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**How different are the determinants of corporate
decisions in times of shock? - Evidence from
September 11, Global Financial Crisis, and
COVID-19 Pandemic**

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Dissertation written under the supervision of Professor Diana Bonfim

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How different are the determinants of corporate decisions in times of shock? - Evidence from September 11, Global Financial Crisis, and COVID-19 Pandemic

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Abstract:

Prior literature and corporate finance theories study decisions on optimal capital structure and appropriate dividend payout mostly under static macroeconomic circumstances. To understand how firms preserve financial flexibility in times of shock, this dissertation analyzes possible contrasts on the impact of classic determinants of corporate policy after the September 11 attack, during the Global Financial Crisis and in the COVID-19 pandemic period, when compared to respective prior stable years. Additionally, it evaluates if predictors have a distinct influence within the three shocks. Based on a sample of 617 firms listed in the New York Stock Exchange that survived through 1999-2001, results show that determinants' relations with changes in capital structure do not differ during crises. Although these present an identical behavior in the three different periods, details in the outcomes mirror each crisis own characteristics. Profitability and liquidity have a greater impact on leverage during the Global Financial Crisis, while stock market volatility is only significant in times of major uncertainty, such as the September 11 attack and the COVID-19 pandemic. However, profitability, liquidity, and size effects on payout policy are not only conflicting to what dividends' theory state in steady periods but are also, unlike leverage, distinct across studied periods.

Keywords: capital structure, dividend policy, September 11, global financial crisis, COVID-

Quão diferente são os determinantes de decisões corporativas em tempos de crise? – Evidência do 11 de setembro, Crise Financeira Global, e pandemia da COVID-19

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Resumo:

Literatura anterior e teorias de *corporate finance* estudam as decisões sobre a estrutura ótima de capital e o pagamento de dividendos apropriado principalmente sob circunstâncias macroeconômicas estáticas. Para entender como é que empresas preservam a flexibilidade financeira em tempos de choque, esta dissertação analisa possíveis contrastes de impacto de determinantes clássicos na política corporativa após o ataque de 11 de setembro, durante a crise financeira global e no período de pandemia da COVID-19, quando comparados com os respectivos anos estáveis anteriores. Além disso, avalia se os indicadores têm uma influência distinta dentro dos três choques. Com base numa amostra de 617 empresas listadas na Bolsa de Valores de Nova York que sobreviveram de 1999-2001, os resultados mostram que as relações dos determinantes com mudanças na estrutura de capital não diferem em períodos de crise. Apesar de apresentarem um comportamento idêntico nos três períodos distintos, alguns detalhes espelham as características próprias de cada crise. A rentabilidade e a liquidez têm um impacto maior no endividamento durante a crise financeira global, enquanto a volatilidade do mercado de ações só é significativa em tempos de grande incerteza, como o ataque de 11 de setembro e a pandemia da COVID-19. No entanto, os efeitos da rentabilidade, liquidez, e dimensão na política de pagamento de dividendos não são apenas contraditórias com o que a teoria afirma em períodos estáveis, mas também são, ao contrário do caso da estrutura de capital, distintos nos períodos estudados.

Palavras-chave: estrutura de capital, política de dividendos, 11 de setembro, crise financeira global, COVID-19

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List of Abbreviations

MM – Modigliani-Miller

9/11 – September 11 terrorist attack

GFC – Global Financial Crisis

COVID-19 – Coronavirus pandemic

NYSE – New York Stock Exchange

US – United States of America

UK – United Kingdom

OLS- Ordinary Least Squares

p.p. - percentage points

e.g. - *exempli gratia*, “for example”

1. Introduction

Decisions concerning the optimal choice of debt levels are some of the most complex and important decisions for financial managers. Either to enable firms' expansion or simply to facilitate daily operations, small and large firms need funds to keep their business functioning. When internal funds are not available or managers decide not to use them, external sources are needed. However, this choice implies an established and continual financial compensation to lenders – such as interest payments -, which can become a burden at certain times. Therefore, making the correct assessments and adopting the best strategy makes the difference on how a firm maintains its performance and competitiveness on the market.

Equally challenging is to combine the decisions on the amount and frequency of dividends paid out to investors for the current financial situation. Despite extensive research, the reasoning behind dividend payout policy is one of the most debatable and inconclusive topics in the corporate finance literature. Black (1976) initially stated that the dividend picture seems a puzzle where the pieces do not fit together. 46 years later, the behavior, dynamics, and determinants of payout policy still do not have a common acceptable explanation.

Over the years, studies treated capital structure and dividend policy decisions as two independent and distinct financing policy variables. Nonetheless, there is reason to believe that there are common factors affecting both policies and therefore an interdependence in the reasoning behind their choice. Intuitively, a payout ratio of a firm determines its retention ratio, which, in itself, defines how many internal resources a firm has to grow the business. Consequently, the choice of incurring debt or not is linked to these ratios, suggesting a relation between policies.

There is a vast empirical literature regarding which determinants influence managers when choosing the optimal capital structure. Titman and Wessels (1988); Harris and Raviv (1991); Rajan and Zingales (1995); and Fama and French (2002) empirically show that some firm-level characteristics have a relation with leverage decisions. Additionally, stock market conditions have been also proven to be an important determinant of whether to issue debt or equity (Graham and Harvey, 2001). Baker and Wurgler (2004) take this connection to dividends. The authors find that the decision to pay dividends is driven by investors placing a premium on dividend-paying stocks. The evidence that stock market conditions are not only an important determinant of firms' leverage, but also a contributing factor to dividends

decisions, adds to the premise that both policies choices may be driven by common underlying factors. Therefore, capital structure and dividend payout are each regressed on the same determinants in this dissertation.

Most prior studies assess the behavior of these predictors and test corporate finance theories under static macroeconomic circumstances. There is less research on how managers' decisions on capital structure and dividend policy are affected under the impact of economic downturns. However, these periods of shock create an environment of uncertainty that provides an interesting foundation for empirical studies to explore. Is the relationship between capital structure determinants and leverage distinct when access to debt is diminished and risk exposure is intensified? Are companies maintaining dividends payment in such states? To which firms' characteristics is this decision related to? Do classic corporate finance theories still hold in extreme situations?

To analyze and address these questions, the study considers the three major shocks/crises of the first two decades of this century to have hit the global economy, in particular the United States: the September 11 terrorist attack, the Global Financial Crisis, and the latest COVID-19 pandemic. Despite being categorically different crisis, the comparison between them is appropriate for this research purpose. All three events were extremely destabilizing for the economy and created exogenous shocks, increasing agency costs of both shareholders and debtholders. While the Global Financial Crisis created an impact on its own, causing the deepest recession since the Great Depression in 1930, the terrorist attack and the COVID-19 pandemic affected the economy in a somewhat similar way. Not only stock markets were shocked by both unforeseen incidents and supply chains severely damaged, but consequences for the airline, hospitality, and tourism sectors were also devastating. As an article published by the Financial Times in June 2020 mentions, "the industry in late 2001 experienced many of the ills it is seeing now. Airlines bled cash. Their survival was threatened. Government stepped in with financial support, as they are doing today."

