitations of our observations. One possible reason, as mentioned before, is that the level of specialization and discipline required in order to successfully execute this strategy is so high that investors cannot rely upon the disclosed information to properly assess the efficacy of such strategy.

But by looking at the subsamples in Section 7.2.2.2, we see that this countercyclical strategy has an even greater and significant negative effect on the firm value of companies that have a high debt capacity. That might be explained by assuming the perspective of the theories regarding the agency costs of free cash flow (Jensen 1986), the empire building and hubris theories. Despite having an advantage in their valuation by being able to pursue acquisitions during non-crisis periods, those companies lose more value than their peers when they pursue this countercyclical acquisition strategy in crisis periods, which is also aligned to Harford (1999)'s findings.

We can arguably conclude that the findings of the impact on the firm value of countercyclical acquisitions strategy supported by derivative cashflows do not invalidate such strategy, which results especially viable to companies with medium debt capacity. Nonetheless, we find evidence supporting the hypothesis that shareholders are not recognizing added value for such a strategy in the oil and gas industry. The analysis based on our sample suggests that it is in fact destroying value of high debt capacity companies especially in crisis years, on average, and it is in line with empirical findings (Harford 1999).

7.3.1 Research shortcomings

Despite our generally statistically significant results, and the most accurate economic considerations within our capabilities, we reckon that our findings might have captured spurious relationships among variables. One issue we have already mentioned is the selection bias, due to limited resources concerning the accounting of bankrupted companies.

The concern regarding spurious relationships is particularly heightened when looking at hypothesis 2's results. In fact, despite being in our opinion economically significant and aligned to seminal papers, we witnessed a fairly limited amount of year-firm observations in general, and in particular of companies with non-zero *Acquisitions* values. Given the fairly high reliability of COMPUSTAT data, we deem it as a fair representation of the population (i.e. no missing value issues), but it leaves us with few observations for our regression and 3-way factorial interaction term.

8. Conclusion

This paper had the purpose of contributing to the empirical literature at the intersection between risk management and M&A. We started by relying on a data sample of 841 year-firm observations of U.S. oil and gas companies, over the period 2006-2016, by also including actual derivative cashflows rather than relying on hedging dummy variables, as it is instead common practice in the literature. The period has been purposefully chosen over two oil crises subjected to exogenous shocks. The research has been twofold. The first step consisted in investigating whether it is possible for oil and gas companies to create a horizontal phase shift between the industry-wide cycle and the idiosyncratic cycle. This was done by employing a Fixed Effects model to empirically analyze the data sample, using acquisitions as the dependent variable and derivative cashflow and crisis year as the main explanatory variables. Our results provide evidence based on FSS (1993)'s theory that companies with medium debt capacity can employ a countercyclical acquisition strategy based on derivative cashflow to seize the benefits presented by the illiquidity discount, similarly to what only the financial deep pockets investors generally tend to being able to afford (Shleifer and Vishny 1992). As such, our results should be viewed as a contribution to their theory.

Secondly, given the positive results obtained in the first hypothesis, the interest has been drawn towards the impact that such strategy has on firm value. We linked this type of enquiry to the existing and wide empirical research area on hedging premium, by using Tobin's Q ratio as firm value proxy and as our dependent variable. We employ a Fixed Effects model with a 3-way factorial interaction term to capture the interplay among our main independent variables, namely crisis periods, derivative cashflow and acquisition activities. We find weak evidence supporting the hypothesis that in the oil and gas industry shareholders are not recognizing added value for such a strategy. On the contrary, we find medium significant evidence that this strategy is in fact destroying value of high debt capacity companies especially in crisis years, arguably due to reasons related to Jensen's free cashflow explanation.

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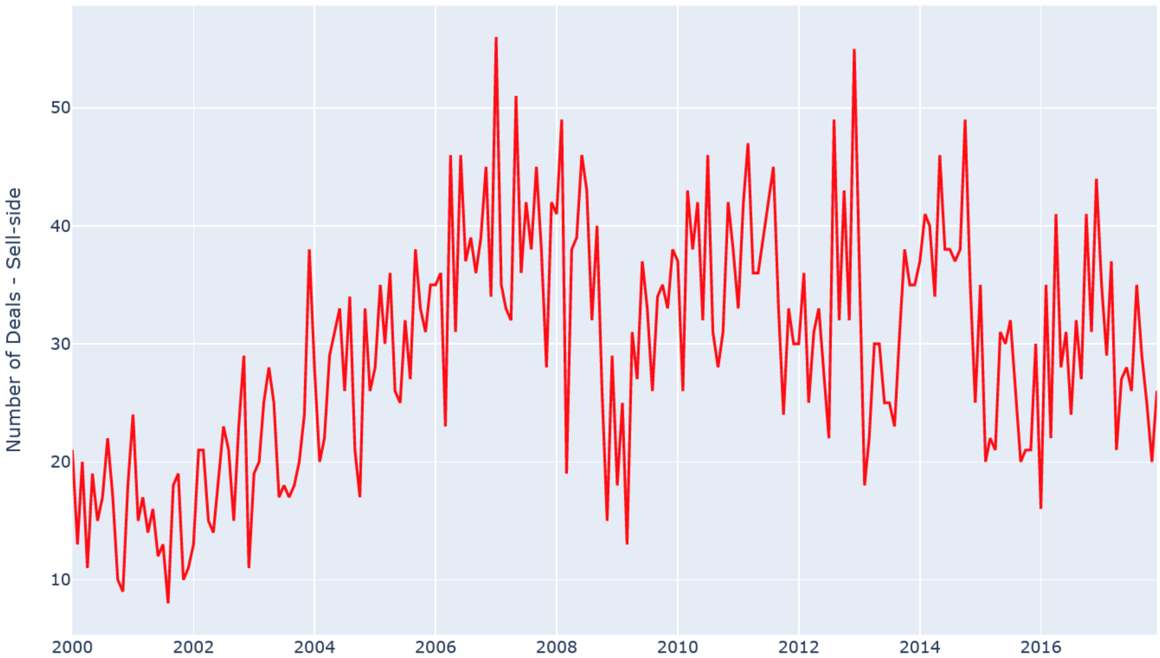
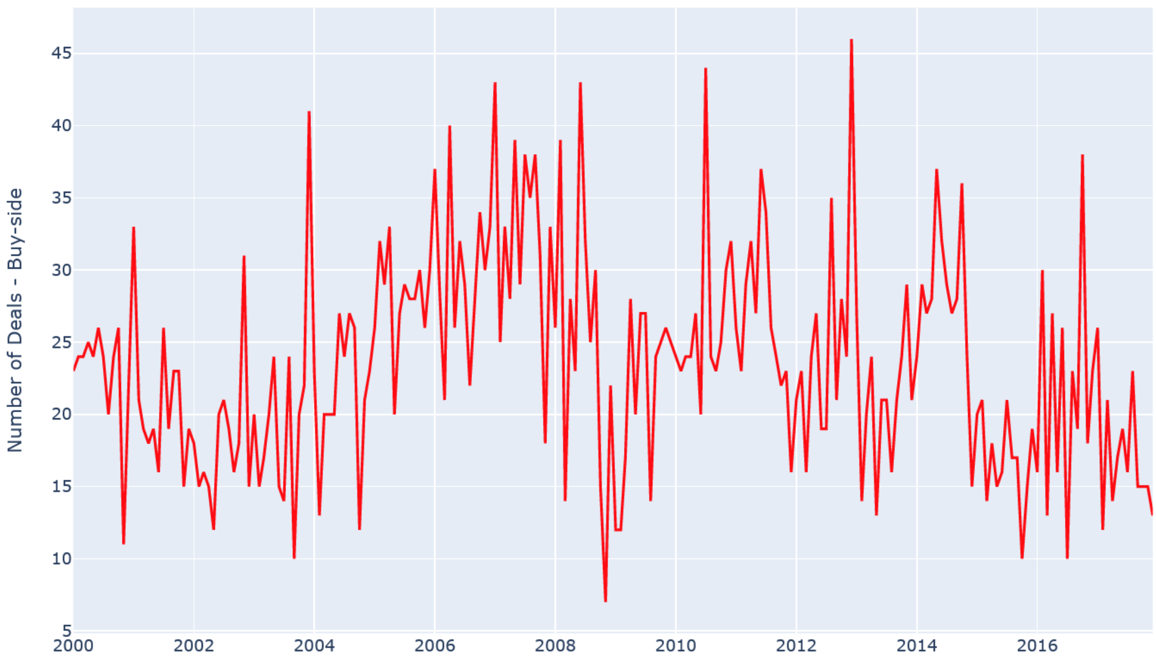
Appendix: Figures and Tables

Figure 1: Number of sell-side transactions (U.S. oil industry)



Source: authors' analysis on Thomson Reuters data.