To understand how firms preserve financial flexibility over time and avoid the inherent risks of downturns, this dissertation implements a multivariate regression analysis for each major shock period. The main goal is to analyze possible contrasts on the impact of the determinants on corporate policy during crises, when compared to prior stable years. Additionally, it is also interesting to make an evaluation across the three crises and investigate if managers behaved differently accordingly to the specific macroeconomic situation. The predictors chosen to

make this research were profitability, liquidity, tangibility, size, growth opportunities, non-debt tax shields, and stock market volatility.

The study sample consists of New York Stock Exchange firms that survived through the period of 1999 to 2021. Besides being the world's largest stock exchange (by market capitalization) and providing a more than significant sample size, it reflects in the most authentic manner the consequences for firms trading in New York City, as the city was the epicenter of the September 11 attack and also severely hit by the Coronavirus pandemic. Accounting and stock market data for sample companies were retrieved from Thomson Reuters - Refinitiv Eikon Datastream.

Results show that firms that were able to draw financial flexibility in the last 22 years, when making leverage decisions, follow more vigorously the classic capital structure theories. This means that, not only is the relationship to debt similar when facing a shock for most determinants, but their impact on firms' debt level is also sharper than in other years. Sample companies presented an identical behavior in the three different periods. Nonetheless, small details in the outcomes mirror each crisis own characteristics. Profitability and liquidity have a greater impact on leverage decrease during the Global Financial Crisis, as firms try to remain solvent in a period of credit crunch, while stock market volatility is only significant for capital structure decisions in times of major uncertainty, such as the September 11 attack and the COVID-19 pandemic. On the other hand, some firm's characteristics influence payout policy in a different manner than what dividends' theory state in normal periods. Companies that increase their profitability ratio pay less dividends during the three crises, contradicting the signaling hypothesis (detailed in section 2.2.1.). Moreover, predictors' relation to payout policy is, unlike leverage, distinct in the studied periods. In particular, liquidity and size determinants have a positive impact after the 2001 attack, but during the pandemic their effect is negative.

As corporate finance decisions attract the attention of different business players such as analysts, investors, and management of firms, this study aims to contribute to the literature in different perspectives. Firstly, by analyzing how policies variations are driven by variations in firms' attributes, the dissertation adds to the research and understanding of the determinants of financial decisions, especially during periods of economic instability. Additionally, by examining only companies that survived through three different shock periods, the investigation helps policymakers taking successful strategies to handle downturns, and

investors in identifying firms that possess the necessary characteristics to avoid financial distress during a crisis.

The remainder of this master thesis proceeds as follows. Section 2 documents existing literature regarding corporate finance theories and financial policy in each crisis context. Section 3 presents the data used, describes the variables chosen and the methodology implemented in this study. Section 4 analyzes the descriptive statistics and discusses empirical results from each crisis' model. Conclusions are displayed in Section 5, while limitations and suggestions for future research are referred in Section 6. Section 7 shows relevant tables that were previously discussed in the results segment, Section 8 presents the references to the literature mentioned in this dissertation, and finally the appendix in Section 9 contains additional material.

2. Literature Review

Corporate decisions regarding capital structure and dividend policy have been a common investigation topic for corporate finance researchers over the past fifty years. This vast literature presents modern theories which have their basis in the first findings presented in the Modigliani and Miller (1958) seminal work. However, empirical evidence is still lagging behind the theoretical research progress and the exact motives and factors regarding these decisions remain unsolved.

2.1. Capital Structure theories

Modigliani and Miller (1958) gave the initial contribution to the capital structure research development, introducing the irrelevance proposition. Under the assumption of frictionless efficient capital markets, where firms do not pay taxes, as well as the nonexistence of transactions costs, bankruptcy costs and asymmetric information, the value of the firm is not affected by the firm's capital structure.

Although it was considered the initial generally accepted theory of capital structure, the irrelevance theorem received some criticism regarding the unrealistic approach taken. Durand (1959) considered Modigliani and Miller's treatment as unrealistic and inconsistent. However, as shown by Stern & Chew (2003), most authors and finance economists recognize that regardless the lack of empirical power, MM's contribution goes beyond the propositions themselves: it gave the theoretical background to the further development of different attitudes and theorems to the issue of finding the most appropriate sources and methods of financing. Nowadays, two major theories arise from the divergence of the perfect capital markets assumption: the Trade-off theory and the Pecking Order theory.

2.1.1. Trade-off theory

Based on the MM's 1963 model adaptation, the Trade-off theory suggests that the optimal capital structure of a firm is achieved in a trade-off between the tax advantages and other benefits of debt, against both bankruptcy and agency costs. In a tax benefits-bankruptcy costs perspective, firms should find the optimal level of benefits related to the interest tax shield in contrast to direct and indirect costs of bankruptcy (Kraus and Litzenberger, 1973). In an agency costs perspective and based on the agency theory (Mitnick, 1973), debt financing may arise conflicts between managers, shareholders and bondholders (Jensen and Meckling, 1976;

Jensen, 1986; Stulz, 1990), due to possible differences between all mentioned parties' interests and consequent actions.

2.1.2. Pecking Order theory

Initially proposed by Donaldson (1961) and further developed by Myers (1984), the pecking order theory does not target an optimal capital structure, but instead suggests that firms have a hierarchy with respect to financing choices: when raising new finance, firms prefer to use first internal retained earnings, then debt if additional funds are needed and lastly equity issue. Besides trying to avoid the transactions costs associated with external financing, these preferences result from the concept of asymmetric information between managers and external users (e.g., adverse selection), which can precisely occur when firms are seeking for external funds. Internal financing signals that the company is in a strong healthy state and minimizes information asymmetry. When issuing debt, investors will assume that managers believe the stock is undervalued and therefore that management is confident in meeting its obligations. The issuance of equity however transmits a negative sign to investors, as management is seeking financing by diluting (possibly overvalued) shares.

2.2. Dividend Policy theories

When surveying CFO's and corporate executives, Lintner (1956) described how past and current earnings were the major factors to define sample firms' payout policy. Benartzi, Michaely, and Thaler (1997) stated that Lintner's model still best described dividend setting rationale.

Five years later, Miller and Modigliani (1961) proposed in their study that in a perfect market and assuming rational investors, firm's market value is unaffected by their dividend policy. Black and Scholes (1974) results, assuming also the assumption of perfect markets, are consistent with the dividend irrelevance hypothesis.