Figure 2: Number of buy-side transactions (U.S. oil industry)



Source: authors' analysis on Thomson Reuters data.

Figure 3: WTI Oil prices

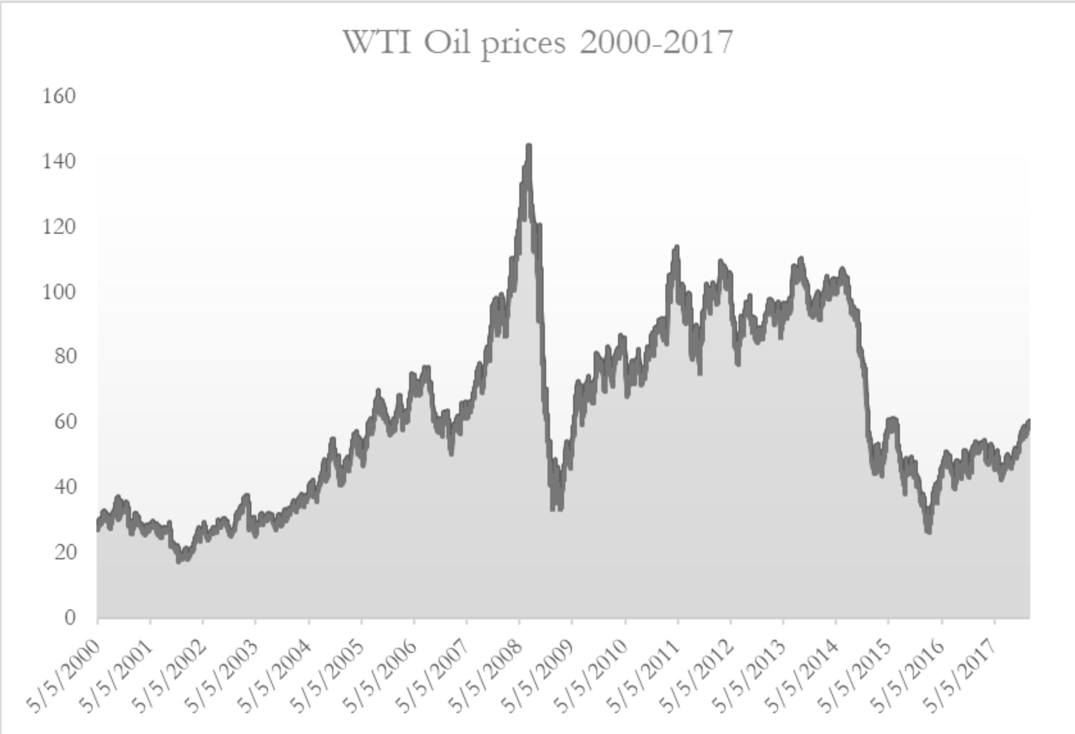


Table 1: Correlation Matrix

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
(1) Acquisitions	1.000												
(2) derCF	-0.049	1.000											
(3) TobinsQ	-0.077	0.026	1.000										
(4) totalassets	0.059	0.023	-0.144	1.000									
(5) leverage	0.016	0.271	0.201	0.102	1.000								
(6) cash	-0.066	-0.073	0.003	-0.442	-0.181	1.000							
(7) operatingCF	-0.045	-0.260	0.015	0.306	-0.126	-0.241	1.000						
(8) capex	-0.140	0.069	0.223	0.074	0.188	-0.187	0.153	1.000					
(9) Zscore	-0.023	-0.068	0.242	-0.100	-0.214	0.121	-0.034	0.003	1.000				
(10) oilavgprice	-0.035	0.022	-0.016	0.045	-0.016	-0.034	0.239	0.241	0.045	1.000			
(11) fx_effect	0.024	0.008	0.028	-0.103	0.004	0.010	-0.047	-0.006	0.005	-0.050	1.000		
(12) ROA	0.029	-0.257	-0.100	0.153	-0.584	-0.023	0.266	-0.235	0.099	0.029	0.007	1.000	
(13) unrealized_derCF	0.017	-0.458	-0.109	0.028	0.006	-0.023	0.114	0.125	-0.001	0.046	0.005	0.061	1.000

Table 2: Summary statistics by year, acquisitions, hedging profile

Year	Total	Hedgers		Acquirers		Sellers		Zero net-acquisitions	
	N	N	%	N	%	N	%	N	%
2006	72	36	50.00%	24	33.33%	2	2.78%	46	63.89%
2007	80	48	60.00%	20	25.00%	1	1.25%	59	73.75%
2008	81	53	65.43%	16	19.75%	2	2.47%	63	77.78%
2009	81	54	66.67%	9	11.11%	2	2.47%	70	86.42%
2010	81	54	66.67%	18	22.22%	0	0.00%	63	77.78%
2011	81	53	65.43%	13	16.05%	1	1.23%	67	82.72%
2012	81	53	65.43%	14	17.28%	0	0.00%	67	82.72%
2013	81	54	66.67%	15	18.52%	1	1.23%	65	80.25%
2014	81	55	67.90%	9	11.11%	1	1.23%	71	87.65%
2015	69	23	33.33%	8	11.59%	2	2.90%	59	85.51%
2016	53	26	43.40%	5	9.43%	2	3.77%	46	86.79%

Table 3: Summary statistics

Panel A – Level	N	Mean	St.Dev	Min	1st Per	25th Per	Median	75th Per	99th Per	Max
Acquisitions	841	92.766	798.243	-81.912	-.657	0	0	0	1631.692	21087
derCF	841	44.987	203.608	-397	-175	0	0	11.6	888	2400
TobinsQ	841	1.636	1.03	0	.467	1.084	1.38	1.836	5.786	10.274
totalassets	841	5882.866	11905.57	0	2.747	158.81	1329.687	4340.256	55952	69443
leverage	840	.585	.402	.007	.023	.403	.542	.672	2.321	5.123
cash	841	213.989	675.131	0	0	2.699	12.921	69.293	3698	7369
operatingCF	841	755.581	1741.432	-1877	-44.895	8.792	121.241	543.3	9349	12927
capex	841	1076.424	2112.379	0	0	22.885	276.084	1011.633	10226	17649
Zscore	840	3.134	25.94	-44.389	-15.8	.336	1.396	2.373	35.895	666.894
oil avgprice	841	58.895	36.483	0	0	42.63	69.55	88.26	108.36	112.75

Panel B – Scaled by TA	N	Mean	St.Dev	Min	1st Per	25th Per	Median	75th Per	99th Per	Max
Acquisitions (scaled)	840	.018	.075	-.191	-.004	0	0	0	.368	.902
derCF (scaled)	840	.011	.041	-.126	-.04	0	0	.009	.149	.549
cash (scaled)	840	.075	.143	0	0	.005	.022	.075	.922	.995
operatingCF (scaled)	840	.107	.121	-.721	-.273	.052	.112	.173	.423	.61
capex (scaled)	840	.218	.149	0	0	.11	.2	.302	.714	1.293