In reality MM's (1961) proposition does not hold, as capital markets are not perfect. However, similar to the capital structure subject, it provided the background for numerous studies and findings based on other market imperfections or behavior factors. The most important explanations are the signaling hypothesis and agency costs and free cash flow hypothesis.

2.2.1. Signaling hypothesis

This explanation (e.g. Bhattacharya, 1979; John and Williams, 1985; Miller and Rock, 1985), is established from the existence of a market imperfection involving asymmetric information between managers and shareholders. According to this theory, managers can signal private information about firm's future performance to external users through their dividend's choice. If a firm changes the policy and decides to increase dividend payment, this hypothesis suggests that this action is a signal towards future profitability of the firm. Therefore, market will react positively and share price increases.

Michaely and Allen (2002) state that not only dividend changes announcement and stock price changes share the same signal, but magnitude of the price reaction is proportional to the magnitude of the dividend change. Supporting the signaling hypothesis, Brickley (1983) shows in its study sample that firms earnings significant rise in the respective and next year for firms that increased their dividends by more than 20 percent. On the other hand, Benartzi, Michaely, and Thaler (1997) show no significant results confirming signaling expectations, stating that dividends are not so much related to future earnings as they are with past earnings.

2.2.2. Agency costs and free cash flow hypothesis

The free cash flow hypothesis questions MM's assumption that there are no conflicts of interest between managers and shareholders (agency costs). The main assumption regarding this theory is that managers may act in a costly way to shareholders, such as taking on excessive perquisites or overinvest in unprofitable interests (Jensen, 1986). Therefore, to mitigate agency costs, firms increase dividends as a mechanism to reduce firm's free cash flow available to managers (Easterbrook, 1984; Rozeff, 1982).

Empirical evidence regarding this hypothesis seems to be particularly inconsistent, since it is more difficult to detect a relationship between dividend policy and not directly observable problems as agency costs. Easterbrook also concludes that higher dividends will force managers to seek financing in external markets, and therefore be more efficiently monitored by investments professionals. La Porta et al. (2000), investigate the influence of investor protection law on dividends payout. After dividing the sample into countries with good legal protection for minority shareholders from the ones who have a poor protection, the authors analysis concludes that agency approach is highly significant in understanding corporate payout policy.

2.3. Corporate financial policy in the September 11 context

There is few or no literature regarding the specific statistical impact of the September 11 terrorist attack on firm's capital structure or dividend policy. However, prior studies confirmed that terrorist attacks leave psychological sequels and the effect is bigger when the event occurs in a close proximity (Ahern, 2018). Antoniou, Kumar, and Maligkris (2017) state that managers who are local to the attacks' location become more business pessimists, releasing negatively biased forecasts, and adopting more conservative policies. As managers' risk aversion increases, the study shows that leverage decreases and the necessity of keeping earnings internally for future investment rises, leaving dividend payout as a second necessity.

Additionally, there has been evidence of its adverse impact on the macroeconomy (Blomberg, Hess, and Orphanides, 2004) and on stock market volatility. Between September 11 and September 25, an estimated US\$ 2 trillion were lost in world equity markets, and 20 of the world's major stock market indexes dropped by more than 10 percent.

Arin, Ciferri, and Spagnolo (2008) have done a research of terrorist attacks on six financial markets, and results confirm that terror has indeed a significant impact on stock markets and its volatility. Still, Do (2021) states that investors in firms affected by the negative shock in the market play an important role in motivating companies to increase their dividend payout, with the goal of sending a positive signal regarding the future. In fact, the study shows a positive and significant effect on the amount of dividends paid.

However, when analyzing data from 14 different attacks, A. H. Chen and Siems (2004) found no evidence of lower returns on US stock markets. Despite showing a negative reaction to 9/11 on the majority of 36 stock indices, the authors claim that US financial markets are more flexible and liquid and recover quicker than other global financial markets.

2.4. Corporate financial policy in the Global Financial Crisis context

The Global Financial Crisis triggered the collapse and bankruptcy of various financial institutions in the United States, affecting deeply macroeconomic conditions. As most studies point, credit supply to firms was significantly reduced during the crisis (Ivashina and Scharfstein, 2010) and the cost of loans were increased (Santos, 2011). Campello, Graham, and Harvey (2010) support these affirmations when surveying 150 CFOs, claiming that firms had to cancel investments due to the inability to access external financing.

In a more detailed analysis, a study developed by the World Bank regarding the effects of the Global Financial Crisis on firm's capital structure, Demirguc-Kunt, Martinez-Peria, and Tressel (2015) find weaker evidence of a significant decline in leverage among firms listed in a stock exchange, relatively to non-listed. The authors argue that stock markets act as a spare tire and therefore firms likely benefit from it.

As external funding costs increase or the availability to it is severely diminished, Bliss, Cheng, and Denis (2015) state that the natural response for this event is the reduction of dividend payouts and the increase of cash-flows retention, in order to consolidate financial reserves in times of risk and uncertainty. Hauser (2013) shows that during the GFC, probability of paying a dividend decreases as the probability of a dividend cut on the other hand increases. Almeida, Campello, and Weisbach (2011) have previously suggested a similar outcome, as firms cut dividend payments to fill the obligation of interest expenses.

However, following the signaling hypothesis and what a dividend cut signals to the market, literature seems to be in disagreement regarding this topic. Floyd, Li, and Skinner (2015) observe that firms show some resilience to changes in payout policy as the 2008 financial crisis begins. Instead, observed industrial companies would prefer to cut share repurchases aggressively.

2.5. Corporate financial policy in the COVID-19 context

As we are still living the COVID-19 pandemic/crisis, there is few trustworthy literature that can estimate the influence of this outbreak on firm's capital structure. However, it is clear that it made an impact on the economy. According to the UCLA-LoPucki Bankruptcy Research Database (BRD), the number of US listed companies filing for bankruptcy between January to May 2020 doubled compared with the same period in 2019. Uncertainty and risk are now, and more than ever, huge factors to take into consideration when analyzing how bank credit is characterized and how it changed and evolved from the Financial Crisis situation.

From an initial point of investigation, it seems that government and bank regulations allowed firms to get an easier look at external finance. At the beginning of the pandemic, Li et al. (2020) state that liquidity injection programs helped banks respond to the sudden liquidity demand from firms, contrasting from what was studied during the Global Financial Crisis. The United States government supported in fact the financial system by changing banking rules to facilitate bank lending (Seelye and Ziegler, 2020). In empirical analysis studies, both

Turkki (2021) and Devi, Warasniasih, and Masdiantini (2020) papers reflect an increase in the leverage ratio for non-financial firms in Europe and in the Indonesia Stock Exchange, respectively. Closs (2021) however, in a study of 1159 non-financial firms in the United States, does not find any statistical significance when comparing leverage between the pre-pandemic period and pandemic period.

Regarding dividend policy decisions, there is a similar contrast of empirical findings. Krieger, Mauck, and Pruitt (2021) reach two interesting conclusions in their study on 1400 US publicly traded and dividend paying firms. First, the authors find that unlike Floyd, Li, and Skinner 's (2015) observation on the Global Financial Crisis, during the second quarter of 2020 there is evidence of dividend cuts across all industries and not only in the financial industry. Moreover, the proportion of cuts and omissions are three to five times higher than any other quarter since 2015. Consistently, Ali (2021) shows a significant increase in the proportion of dividend cuts and omissions on nearly 9000 firms listed listed in the G-12 countries. However, Mazur, Dang, and Vo (2020) find that most S&P500 firms maintain or increase the level of dividend payment during the COVID-19 pandemic.

3. Data and Methodology

3.1. Data

To select the appropriate NYSE firms' sample and financial information, data was retrieved from Thomson Reuters - Refinitiv Eikon Datastream. In order to cover information regarding the September 11 terrorist attack, the Global Financial Crisis and the latest COVID-19 pandemic, yearly data from financial statements was taken from 1999-2002, 2004-2009, and 2018-2021, as remaining years are not relevant for the study.

As this study aims to make a comparison of how the defined dimensions/determinants affected corporate and financial decisions in these different periods of crisis, it is crucial to make the data as homogeneous as possible. Therefore, active NYSE firms with data available since 1999 which survived the entire considered period made the initial list. It could be argued that filtering data in that manner originates a potential source of survivorship bias, as the study will not regard historical data and consequent decisions of newly listed firms, as well as businesses that got inactive/went dead. However, a meaningful comparison of each dimension's effect would be more difficult to achieve.

Following the criteria of Rajan and Zingales (1995) and Frank and Goyal (2009), companies involved in the financial sector such as banks, insurance, private equity and investment firms are excluded from the sample, as factors influencing decisions regarding capital structure differ from the remaining non-financial firms.

After necessary adjustments to align the accounting data for the defined variables, a final sample of 617 firms matches the criteria. All data is in United States Dollars.

3.2. Variables Definition

The vast existing empirical literature regarding the impact of several factors to corporate leverage decisions gives the theoretical background to define the appropriate variables and respective proxies to consider when studying these decisions (Titman and Wessels, 1988; Harris and Raviv, 1991; Rajan and Zingales, 1995; Fama and French, 2002). Therefore, the list of variables defined in this study follows the most consensual dimensions used in previous research.

To evaluate firms' financing decisions and analyze capital structure, the first dependent variable used in this dissertation is Leverage (LEV) and is computed as the ratio of Total Debt

(long-term debt plus short-term debt) to Total Assets. In a second regression, to evaluate how firms manage dividends in times of crisis, Dividend Policy (DPO) is calculated as the ratio of Dividends Paid to Net Income. As one of the goals in this dissertation is to identify not only a potential interdependency on influential factors, but also a possible relationship between capital structure and dividends decisions, each regression considers one of these variables as an independent one while the other is the dependent.

Authors that attempted to study this relationship obtained empirically inconsistent findings. Adedeji (1998) finds that there is a positive relationship between leverage and dividend payout ratio for firms in the UK. In a case of earnings shortage, to avoid omitting or cut dividends and the consequent stock price decrease as assumed by the signaling hypothesis, firms follow the pecking order theory and seek for debt financing. Chang and Rhee (1990) also show empirical evidence regarding a positive relationship between leverage and dividend ratios, defending that firms with a higher payout ratio tend to be more leveraged than firms with low payout ratios.

Oppositely, a series of authors refute a positive relationship theory. Rozeff (1982) predicts a negative relationship between leverage and dividends payout. DeAngelo and DeAngelo (2007) state that investors prefer policies such as low leverage and high dividends since they provide better financial flexibility and reduce investment distortions, while controlling agency costs. Agrawal and Jayaraman (1994) find that all-equity firms seem to have significantly higher dividend payout than leveraged firms. On the other way around, dividend-paying firms tend to have lower leverage than non-payers (Frank and Goyal, 2009).

The remaining independent variables are, as previously stated, acknowledged by several praised authors as impactful aspects to firms' capital structure decisions. Therefore, standard firm-level determinants such as i) Profitability (PROF), ii) Liquidity (LIQ), iii) Tangibility (TANG), iv) Size (SIZE), v) Growth Opportunities (GROW) and vi) Non-Debt Tax Shields (NDTS) are used in this study, as well as vii) Stock Price Volatility (VOL) to measure the influence of stock market conditions. To analyze the effect of these factors and link them to agency theory and asymmetric information concepts, it is necessary to form judgements and signaling hypothesis based on prior empirical studies.

i) Profitability (PROF) - Most empirical studies suggest that profitability has a negative relation with leverage. Authors base their conclusions on the pecking order theory, stating that profitable companies are able to grow more from retained earnings and therefore prefer to

finance new investments from internal sources rather than seeking for external funds, thus decreasing the amount of debt (S. Myers, 1984; Rajan and Zingales, 1995; Demirgüç-Kunt and Maksimovic, 1999; Fama and French, 2002). On the other hand, higher profitability increases free cash flow available which consequently raises the possibility of agency costs. Jensen (1986) refers that debt may mitigate this issue, as it ensures discipline among managers, leading to more efficient investment decisions in order to avoid the risk of bankruptcy. In addition, according to the trade-off theory profitable firms find interest tax shields more valuable and face lower expected costs of financial distress, becoming more likely to benefit from the increase of leverage. However, empirical studies seem to be more consistent with the view that the profitability determinant is negatively related with leverage. Therefore, this study follows the same expectation among selected firms.

H1.1.: Profitability is negatively related to leverage.

Regarding dividends decision, Lintner (1956) states that current profitability and previous year's dividend are the significant factors that affect current dividends. Baker and Powell (2000) argue that firms tend to pay more dividends to investors if current earnings are increased. This implies that companies tend to follow the signaling theory of dividends, meaning that shareholders will receive higher dividend payments as a signal of good firm performance, as well as the free cash flow hypothesis, as a mechanism to reduce firm's free cash flow available to managers and mitigate agency costs.

H1.2.: Profitability is positively related to dividend payout policy.

Following Myers (1984) and Rajan and Zingales (1995), profitability is measured as the ratio of EBIT to Total Assets (Return on Assets).

ii) Liquidity (LIQ) - To determine a firm's ability to pay off current debt obligations without the need to seek for external finance, this study uses the ratio of Current Assets to Current Liabilities (Current Ratio) to measure liquidity. Despite existing limited significant results among studies that can show a clear path to which direction does the relationship between liquidity and leverage take, conventional theories suggest a negative relation between them. In fact, the reasoning seems to be similar to the profitability determinant. If a firm has a high liquidity ratio, then it has the ability to meet its debt obligations without having to take out loans, as it has available internal funds. Ozkan (2001), Frieder and Martell (2006) and de Jong, Kabir, and Nguyen (2008) empirically confirm this relation. Nonetheless, there is still

evidence of a positive relation between liquidity and level of debt. Sibilkov (2009) shows that high liquidity increased leverage in selected firms, as such firms are “safe obligors” because respective liquid assets are able to cover the arrears.