Table 4: Summary statistics by hedging profile

Panel A – Non-hedgers	N	Mean	St.Dev	Min	1st Per	25th Per	Median	75th Per	99th Per	Max
Acquisitions (scaled)	332	.012	.052	0	0	0	0	0	.358	.358
derCF (scaled)	332	0	0	0	0	0	0	0	0	0
TobinsQ	332	1.875	1.378	0	.467	1.126	1.474	2.135	8.287	10.274
totalassets	332	4670.964	11641.26	2.475	2.618	26.985	136.817	1995.56	60044	69443
leverage	332	.542	.492	.007	.014	.253	.461	.671	2.768	4.08
cash (scaled)	332	.144	.202	0	0	.014	.064	.201	.982	.995
operatingCF (scaled)	332	.084	.149	-.44	-.39	.001	.092	.174	.48	.61
capex (scaled)	332	.187	.164	0	0	.07	.155	.257	.718	1.293
Zscore	332	6.304	40.92	-18.346	-16.861	.194	1.686	4.12	131.947	666.894
oil avgprice	332	53.402	37.343	0	0	0	61.82	85.48	109.53	112.75

Panel B – Hedgers	N	Mean	St.Dev	Min	1st Per	25th Per	Median	75th Per	99th Per	Max
Acquisitions (scaled)	508	.019	.062	0	0	0	0	0	.358	.358
derCF (scaled)	508	.018	.052	-.126	-.049	-.002	.004	.023	.203	.549
TobinsQ	509	1.48	.675	0	.523	1.062	1.336	1.725	3.776	6.638
totalassets	509	6673.34	12020.44	0	23.135	734.576	2060.005	5437.716	52589	61689
leverage	508	.613	.327	.085	.202	.482	.569	.672	1.82	5.123
cash (scaled)	508	.03	.048	0	0	.003	.012	.034	.232	.383
operatingCF (scaled)	508	.122	.096	-.721	-.071	.067	.12	.173	.344	.462
capex (scaled)	508	.238	.134	.004	.021	.142	.218	.319	.58	1.196
Zscore	508	1.061	3.079	-44.389	-6.744	.423	1.25	1.991	6.33	17.8
oil avgprice	509	62.477	35.492	0	0	53.59	72.83	89.61	106.7	110.92

Table 5: Number of hedgers/non-hedgers according to their annual acquisition activities

Acquisition Profile of the company	N Total	N Hedgers of the respective profile	% Hedgers of the respective profile
Seller	14	6	42.86%
Zero net-acquirer	676	396	58.57%
Acquirer	151	106	70.20%

Table 6: Leverage (mean), hedging and acquisition profiles by Year

Year	Total	Hedgers with Pos Acq		Non-Hedger with Pos Acq		Hedgers with 0-acq		Non-hedgers with 0-acq		Hedgers with Pos Selling		Non-hedgers with Pos Selling	
	N	N	Leverage (mean)	N	Leverage (mean)	N	Leverage (mean)	N	Leverage (mean)	N	Leverage (mean)	N	Leverage (mean)
2006	72	15	0.611	9	0.47	21	0.559	25	0.376	.	.	2	0.209
2007	80	16	0.537	4	0.384	31	0.504	28	0.42	1	0.561	.	.
2008	81	12	0.609	4	0.584	40	0.557	23	0.441	1	0.857	1	0.262
2009	81	9	0.65	.	.	43	0.602	27	0.544	2	0.393	.	.
2010	81	13	0.58	5	0.347	41	0.564	22	0.392	.	.	.	.
2011	81	11	0.565	2	0.543	42	0.556	25	0.421	.	.	1	0.278
2012	81	8	0.582	6	0.49	45	0.632	22	0.455	.	.	.	.
2013	81	11	0.554	4	0.949	42	0.622	23	0.413	1	0.587	.	.
2014	81	6	0.611	3	0.524	48	0.652	23	0.476	1	0.696	.	.
2015	69	3	0.771	5	0.849	20	1.006	39	0.907	.	.	2	0.802
2016	53	2	0.37	3	1.751	23	0.797	23	0.745	1	0.525	1	0.521

Table 7: Univariate test – Acquisitions and hedging profile

Test of differences in means: (1) < (2)

Period	Statistic	Nonhedgers (1)	Hedgers (2)	Difference (3) = (1) - (2)	t-statistic	p-value
All years	N	332	508			
	Mean	0.012	0.019	-0.007**	-1.789	0.037
	St. Error	0.003	0.003	0.004		
	St. Dev.	0.052	0.062			
Crisis years	N	128	155			
(2008, 2009,	Mean	0.008	0.015	-0.007	-1.246	0.107
2015, 2016)	St. Error	0.004	0.004	0.006		
	St. Dev.	0.043	0.055			
Non-crisis years	N	204	353			
(2006, 2007,	Mean	0.014	0.021	-0.006	-1.195	0.116
2010-'14)	St. Error	0.004	0.003	0.005		
	St. Dev.	0.058	0.065			

Table 8: Univariate test – Acquisitions and leverage

Test of differences in means: (1) < (2)

Period	Statistic	Low Leverage (1)	High Leverage (2)	Difference (3) = (1) - (2)	t-statistic	p-value
All years	N	420	420			
	Mean	0.011	0.022	-0.011***	-2.782	0.003
	St. Error	0.002	0.003	0.004		
	St. Dev.	0.045	0.069			
Crisis years (2008, 2009, 2015, 2016)	N	132	151			
	Mean	0.008	0.015	-0.007	-1.161	0.123
	St. Error	0.004	0.005	0.006		
	St. Dev.	0.042	0.056			
Non-crisis years (2006, 2007, 2010-'14)	N	288	269			
	Mean	0.012	0.025	-0.014***	-2.601	0.005
	St. Error	0.003	0.005	0.007		
	St. Dev.	0.047	0.075			

Table 9: Univariate test – Derivative cash flows and leverage

Test of differences in means: (1) < (2)

Period	Statistic	Low Leverage (1)	High Leverage (2)	Difference (3) = (1) - (2)	t-statistic	p-value
All years	N	420	420			
	Mean	0.007	0.014	-0.007***	-2.402	0.008
	St. Error	0.001	0.003	0.003		
	St. Dev.	0.026	0.052			
Crisis years (2008, 2009, 2015, 2016)	N	131	151			
	Mean	0.010	0.026	-0.015***	-2.515	0.006
	St. Error	0.003	0.006	0.006		
	St. Dev.	0.032	0.069			
Non-crisis years (2006, 2007, 2010-'14)	N	288	269			
	Mean	0.006	0.008	-0.001	-0.554	0.290
	St. Error	0.001	0.002	0.003		
	St. Dev.	0.023	0.037			

Table 10: POLS - Hypothesis 1

Panel A: POLS		
	(1)	(2)
Standard errors	Regular	Cluster Robust
Acquisitions		
$derCF_{(t-1)}$	-0.041	-0.041
	(0.089)	(0.072)
$Ycrisis_{(t-1)}$	-0.013**	-0.013**
	(0.006)	(0.006)
$Ycrisis_{(t-1)} \times derCF_{(t-1)}$	0.093	0.093
	(0.118)	(0.073)
$Log(assets)_{(t-1)}$	-0.002	-0.002
	(0.001)	(0.001)
$leverage_{(t-1)}$	0.000	0.000
	(0.008)	(0.007)
Cash	-0.057***	-0.057***
	(0.018)	(0.020)
$OperatingCF_{(t-1)}$	-0.010	-0.010
	(0.022)	(0.018)
Capex	-0.071***	-0.071***
	(0.018)	(0.023)
$Log(TobinsQ)_{(t-1)}$	-0.004	-0.004
	(0.006)	(0.007)
$Zscore_{(t-1)}$	0.000	0.000*
	(0.000)	(0.000)
Constant	0.050***	0.050***
	(0.010)	(0.018)
Panel B: White-test		
Chi-squared		76.08
P-value		0.092*
Observations	757	757
R-squared	0.036	0.036

Standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 11: Fixed Effects – Hypothesis 1

Panel A: Fixed Effects			
	(1)	(2)	(3)
Standard errors	Regular	Cluster Robust	Omitted control variables
Acquisitions			
$derCF_{(t-1)}$	-0.219**	-0.219***	-0.132*
	(0.098)	(0.080)	(0.071)
$Ycrisis_{(t-1)}$	-0.017***	-0.017**	(0.000)
	(0.006)	(0.007)	-0.008**
$Ycrisis_{(t-1)} \times derCF_{(t-1)}$	0.266**	0.266**	(0.004)
	(0.122)	(0.115)	(0.000)
$Log(assets)_{(t-1)}$	-0.026***	-0.026***	0.185**
	(0.004)	(0.009)	
$leverage_{(t-1)}$	-0.021**	-0.021**	
	(0.009)	(0.009)	
Cash	-0.064*	-0.064**	
	(0.034)	(0.030)	
$OperatingCF_{(t-1)}$	-0.005	-0.005	
	(0.031)	(0.023)	
Capex	-0.091***	-0.091***	
	(0.021)	(0.029)	
$Log(TobinsQ)_{(t-1)}$	-0.002	-0.002	
	(0.008)	(0.007)	
$Zscore_{(t-1)}$	0.000*	0.000***	
	(0.000)	(0.000)	
Constant	0.232***	0.232***	0.016***
	(0.031)	(0.072)	(0.003)
Panel B: Hausmann test			
Chi-squared		59.03	
P-value		0.000***	
Observations	757	757	757
R-squared	0.088	0.088	0.088
Number of ID	81	81	81

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 12: Fixed Effects Subsamples – Hypothesis 1

	(1)	(2)	(3)
Debt capacity	Low	Medium	High
Acquisitions			
$derCF_{(t-1)}$	-0.246***	-0.921**	0.154
	(0.074)	(0.363)	(0.123)
$Ycrisis_{(t-1)}$	-0.018*	-0.009*	-0.004
	(0.010)	(0.005)	(0.006)
$Ycrisis_{(t-1)} \times derCF_{(t-1)}$	0.256***	0.818**	-0.083
	(0.086)	(0.322)	(0.140)
$Log(assets)_{(t-1)}$	-0.032***	-0.010*	-0.023
	(0.009)	(0.006)	(0.016)
$leverage_{(t-1)}$	-0.009	0.003	-0.022*
	(0.039)	(0.026)	(0.012)
Cash	-0.043	-0.041	0.014
	(0.097)	(0.047)	(0.023)
$OperatingCF_{(t-1)}$	0.001	-0.035	0.012
	(0.050)	(0.041)	(0.031)
Capex	-0.072***	-0.076*	-0.070
	(0.025)	(0.040)	(0.045)
$Log(TobinsQ)_{(t-1)}$	-0.005	0.009	0.003
	(0.013)	(0.013)	(0.006)
$Zscore_{(t-1)}$	0.001	0.002	0.000
	(0.004)	(0.002)	(0.000)
Constant	0.278***	0.112**	0.157
	(0.080)	(0.047)	(0.104)
Observations	269	234	254
R-squared	0.124	0.171	0.199
Number of ID	57	69	58

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Table 13: Robustness checks - Hypothesis 1

Robustness Check Variables	(1) Changed Dependent variable Investments	(2) Variables without lag Acquisitions	(3) Additional explanatory variables Acquisitions	(4) Additional crisis year Acquisitions	(5) Excluding crisis year Acquisitions
$derCF_{(t-1)}$	-0.253		-0.211***	-0.205***	-0.106**
	(0.173)		(0.041)	(0.067)	(0.041)
$Ycrisis_{(t-1)}$	-0.065***		-0.012**	-0.008**	0.000
	(0.009)		(0.005)	(0.004)	(0.006)
$Ycrisis_{(t-1)}$ X $derCF_{(t-1)}$	0.215		0.208***	0.229**	0.087
	(0.225)		(0.069)	(0.099)	(0.063)
$Log(assets)_{(t-1)}$	-0.039***		-0.020***	-0.019***	-0.018***
	(0.012)		(0.005)	(0.005)	(0.005)
$leverage_{(t-1)}$	-0.108***		-0.016**	-0.017**	-0.018**
	(0.024)		(0.007)	(0.008)	(0.008)
Cash	-0.254***	-0.066**	-0.059**	-0.057*	-0.061**
	(0.082)	(0.026)	(0.029)	(0.029)	(0.030)
$OperatingCF_{(t-1)}$	-0.090		-0.015	-0.015	-0.023
	(0.070)		(0.019)	(0.019)	(0.017)
$Log(TobinsQ)_{(t-1)}$	0.073***		0.001	0.002	0.007
	(0.015)		(0.005)	(0.005)	(0.006)
$Zscore_{(t-1)}$	0.001***		0.000***	0.000***	0.000***
	(0.000)		(0.000)	(0.000)	(0.000)
der_CF_scaled		-0.161***			
		(0.057)			
Ycrisis		-0.006			
		(0.005)			
Ycrisis X derCF		0.053			
		(0.068)			
Log(assets)		-0.006			
		(0.005)			
Leverage		-0.004			
		(0.006)			
OperatingCF		-0.033			
		(0.024)			
Capex		-0.042***	-0.074***	-0.068***	-0.061***
		(0.014)	(0.019)	(0.018)	(0.017)
Log(TobinsQ)		-0.002			
		(0.004)			
Zscore		-0.000			
		(0.000)			
Unrealized $derCF_{(t-1)}$			-0.045		
			(0.048)		
Constant	0.570***	0.080**	0.183***	0.172***	0.161***
	(0.093)	(0.039)	(0.041)	(0.038)	(0.038)
Observations	757	838	757	757	757
R-squared	0.283	0.027	0.095	0.092	0.082
Number of ID	81	81	81	81	81

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Table 14: Univariate test – Firm value and acquisitions activities

Firm value - Test of differences in means: (1) < (2)

Period	Statistic	No M&As (1)	M&As (2)	Difference (3) = (1) - (2)	t-statistic	p-value
All years	N	687	151			
	Mean	0.400	0.257	0.143***	4.213	0.000
	St. Error	0.018	0.029	0.034		
	St. Dev.	0.477	0.352			
Crisis years (2008, 2009, 2015, 2016)	N	243	38			
	Mean	0.337	0.218	0.120*	1.544	0.064
	St. Error	0.031	0.071	0.078		
	St. Dev.	0.489	0.437			
Non-crisis years (2006, 2007, 2010-'14)	N	444	113			
	Mean	0.435	0.271	0.402***	4.395	0.000
	St. Error	0.022	0.030	0.019		
	St. Dev.	0.467	0.320			

Table 15: Univariate test – Firm value and hedging profile

Firm value - Test of differences in means: (1) < (2)

Period	Statistic	Non-hedgers (1)	Hedgers (2)	Difference (3) = (1) - (2)	t-statistic	p-value
All years	N	331	507			
	Mean	0.465	0.316	0.149***	4.325	0.000
	St. Error	0.030	0.017	0.034		
	St. Dev.	0.540	0.389			
Crisis years (2008, 2009, 2015, 2016)	N	127	154			
	Mean	0.418	0.241	0.178***	3.076	0.001
	St. Error	0.045	0.036	0.058		
	St. Dev.	0.507	0.450			
Non-crisis years (2006, 2007, 2010-'14)	N	204	353			
	Mean	0.493	0.349	0.145***	3.324	0.001
	St. Error	0.039	0.019	0.043		
	St. Dev.	0.559	0.356			