H2.1.: Liquidity is negatively related to leverage.

The liquidity factor is mostly tested empirically for capital structure purposes. This means that there is not a reliable literature where a hypothesis on dividend policy can be verified. However, following the same rational as the previous determinant, firms will likely sign to the market their good health. If high liquidity translates into higher cash availability in the short term, liquid firms are therefore more likely to pay dividends compared to companies facing liquidity crunch.

H2.2.: Liquidity is positively related to dividend payout policy.

iii) Tangibility (TANG) – The most common measure for tangibility is the ratio of Fixed Assets to Total Assets (Bradley, Jarrell, and Kim, 1984; Harris and Raviv, 1991; Rajan and Zingales, 1995), and therefore this study uses the same proxy for its research. The mentioned authors project a positive relation of tangibility to leverage. Companies with a larger fraction of tangible assets can use them as collateral, meaning that bankruptcy risk and costs are decreased, as well as sensitivity to asymmetric information due to the nature of the assets. Furthermore, a financial institution will also feel more secure to lend money to a company with more tangible assets, especially in critical times like the crises studied in this dissertation. Thus, firms have the capacity to borrow more. On the other hand, more tangible assets could translate into less current assets, which consequently means less possibility of creditors lending especially short-term debt.

H3.1.: Tangibility is positively related to leverage.

In relation to dividend policy, there is no evidence that can prove empirically a positive or negative relation (or even a relation) between tangibility and dividends. However, theoretically a relation might be constructed. From the previous hypothesis, firms with a higher proportion of tangible assets are more likely to increase their level of debt. This suggests fewer reliance on retained earnings in possible investments, which in turn implies that more cash is available to be paid as dividends. Then, a positive relation is expected between tangibility and dividend policy.

H3.2.: Tangibility is positively related to dividend payout policy.

iv) Size (SIZE) – The effect of size, measured as the natural logarithm of Total Assets (Frank and Goyal, 2009), seems to be positive in leverage. Most literature debates that this determinant is an inverse proxy of probability of bankruptcy, as large firms may be more diversified and have easier access to debt markets. With more advantageous interest rates and lower information asymmetry, these companies are expected to increase their debt level to maximize tax benefits, following the trade-off theory (Rajan and Zingales, 1995; Fama and French, 2002; Frank and Goyal, 2009). On the other hand, because information asymmetries are lower, bigger firms are more capable of issuing informationally sensitive securities like equity. Nonetheless, empirical literature widely supports a positive relation.

H4.1.: Size is positively related to leverage.

Regarding dividend payout policy, empirical studies are consistent in their results. Jensen and Meckling (1976), Smith and Watts (1992) and Fama and French (2001) conclude that larger firms have higher propensity to pay dividends. Following the rationale regarding the relation with leverage, if large companies have an easier access to debt markets and take advantage of it, internal funds will not be as needed when compared to smaller firms. Consequently, the capacity to pay dividends increases.

H4.2.: Size is positively related to dividend payout policy.

v) Growth Opportunities (GROW) – Following S. C. Myers (1977) and Rajan and Zingales (1995), the ratio of Market Value of Assets to its Book Value is the proxy used to measure growth opportunities. Theory gives ambiguous assumptions regarding the effect of growth on capital structure. On one hand, trade-off theory indicates the hypothesis of a negative relation, as expected growth leads to an increase of financial distress costs, forcing firms to reduce their level of debt. S. C. Myers (1977) argues that growing companies are more probable to forego profitable investment opportunities if they are more indebted, as debt holders will take more advantage of the new investments' benefits than shareholders. Furthermore, Rajan and Zingales (1995) agree with an inverse relation. The authors state that firms with expected growth should exploit a possible overvaluation in the market and use a greater amount of equity finance, instead of debt. On the contrary, according to the pecking order theory growth and leverage are positively related. In order to finance new projects, firms will respect the funding sources hierarchy. As retained earnings may not be sufficient to fund new investment

opportunities on growing firms, external finance is needed. Therefore, following the hierarchy, these companies will issue debt before equity. However, most empirical literature appears to follow the trade-off theory perspective.

H5.1.: Growth opportunities are negatively related to leverage.

In regards to dividends, studies come to a consensual conclusion. A negative relation is also expected between growth opportunities and dividend payout policy, as these firms are more likely to retain internally funds, instead of paying out dividends (Rozeff, 1982; S. C. Myers and Majluf, 1984; G. R. Jensen, Solberg, and Zorn, 1992). Fama and French (2001) also report that dividend payers have less valuable growth opportunities than non-payers.

H5.2.: Growth opportunities are negatively related to dividend payout policy.

vi) Non-Debt Tax Shields (NDTS) – The proxy for non-debt tax shields is the ratio of Depreciation and Amortization to Total Assets, commonly used in research papers. DeAngelo and Masulis (1980) state that non-tax benefits are achieved through depreciation, amortization and depletion allowances and serve as an alternative for interest tax shields. Studies show mixed results concerning its relation with leverage. Titman and Wessels (1988) and Harris and Raviv (1991) find a positive association between NDTS and level of debt. Alternatively, a negative relation can be expected as non-debt tax benefits reduce the appeal of debt tax shields, which consequently decreases corporate leverage. This study will follow historical literature conclusions and anticipate a positive relation between NDTS and debt issuance.

H6.1.: Non-debt tax shields are positively related to leverage.

There is considerably less research on the effect of non-debt tax shields on dividend policy. Without empirical backup, it will be assumed that there is a negative relation, due to the assigned cost of purchasing depreciable assets. As these costs are presumably greater than the tax benefit, the funds available for dividend distribution are consequently decreased. However, the inverse relation is equally plausible by virtue of the nature of the proxy for NDTS itself. In H3.2., this dissertation assumes that tangibility has a positive effect on dividends. A higher proportion of tangible fixed assets generates higher levels of depreciation and tax credit. Therefore, if the amount of depreciation is the primary component of NDTS, reasoning leads to the conclusion that there is a higher propensity to pay dividends.

H6.2.: Non-debt tax shields are negatively related to dividend payout policy.

vii) *Stock Price Volatility (VOL)* – Welch (2004) affirms that stock price effects are more important in explaining leverage ratios than all other determinants already defined. However, the author states that mainly due to high adjustment costs, firms do not seem to intervene despite equity price fluctuations. To assess stock market conditions, VOL is computed as the Standard Deviation of firms' stock price (deviation from the mean). Issuing equity is more costly when stock price is volatile, as equity holders would demand a greater premium to compensate them for the higher risk in times of uncertainty. Thus, firms would be more willing to take on debt. However, Harris and Raviv (1991) and Chen, Wang, and Zhou (2013) present a negative relation between volatility and leverage. As stock price volatility increases, uncertainty surrounding the firm increases and so does the probability of financial distress. Therefore, it is unlikely for a company to take on additional debt, either because banks will be less likely to lend money to firms facing volatility issues, or the cost of it would be substantially higher to compensate the lender.

H7.1.: Stock Price Volatility is negatively related to leverage.

Firms with a volatile stock price bear more risk and have a higher degree of uncertainty on future earnings. Consequently, managers are less likely to increase dividends as future performance and cash flow is more unpredictable, building a negative relation to payout policy. However, most papers argue that the relation between stock price volatility and dividend payout ratio comes from the effect of dividends decision and not the other way around. Nonetheless, the consistent conclusion among empirical studies is that share price volatility and dividends are negatively related (Baskin, 1989). Theoretically, firms that pay higher dividends are less likely to take on investment actions. Thus, as risk is mitigated, cost of capital is reduced and consequently the volatility of stock price.

H7.2.: Stock Price Volatility is negatively related to dividend payout policy.

Additionally, to analyze changes in the determinants of financial policy, dummy variables are created to identify the periods pre-shock/crisis and the respective shock/crisis. For the September 11 terrorist attack, bef_SEP11 considers the period before the attack, between 1999-2000, and SEP11 the period 2001-2002. Regarding the global financial crisis, bef_GFC covers 2004-2006 and GFC 2007-2010, and lastly bef_COV includes 2018-2019 and COV the effects of years 2020-2021.

3.3. Methodology

The initial step is to verify which model is a good fit to study this dataset, as this dissertation collects a series of repeated observations of the same firms over an extended time frame. Therefore, a Breusch-Pagan Lagrange multiplier test to both LEV and DPO was done to check whether or not heteroscedasticity is present in the regression model. In other words, not rejecting the null hypothesis in this test would imply that the variance between firms' unobservable individual effects is zero. In this case, a pooled OLS estimation would be an appropriate model. However, the null hypothesis was rejected for both regressions, which indicates that there are significant differences across companies and sample should be treated as panel data.

To decide which panel data model is the best to analyze the temporal behavior of the selected variables on NYSE firm's capital structure and dividend payout policy, a Hausman test was conducted. The null hypothesis states that there is no correlation between firm's unobservable effects and the regressors in the model. In this case, the random-effects model would be used in this study to draw conclusions. Results from the test suggest to follow the alternative hypothesis and rely on the fixed-effects model to input the regressions and interpret results. The regression includes also robust standard errors.

To first analyze the effects of each predictor on firms' capital structure, the following multivariate linear regression was estimated for the entire sample:

$$LEV_{i,t} = \alpha + \beta X_{i,t} + \theta_i + \varepsilon_{it} \quad (1),$$

where LEV_{it} is the first dependent variable, measured by the ratio of total debt to total assets of firm i at year t . X represents the matrix of explanatory variables of firm i at year t , which include dividend payout policy (DPO), profitability (PROF), liquidity (LIQ), tangibility (TANG), size (SIZE), growth opportunities (GROW), non-debt tax shields (NDTS), and stock price volatility (VOL). β corresponds to the coefficient of the respective independent variable, θ_i represents firm fixed-effects and allows to control for time invariant heterogeneity at the firm level, and finally ε_{it} is the error term.

In order to investigate the statistical strength of the same endogenous variables for dividend policy decisions regarding the entire sample, DPO is regressed as the independent variable and LEV takes the spot as an independent variable for regression (2):

$$DPO_{i,t} = \alpha + \beta X_{i,t} + \theta_i + \varepsilon_{it} \quad (2).$$

As this study aims to make a comparison on how these determinants affect capital structure and dividend policy in different periods of downturns, the regressions are estimated and interpreted for the three subperiods separately.

$$LEV_{i,t} = \alpha + \beta X_{i,t} * C_i + \theta_i + \varepsilon_{it} \quad (1),$$

$$DPO_{i,t} = \alpha + \beta X_{i,t} * C_i + \theta_i + \varepsilon_{it} \quad (2),$$

where C is a dummy variable for the crisis period, which is equal to 1 for years during the crisis and 0 if the year was in the precedent range. As the omitted dummy represents the years antecedent to the crisis, the coefficients will illustrate how different each predictor affects the dependent variable when compared to the stable period.

To account for the September 11 terrorist attack's effects, SEP11 represents C and coefficients are compared to the period bef_SEP11. Following the same rationale, GFC is the C dummy for the global financial crisis years and is assessed in comparison to bef_GFC. Finally, for the COVID-19 pandemic C is assumed by dummy COV and respective β 's are compared to bef_COV.

To improve statistical efficiency and increase the robustness of interpretations and conclusions, the study adopts a 95% winsorization for the sample in each period (before and during shocks). To winsorize the top 2.5% and bottom 2.5% of data points, the extreme values are replaced by maximum and minimum values at the mentioned threshold, therefore eliminating potential outliers in the data sample.

4. Empirical Results

Descriptive statistics for the whole set of crises are presented in Table 5. Panel A describes the statistics for the entire sample. On average, New York Stock Exchange firms that are active since 1999 have 27% of debt on their capital structure (LEV) and pay out 24.6% of their net income to shareholders (DPO) in the jointly period. Panel B, C and D show the respective descriptive statistics for September 11, Global Financial Crisis and COVID-19 pandemic phases. In the first analyzed crisis, sample firms appear to support a slightly lower level of debt (28%) than the average on the precedent years (28.4%), and also pay out less dividends (21.2%). In the GFC interval, capital structure statistics seem to align with common literature. Despite being listed in a stock exchange, firms decrease the amount of leverage when compared to the previous period (average of 22.4% compared to 24.4%), contradicting Demircuc-Kunt, Martinez-Peria, and Tressel (2015) findings. Additionally, firms follow the signaling hypothesis and show some resilience to cutting dividends, increasing their average dividend payout ratio from 22.6% to 25.5%. This supports Floyd, Li, and Skinner (2015) prior conclusions on this topic and contradicts Almeida, Campello, and Weisbach (2011) outcomes, as well as Hauser's (2013). Finally, following government regulations on bank lending such as liquidity injection programs (Li et al., 2020), sample firms in the COVID-19 tested year increase their indebtedness to a mean of 31.5%. However, consistent with recent studies on dividend policies of US publicly listed firms during the pandemic (Krieger, Mauck, and Pruitt, 2021), companies show indications of dividends cuts and present in fact a lower average of DPO (28.7%) when compared to the prior period.