Table 16: Univariate test – Firm value and leverage

Firm value - Test of differences in means: (1) < (2)

Period	Statistic	Low Leverage (1)	High Leverage (2)	Difference (3) = (1) - (2)	t-statistic	p-value
All years	N	419	419			
	Mean	0.353	0.396	-0.0423*	-1.352	0.088
	St. Error	0.025	0.019	0.032		
	St. Dev.	0.516	0.396			
Crisis years (2008, 2009, 2015, 2016)	N	131	150			
	Mean	0.223	0.406	-0.183	-3.205***	0.001
	St. Error	0.043	0.038	0.057		
	St. Dev.	0.491	0.462			
Non-crisis years (2006, 2007, 2010-'14)	N	288	269			
	Mean	0.412	0.391	0.022	0.584	0.280
	St. Error	0.030	0.022	0.037		
	St. Dev.	0.517	0.355			

Table 17: Fixed Effects - Hypothesis 2

VARIABLE	(1) log(TobinsQ)	(2) log(TobinsQ)	(3) log(TobinsQ)	(4) log(TobinsQ)	(5) log(TobinsQ)
Acquisitions	-0.053	-0.042	-0.000	-0.155	-0.350*
	(0.201)	(0.224)	(0.206)	(0.154)	(0.192)
derCF	0.204	0.214	0.623**	-0.187	-0.212
	(0.285)	(0.289)	(0.295)	(0.382)	(0.419)
log(totalassets)	-0.133***	-0.133***	-0.175***	-0.178***	-0.178***
	(0.030)	(0.030)	(0.024)	(0.024)	(0.024)
leverage	0.294***	0.294***	0.276***	0.261***	0.262***
	(0.083)	(0.084)	(0.076)	(0.078)	(0.078)
ROA	0.067	0.068	0.075	0.073	0.077
	(0.082)	(0.083)	(0.075)	(0.075)	(0.075)
Capex	0.550***	0.550***	0.442***	0.426***	0.432***
	(0.160)	(0.160)	(0.147)	(0.146)	(0.146)
Zscore	0.004***	0.004***	0.004***	0.004***	0.004***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Oil avgprice	-0.001	-0.001	-0.003***	-0.003***	-0.003***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Acquisitions × derCF		-3.001			34.874**
		(15.370)			(13.832)
Ycrisis = 1			-0.182***		
			(0.026)		
Ycrisis = 0 (base)					
Ycrisis = 1				-0.203***	-0.206***
				(0.029)	(0.029)
Ycrisis(0) × Acquisitions (base)					
Ycrisis(1) × Acquisitions				0.441	0.668*
				(0.388)	(0.399)
Ycrisis(0) × derCF (base)					
Ycrisis(1) × derCF				1.277**	1.385**
				(0.532)	(0.548)
Ycrisis(0) × Acquisitions × derCF (base)					
Ycrisis(1) × Acquisitions × derCF					-67.509**
					(33.453)
Constant	0.772***	0.773***	1.503***	1.543***	1.549***
	(0.210)	(0.210)	(0.171)	(0.176)	(0.174)
Observations	838	838	838	838	838
R-squared	0.361	0.362	0.300	0.306	0.311
Period Fixed effects	Yes	Yes	No	No	No
Number of IDs	81	81	81	81	81