To verify the direction and strength of the linear relationship between variables and detect possible cases of autocorrelation, Table 6 presents the Pearson correlation coefficients for each dimension. To avoid multicollinearity issues and validate a regression model, the most accepted coefficient threshold among statistics is 0.8. As -0.506 is the coefficient with the highest degree of correlation present in the data, displayed between dividend payout policy (DPO) and stock price volatility (VOL), all remaining relationships between predictors are considered either weakly or moderately correlated. Therefore, there is no evidence of multicollinearity in this research's data and the regression model is valid for the study.

Table 1 presents the regression outputs for the entire sample. The indicated and subsequent tables include two dependent variables, (1) leverage ratio (LEV) and (2) dividend payout policy (DPO). In regression (1), the independent variables used are dividend payout (DPO),

profitability (PROF), liquidity (LIQ), tangibility (TANG), size (SIZE), growth opportunities (GROW), non-debt tax shields (NDTS) and stock price volatility (VOL). To structure regression (2), this study uses the same explanatory variables previously mentioned apart from DPO, which is replaced with leverage ratio (BOOKLev). The first step was to conduct the F-test to evaluate the overall significance of the model. The null hypothesis, which states that the model with no independent variables fits the data as well as the dissertation's model, was rejected. Therefore, the model used is a better fit to the data than the intercept-only model.

In the overall period, when considering leverage (1) as the dependent variable, results show that profitability, liquidity, size, and stock price volatility are statistically significant at a 1% significance level, as tangibility, growth opportunities, and non-debt tax-shields are significant at a 5% level.

The following effects of the significant determinants in firm's level of debt go in accordance with the hypotheses previously elaborated. Firstly, the negative coefficient of profitability aligns with H1.1, and the pecking order theory, as profitable sample firms are more likely to follow the hierarchical preference in terms of financing sources, prioritizing internal retained earnings to external finance. Likewise, the behavior of more liquid NYSE firms seems to be in line with H2.1, and the same corporate finance theory, as the negative coefficient indicates that these companies have the ability and prefer to pay current debt obligations without seeking for debt. Regarding size, its positive relation with leverage is consistent with most literature and with the expected hypothesis (H4.1). The results imply that larger tested firms follow the trade-off theory and exploit their size to have an easier access to debt markets, therefore increasing their level of debt to capitalize tax shields. Finally, findings for the predictor non-debt tax shields exhibit a positive association between the variable and leverage, which supports Titman and Wessels (1988) and Harris and Raviv (1991) conclusions, as well as H6.1.

Tangibility, growth opportunities and stock price volatility are the significant variables for the entire sample that do not verify the hypotheses presented. Contrary to H3.1, having a higher proportion of tangible assets does not translate into carrying higher debt in capital structure, as the negative coefficient shows. The positive relation between GROW and level of debt points that growing NYSE firms finance new projects with external debt, as retained earnings may not be sufficient to fund them. Lastly, concerning regression (1), the positive relation

between share price volatility and leverage refutes H7.1, showing that firms take on additional debt when issuing equity becomes more costly.

In regression (2), liquidity and non-debt tax shields do not add statistical significance to the model as they do in regression (1). Thus, at a 1% significance level, profitability and stock price volatility have a significant relation with DPO in the whole period, as size and growth opportunities have at a 5% level. Surprisingly, the profitability coefficient contradicts most empirical studies and H1.2., displaying a negative effect on dividend payout to shareholders. Nonetheless, size, growth opportunities and stock price volatility coefficients confirm the anticipated relation to DPO (H4.2., H5.2. and H7.2., respectively). Identically to Jensen and Meckling (1976), Smith and Watts (1992) and Fama and French (2001) findings, larger NYSE firms have a tendency to pay more dividends. Also consistent with literature is the coefficient regarding growth opportunities, indicating that expanding firms are less likely to pay out dividends. Similarly, volatility is negatively related to dividend payout policy.

Table 1: Regression Results for the entire sample (1999-2002, 2004-2009, 2018-2021)

Variables	Fixed-effects model		Random-effects model	
	(1) LEV	(2) DPO	(3) LEV	(4) DPO
DPO	0.0184 (0.0128)		0.0201* (0.0116)	
LEV		0.0439 (0.0303)		0.0481* (0.0273)
PROF	-0.395*** (0.0482)	-0.611*** (0.0700)	-0.395*** (0.0457)	-0.531*** (0.0664)
LIQ	-0.0310*** (0.00448)	0.00297 (0.00490)	-0.0335*** (0.00409)	0.00123 (0.00448)
TANG	-0.0787** (0.0370)	0.0432 (0.0426)	-0.0165 (0.0246)	0.122*** (0.0305)
SIZE	0.0138*** (0.00511)	0.0127** (0.00592)	0.0170*** (0.00350)	0.0140*** (0.00431)
GROW	0.0426** (0.0191)	-0.0592** (0.0224)	0.4887** (0.0184)	0.5579*** (0.0231)
NDTS	0.583** (0.238)	-0.0740 (0.302)	0.347* (0.209)	-0.324 (0.260)
VOL	0.104*** (0.0252)	-0.311*** (0.0365)	0.106*** (0.0238)	-0.391*** (0.0327)
Constant	0.0985 (0.0833)	0.181* (0.0989)	0.0420 (0.0592)	0.177** (0.0750)
Observations	6,825	6,825	6,325	6,325

(Continued on the next page)

(Table continued)

R-squared	0.106	0.097	0.104	0.092
Number of ID	617	617	617	617

Fixed-effects model and random-effects model regressions (1) and (3) estimate for leverage determinants, while (2) and (4) regress dividend payout as the dependent variable. Sample includes 617 NYSE firms that survived over the 1999-2021 period. Leverage (LEV) is computed as the ratio of Total Debt to Total Assets. Dividend Payout (DPO) is estimated by dividing Dividends Paid to Net Income. Profitability (PROF) is the ratio of EBIT to Total Assets. Liquidity (LIQ) represents the Current Ratio. Tangibility (TANG) quantifies the proportion PPE (property, plant and equipment) on Total Assets. Size is the natural logarithm of Total Assets. Growth opportunities (GROW) are calculated as the ratio of Market Value of Assets to its Book Value. Non-debt tax shields (NDTS) results from the ratio of Depreciation and Amortization to Total Assets. Stock price volatility (VOL) is estimated as the standard deviation of firm's stock price (deviation from the mean). Standard errors are reported in parenthesis. Significance levels: ***: $p < 0.01$, **: $p < 0.05$, *: $p < 0.1$, where "p" stands for p-value.

Table 2, 3 and 4 report the regressions results for considered periods of crisis, namely September 11, Global Financial Crisis and COVID-19 pandemic. To operate a differential analysis, both dependent and independent variables displayed are accounted for the specific impact of the respective crisis. This implies that the coefficients in every model describe, in a comparison approach, the effect of each predictor on the dependent variable in relation to the period pre-crisis.