Standard errors are in parenthesis
**** p<0.01, ** p<0.05, * p<0.1*

Figure 4: Simple slopes of 2-way interaction term

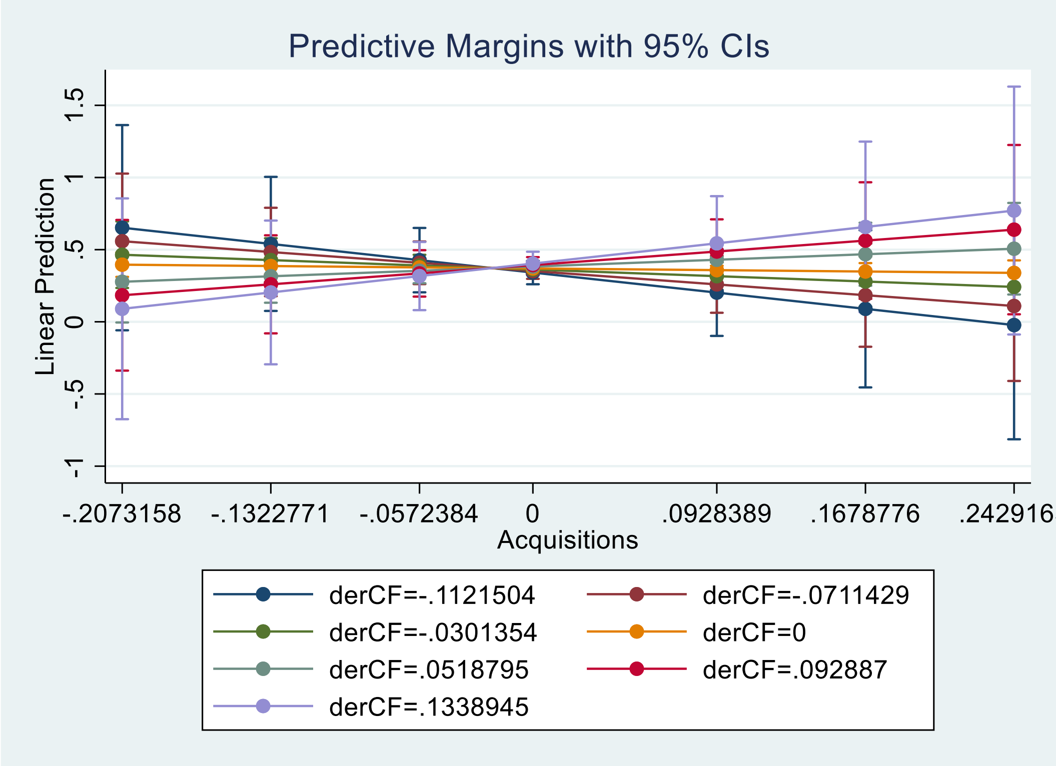


Figure 5: Simple slopes of the 3-way interaction term

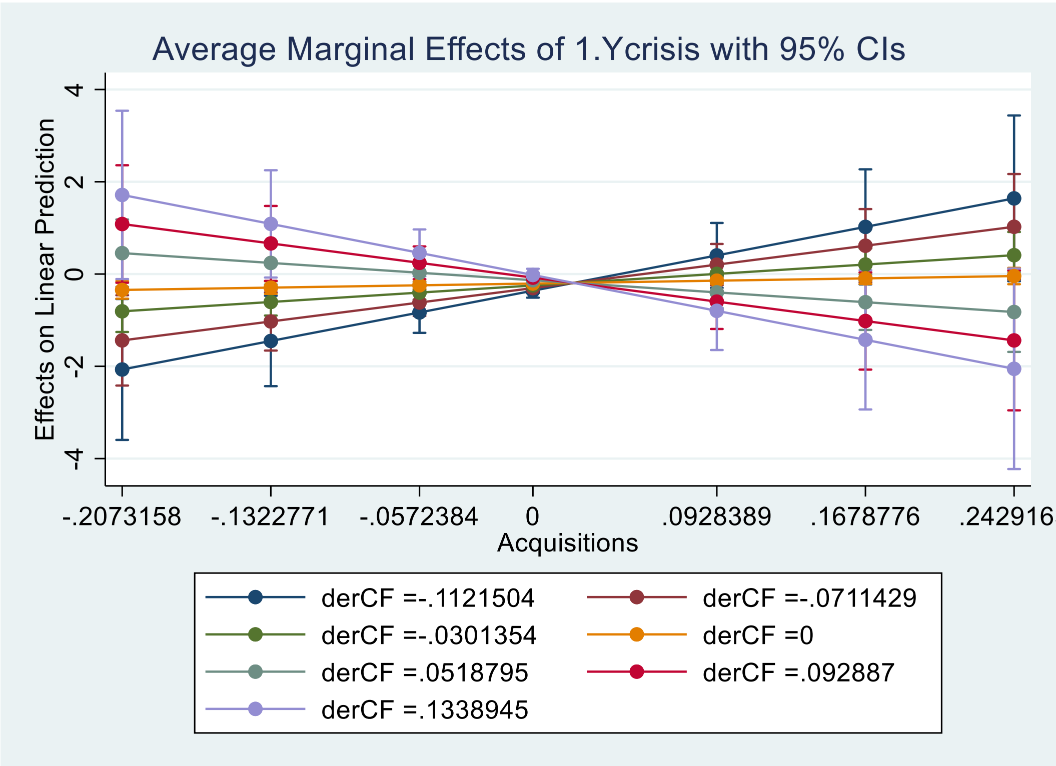


Table 18: Average marginal effects of derCF and Acquisitions

1._at	Acquisitions	0.2429163
	derCF	0.1338945
2._at	Acquisitions	0.2429163
	derCF	0.092887
3._at	Acquisitions	0.2429163
	derCF	0.0518795
4._at	Acquisitions	0.2429163
	derCF	0
5._at	Acquisitions	0.2429163
	derCF	-0.0301354
6._at	Acquisitions	0.2429163
	derCF	-0.0711429
7._at	Acquisitions	0.2429163
	derCF	-0.1121504
8._at	Acquisitions	0.1678776
	derCF	0.1338945
9._at	Acquisitions	0.1678776
	derCF	0.092887
10._at	Acquisitions	0.1678776
	derCF	0.0518795
11._at	Acquisitions	0.1678776
	derCF	0
12._at	Acquisitions	0.1678776
	derCF	-0.0301354
13._at	Acquisitions	0.1678776
	derCF	-0.0711429
14._at	Acquisitions	0.1678776
	derCF	-0.1121504
15._at	Acquisitions	0.0928389
	derCF	0.1338945
16._at	Acquisitions	0.0928389
	derCF	0.092887
17._at	Acquisitions	0.0928389
	derCF	0.0518795
18._at	Acquisitions	0.0928389
	derCF	0
19._at	Acquisitions	0.0928389
	derCF	-0.0301354
20._at	Acquisitions	0.0928389
	derCF	-0.0711429
21._at	Acquisitions	0.0928389
	derCF	-0.1121504
22._at	Acquisitions	0
	derCF	0.1338945

23._at	Acquisitions	0
	derCF	0.092887
24._at	Acquisitions	0
	derCF	0.0518795
25._at	Acquisitions	0
	derCF	0
26._at	Acquisitions	0
	derCF	-0.0301354
27._at	Acquisitions	0
	derCF	-0.0711429
28._at	Acquisitions	0
	derCF	-0.1121504
29._at	Acquisitions	-0.0572384
	derCF	0.1338945
30._at	Acquisitions	-0.0572384
	derCF	0.092887
31._at	Acquisitions	-0.0572384
	derCF	0.0518795
32._at	Acquisitions	-0.0572384
	derCF	0
33._at	Acquisitions	-0.0572384
	derCF	-0.0301354
34._at	Acquisitions	-0.0572384
	derCF	-0.0711429
35._at	Acquisitions	-0.0572384
	derCF	-0.1121504
36._at	Acquisitions	-0.1322771
	derCF	0.1338945
37._at	Acquisitions	-0.1322771
	derCF	0.092887
38._at	Acquisitions	-0.1322771
	derCF	0.0518795
39._at	Acquisitions	-0.1322771
	derCF	0
40._at	Acquisitions	-0.1322771
	derCF	-0.0301354
41._at	Acquisitions	-0.1322771
	derCF	-0.0711429
42._at	Acquisitions	-0.1322771
	derCF	-0.1121504
43._at	Acquisitions	-0.2073158
	derCF	0.1338945
44._at	Acquisitions	-0.2073158
	derCF	0.092887
45._at	Acquisitions	-0.2073158
	derCF	0.0518795
46._at	Acquisitions	-0.2073158

	derCF	0
47._at	Acquisitions	-0.2073158
	derCF	-0.0301354
48._at	Acquisitions	-0.2073158
	derCF	-0.0711429
49._at	Acquisitions	-0.2073158
	derCF	-0.1121504

Model VCE:	Robust
Observations	757
Expression:	Linear prediction
dy/dx w.r.t.:	Ycrisis = 1

Table 19: Simple slopes – 2-way interaction term

	dy/dx	Delta-method Std.Err.	z	P>z	[95%Conf.	Interval]
_at						
1	0.918	0.482	1.900	0.057	-0.027	1.863
2	0.742	0.331	2.240	0.025	0.094	1.391
3	0.567	0.181	3.140	0.002	0.213	0.921
4	0.345	0.042	8.240	0.000	0.263	0.427
5	0.216	0.134	1.620	0.106	-0.046	0.477
6	0.040	0.283	0.140	0.887	-0.514	0.594
7	-0.135	0.434	-0.310	0.755	-0.986	0.715
8	0.766	0.333	2.300	0.021	0.113	1.418
9	0.639	0.228	2.800	0.005	0.191	1.087
10	0.512	0.125	4.110	0.000	0.268	0.756
11	0.351	0.028	12.460	0.000	0.296	0.407
12	0.258	0.092	2.810	0.005	0.078	0.438
13	0.131	0.195	0.670	0.501	-0.251	0.514
14	0.004	0.300	0.010	0.989	-0.583	0.591
15	0.614	0.185	3.320	0.001	0.252	0.976
16	0.536	0.127	4.230	0.000	0.287	0.784
17	0.457	0.069	6.640	0.000	0.322	0.592
18	0.358	0.015	24.320	0.000	0.329	0.387
19	0.301	0.051	5.900	0.000	0.201	0.401
20	0.222	0.108	2.050	0.040	0.010	0.435
21	0.144	0.167	0.860	0.388	-0.183	0.470
22	0.426	0.040	10.630	0.000	0.348	0.505
23	0.408	0.027	15.170	0.000	0.355	0.461
24	0.390	0.014	28.210	0.000	0.363	0.417
25	0.367	0.005	79.580	0.000	0.358	0.376
26	0.353	0.013	26.230	0.000	0.327	0.380
27	0.335	0.027	12.620	0.000	0.283	0.387
28	0.317	0.040	7.970	0.000	0.239	0.394
29	0.310	0.126	2.470	0.014	0.064	0.557
30	0.329	0.086	3.820	0.000	0.160	0.498
31	0.348	0.047	7.400	0.000	0.256	0.440
32	0.372	0.014	27.190	0.000	0.345	0.399
33	0.386	0.037	10.460	0.000	0.313	0.458
34	0.404	0.076	5.340	0.000	0.256	0.553
35	0.423	0.115	3.670	0.000	0.197	0.649
36	0.159	0.272	0.580	0.560	-0.375	0.692
37	0.226	0.187	1.210	0.226	-0.140	0.592
38	0.293	0.102	2.870	0.004	0.093	0.493
39	0.378	0.027	13.960	0.000	0.325	0.432
40	0.428	0.077	5.530	0.000	0.276	0.580
41	0.495	0.161	3.070	0.002	0.179	0.811
42	0.563	0.247	2.280	0.022	0.079	1.046
43	0.007	0.421	0.020	0.987	-0.819	0.832
44	0.123	0.289	0.420	0.671	-0.444	0.689
45	0.239	0.158	1.510	0.131	-0.071	0.548
46	0.385	0.041	9.460	0.000	0.305	0.465
47	0.470	0.119	3.960	0.000	0.238	0.703
48	0.586	0.249	2.360	0.018	0.099	1.073
49	0.702	0.381	1.850	0.065	-0.044	1.448

Table 20: Simple slopes – 3-way interaction term

	dy/dx	Delta-method Std.Err.	z	P>z	[95%Conf.	Interval]
Ycrisis = 0 (base outcome)						
Ycrisis = 1						
_at						
1	-1.828	1.204	-1.520	0.129	-4.187	0.532
2	-1.283	0.841	-1.530	0.127	-2.931	0.365
3	-0.738	0.480	-1.540	0.124	-1.679	0.202
4	-0.049	0.089	-0.550	0.581	-0.224	0.125
5	0.351	0.272	1.290	0.196	-0.182	0.884
6	0.896	0.628	1.430	0.153	-0.334	2.126
7	1.441	0.990	1.460	0.146	-0.499	3.380
8	-1.267	0.837	-1.510	0.130	-2.907	0.373
9	-0.910	0.584	-1.560	0.120	-2.055	0.236
10	-0.553	0.334	-1.660	0.098	-1.207	0.101
11	-0.101	0.061	-1.650	0.098	-0.222	0.019
12	0.161	0.188	0.860	0.392	-0.208	0.529
13	0.518	0.435	1.190	0.234	-0.335	1.371
14	0.875	0.687	1.270	0.203	-0.471	2.221
15	-0.706	0.471	-1.500	0.134	-1.629	0.217
16	-0.537	0.329	-1.630	0.103	-1.182	0.108
17	-0.368	0.188	-1.950	0.051	-0.737	0.002
18	-0.154	0.037	-4.160	0.000	-0.226	-0.081
19	-0.029	0.106	-0.280	0.782	-0.238	0.179
20	0.140	0.245	0.570	0.568	-0.340	0.620
21	0.309	0.386	0.800	0.424	-0.448	1.066
22	-0.012	0.069	-0.170	0.862	-0.147	0.123
23	-0.075	0.049	-1.550	0.122	-0.170	0.020
24	-0.138	0.032	-4.320	0.000	-0.201	-0.076
25	-0.218	0.028	-7.690	0.000	-0.274	-0.163
26	-0.265	0.038	-6.990	0.000	-0.339	-0.190
27	-0.328	0.056	-5.810	0.000	-0.439	-0.217
28	-0.391	0.077	-5.060	0.000	-0.543	-0.240
29	0.416	0.279	1.490	0.136	-0.130	0.962
30	0.209	0.194	1.080	0.281	-0.171	0.590
31	0.003	0.112	0.030	0.979	-0.217	0.223
32	-0.258	0.042	-6.090	0.000	-0.341	-0.175
33	-0.410	0.080	-5.140	0.000	-0.566	-0.254
34	-0.616	0.159	-3.870	0.000	-0.928	-0.305
35	-0.823	0.243	-3.390	0.001	-1.299	-0.347
36	0.977	0.642	1.520	0.128	-0.281	2.235
37	0.583	0.448	1.300	0.193	-0.295	1.460
38	0.188	0.256	0.740	0.462	-0.314	0.690
39	-0.310	0.068	-4.560	0.000	-0.444	-0.177
40	-0.600	0.160	-3.760	0.000	-0.913	-0.287
41	-0.994	0.347	-2.870	0.004	-1.674	-0.315
42	-1.389	0.540	-2.570	0.010	-2.447	-0.330
43	1.538	1.009	1.520	0.127	-0.439	3.514
44	0.956	0.704	1.360	0.174	-0.424	2.335
45	0.374	0.402	0.930	0.353	-0.414	1.161
46	-0.363	0.096	-3.780	0.000	-0.551	-0.175
47	-0.790	0.243	-3.250	0.001	-1.267	-0.314
48	-1.372	0.539	-2.550	0.011	-2.428	-0.317
49	-1.954	0.842	-2.320	0.020	-3.605	-0.304

Table 21: Average marginal effects of derCF and Acquisitions (1st.d.)

1._at	Acquisitions	0.0928389
	derCF	0.0518795
2._at	Acquisitions	0.0928389
	derCF	0
3._at	Acquisitions	0.0928389
	derCF	-0.030135
4._at	Acquisitions	0
	derCF	0.0518795
5._at	Acquisitions	0
	derCF	0
6._at	Acquisitions	0
	derCF	-0.030135
7._at	Acquisitions	-0.057238
	derCF	0.0518795
8._at	Acquisitions	-0.057238
	derCF	0
9._at	Acquisitions	-0.057238
	derCF	-0.030135

Table 22: Simple slopes - 2-way interaction term (1std)

	Margin	Delta-method Std.Err.	z	P>z	[95%Conf.	Interval]
_at						
1	0.430	0.061	7.010	0.000	0.310	0.550
2	0.358	0.015	23.280	0.000	0.328	0.388
3	0.316	0.048	6.550	0.000	0.222	0.411
4	0.383	0.014	26.580	0.000	0.355	0.411
5	0.370	0.005	77.840	0.000	0.360	0.379
6	0.362	0.014	25.850	0.000	0.335	0.390
7	0.354	0.044	8.030	0.000	0.267	0.440
8	0.377	0.015	25.960	0.000	0.349	0.406
9	0.391	0.038	10.370	0.000	0.317	0.464

Table 23: Simple slopes - 3-way interaction term (1std)

	dy/dx	Delta-method Std.Err.	z	P>z	[95%Conf.	Interval]
0.Ycrisis		(base		outcome)		
1.Ycrisis						
_at						
1	-0.397	0.173	-2.290	0.022	-0.736	-0.058
2	-0.144	0.038	-3.810	0.000	-0.217	-0.070
3	0.004	0.101	0.030	0.972	-0.195	0.202
4	-0.134	0.033	-4.110	0.000	-0.198	-0.070
5	-0.206	0.029	-7.070	0.000	-0.263	-0.149
6	-0.247	0.038	-6.470	0.000	-0.322	-0.172
7	0.029	0.106	0.270	0.787	-0.178	0.235
8	-0.244	0.043	-5.650	0.000	-0.328	-0.159
9	-0.402	0.076	-5.290	0.000	-0.551	-0.253

Figure 6: Simple slope 1-st.d. of the 2-way continuous interaction term

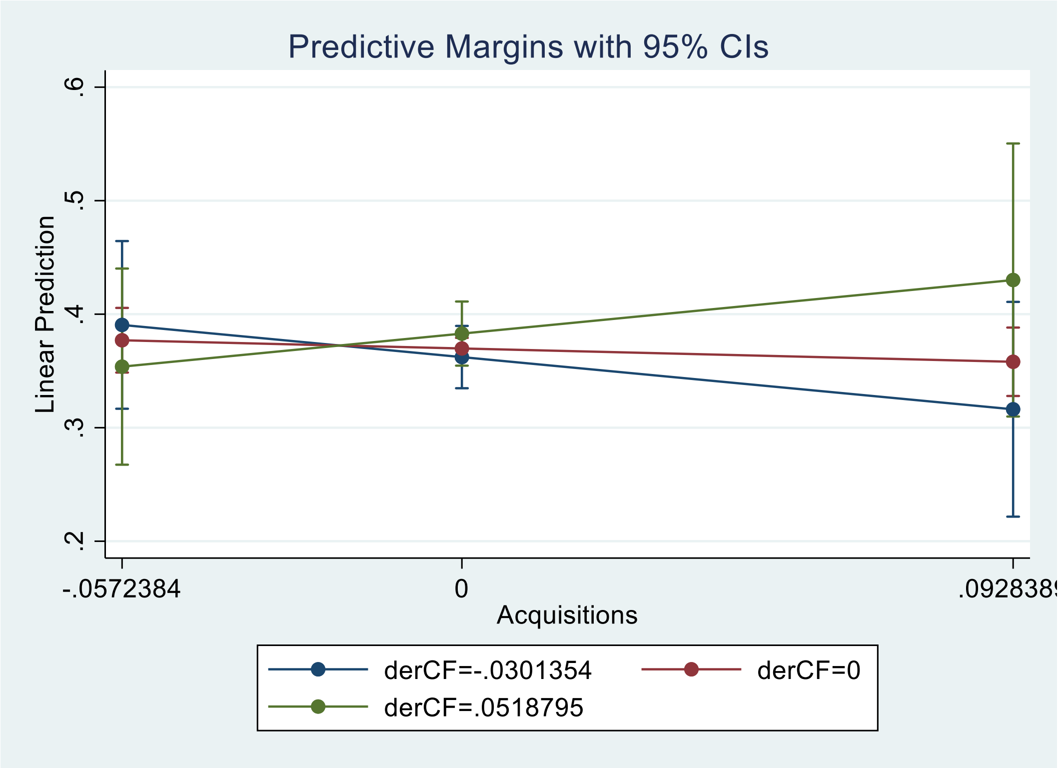


Figure 7: Simple slopes 1-st.d. of the 3-way interaction term

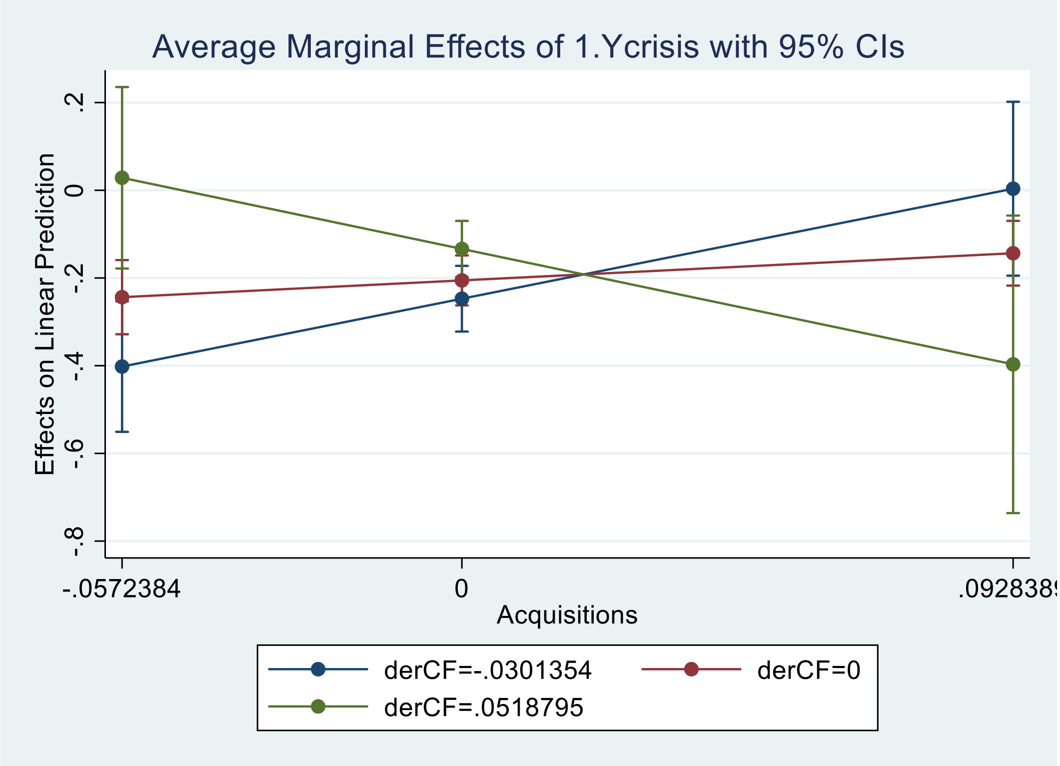


Table 24: Fixed Effects Subsamples – Hypothesis 2

Log(TobinsQ)	(1) Low	(2) Medium	(3) High
Acquisitions	0.087	-0.311	-0.691*
	(0.154)	(0.204)	(0.383)
derCF	0.331	0.525	-0.354
	(0.218)	(0.742)	(0.971)
log(totalassets)	-0.195***	-0.177***	-0.101
	(0.035)	(0.045)	(0.074)
leverage	0.426***	0.618***	-0.443
	(0.085)	(0.200)	(0.506)
ROA	-0.507***	-0.205	0.323
	(0.081)	(0.133)	(0.238)
Capex	-0.010	0.642***	0.532***
	(0.115)	(0.197)	(0.184)
Cash	1.180**	0.099	0.023
	(0.534)	(0.353)	(0.314)
Zscore	0.098***	0.115***	0.003***
	(0.015)	(0.024)	(0.001)
Oil avgprice	-0.001	-0.005***	-0.003**
	(0.001)	(0.001)	(0.001)
Acquisitions × derCF	32.767**	2.928	52.650**
	(13.305)	(23.078)	(21.659)
Ycrisis(0) (base)			
Ycrisis(1)	-0.183***	-0.180***	-0.207***
	(0.037)	(0.052)	(0.049)
Ycrisis(0) × Acquisitions (base)			
Ycrisis(1) × Acquisitions	-0.218	0.647	-0.908
	(0.583)	(0.491)	(1.143)
Ycrisis(0) × derCF (base)			
Ycrisis(1) × derCF	1.265**	1.992**	2.771**
	(0.568)	(0.949)	(1.333)
Ycrisis(0) × Acquisitions × derCF (base)			
Ycrisis(1) × Acquisitions × derCF	-0.448	-51.897	-135.353**
	(21.881)	(52.860)	(67.594)
Constant	1.510***	1.291***	1.222***
	(0.293)	(0.383)	(0.305)
Observations	289	259	290
R-squared	0.590	0.572	0.311
Period Fixed effects	No	No	No
Number of IDs	81	81	81

Standard errors are in parenthesis
*** *p*<0.01, ** *p*<0.05, * *p*<0.1

Table 25: Fixed Effects Robustness checks - Hypothesis 2

VARIABLE	(1) lmarket_to_sales	(2) Log(TobinsQ)	(3) Log(TobinsQ)
Acquisitions	0.667	-0.343*	
	(0.712)	(0.182)	
derCF	0.276	-1.216***	-1.782***
	(0.825)	(0.389)	(0.519)
Acquisitions × derCF	24.781	31.535**	
	(48.613)	(15.018)	
Ycrisis(1)	-0.449***	-0.211***	-0.234***
	(0.076)	(0.027)	(0.053)
Ycrisis(1) × Acquisitions	-0.945	0.684*	
	(1.143)	(0.354)	
Ycrisis(1) × derCF	3.314**	1.825***	1.844***
	(1.340)	(0.448)	(0.620)
Ycrisis(1) × Acquisitions × derCF	-129.787	-58.501*	
	(96.911)	(30.393)	
log(totalassets)	-0.336***	-0.173***	-0.168***
	(0.099)	(0.023)	(0.023)
leverage	-1.496***	0.239***	0.281***
	(0.222)	(0.051)	(0.078)
ROA	0.030		0.074
	(0.112)		(0.076)
capex	1.236***	0.411**	
	(0.338)	(0.160)	
Zscore	0.006***	0.004***	0.004***
	(0.001)	(0.001)	(0.001)
Oil avgprice	-0.008***	-0.003***	-0.003***
	(0.002)	(0.001)	(0.001)
operatingCF		0.381*	
		(0.226)	
Unrealized derCF		-1.552***	-1.667***
		(0.256)	(0.253)
investments			0.340*
			(0.172)
investments × derCF			2.814
			(3.520)
Ycrisis(1) × derCF			0.213
			(0.264)
Ycrisis(1) × investments × derCF			-1.870
			(3.778)
Constant	4.475***	1.508***	1.481***
	(0.706)	(0.158)	(0.169)
Obs.	840	838	838
R-squared	0.411	0.337	0.328
Period Fixed effects	No	No	No
Number of IDs	81	81	81

Standard errors are in parenthesis

**** $p<0.01$, ** $p<0.05$, * $p<0.1$*