4.1. September 11 terrorist attack

Table 2 reports the outputs for the regressions involving the effects of each predictor on leverage and dividend payout policy in the September 11 terrorist attack context.

Regarding regression (1), profitability, liquidity, and size are statistically significant at a 1% significance level, while stock market volatility is at a 5% level.

All coefficients of these four variables are in accordance with the hypothesis developed in section 3.2., which indicates that firms behave more vigorously than what common capital structures theories propose. The coefficient of the first significant predictor indicates that if the profitability ratio was increased by 1 percentage point, the firms' leverage ratio would decrease more 18.8 percentage points when compared to the period pre-crisis. The negative relation is not only consistent with H1.1., but also with S. Myers (1984); Rajan and Zingales (1995); Demirgüç-Kunt and Maksimovic (1999) and Fama and French (2002) associations with the pecking order theory, as firms avoid increasing levels of debt and entering in additional risks when internal funds are available, especially in times where uncertainty, fear,

and anxiety lead managers thoughts. Following the same rationale, a 1 p.p. increase in the liquidity ratio during 2001 and 2002 would result in a sharper leverage decrease of 3.84 p.p. than in the prior period, meaning that firms with higher liquidity would prefer to meet debt obligations without the need to take out loans after the September 11 shock (H2.1.). Larger firms follow the trade-off theory and H4.1. after the event, as the increase of the natural logarithm of total assets by 1 translates into a higher level of debt of 1.94 p.p.. Lastly, stock price volatility coefficient shows the negative effect of the uncertainty surrounding the city of New York and its stock exchange, following the terrorist attack. The inverse relation with leverage confirms the reasoning behind H7.1. It is worth mentioning that when comparing the average magnitude of share price volatility within the three different stages, the September 11 tragedy creates the most volatile shock in the stock market, thus supporting Arin, Ciferri, and Spagnolo (2008) claims.

In regression (2), firms characteristics with an impact on dividend payout policy are profitability, size, and stock price volatility, significant at a 1% level, liquidity at a 5% level, and tangibility at 10%.

Contrarily to most theories and empirical studies that test these determinants in “normal” times, sample firms that improve their performance ignore the signaling theory and adopt much more conservative corporate policies after the event. The negative coefficient of the variable profitability demonstrates that uncertainly leads to managers preferring to retain a greater portion of earnings and to reduce payout, consistent with Antoniou, Kumar, and Maligkris (2017) findings. Nonetheless, firms’ cash position in itself has a different effect on dividends policy. An increase of 1 p.p. on the liquidity ratio – a higher cash availability – would translate into an increase of 1.27 p.p. in the dividend payout ratio, when compared to the period before the attack (confirming H2.2.). Likewise, the relation between tangibility and dividends is still the expected after the incident (H3.2.). Firms with a higher proportion of tangible assets in their balance sheet have a higher payout ratio. The coefficient of size strengthens Jensen and Meckling (1976), Smith and Watts (1992) and Fama and French's (2001) empirical results that larger firms have a higher tendency to distribute dividends, proving that sample firms were able to meet shareholders’ interests after the event (H4.2.). Finally, as previously shown, the stock market suffered high volatility in this period. The 21 p.p. difference in NYSE companies’ payout policy between the pre and during attack periods illustrates the severe repercussions that future cash flow uncertainty has on managers

decisions (H7.2.). This acute negative relation opposes Do (2021) conclusions on the effect of market volatility in payout policy.

Table 2: Regression Results for the September 11 period (2001-2002)

Variables	Fixed-effects model		Random-effects model	
	(1) LEV_SEP11	(2) DPO_SEP11	(3) LEV_SEP11	(4) DPO_SEP11
DPO_SEP11	0.00611 (0.0216)		0.0292 (0.0309)	
LEV_SEP11		0.0117 (0.0460)		0.0669 (0.0708)
PROF_SEP11	-0.188*** (0.0873)	-0.241*** (0.127)	-0.181** (0.115)	-0.275*** (0.166)
LIQ_SEP11	-0.0384*** (0.00687)	0.0127** (0.00627)	-0.0246** (0.0114)	0.0212** (0.00852)
TANG_SEP11	0.0933 (0.0337)	0.0716* (0.0425)	0.0951 (0.158)	0.0417 (0.153)
SIZE_SEP11	0.0194*** (0.00476)	0.0202*** (0.00628)	0.0669* (0.0378)	-0.0122 (0.0248)
GROW_SEP11	-0.0311 (0.335)	0.0596 (0.325)	0.0493 (0.409)	0.0431 (0.349)
NDTS_SEP11	-0.479 (0.259)	0.479 (0.352)	0.146 (0.440)	0.1486*** (0.546)
VOL_SEP11	-0.0729** (0.0529)	-0.210*** (0.0556)	-0.0659* (0.120)	-0.000364 (0.117)
Constant	0.0545 (0.0827)	0.328*** (0.111)	-0.637 (0.553)	0.340 (0.397)
Observations	961	961	961	961
R-squared	0.102	0.155	0.076	0.084
Number of Firms	521	521	521	521

Fixed-effects model and random-effects model regressions (1) and (3) estimate for leverage determinants, while (2) and (4) regress dividend payout as the dependent variable. Each coefficient describes, in a comparison approach, the effect of the respective predictor on the dependent variable in relation to the period pre-attack (1999-2000). Leverage (LEV) is computed as the ratio of Total Debt to Total Assets. Dividend Payout (DPO) is estimated by dividing Dividends Paid to Net Income. Profitability (PROF) is the ratio of EBIT to Total Assets. Liquidity (LIQ) represents the Current Ratio. Tangibility (TANG) quantifies the proportion PPE (property, plant and equipment) on Total Assets. Size is the natural logarithm of Total Assets. Growth opportunities (GROW) are calculated as the ratio of Market Value of Assets to its Book Value. Non-debt tax shields (NDTS) results from the ratio of Depreciation and Amortization to Total Assets. Stock price volatility (VOL) is estimated as the standard deviation of firm's stock price (deviation from the mean). Standard errors are reported in parenthesis. Significance levels: ***: $p < 0.01$, **: $p < 0.05$, *: $p < 0.1$., where "p" stands for p-value.

4.2. Global Financial Crisis

Table 3 describes the relation between each determinant and the dependent variable leverage (1) and dividend payout policy (2) during the Global Financial Crisis, in comparison to years that preceded it.

Profitability and size have a significant effect on leverage (1) at a 1% level, while liquidity, tangibility and growth opportunities have at 5%.

The coefficients of the variables PROF, LIQ and SIZE follow the same signal as before, which means that firms' characteristics had an impact on leverage decisions when entering the global financial crisis that was similar to the terrorist shock reaction. However, the magnitude of the effects is different. Firstly, the negative coefficient of the predictor profitability implies that NYSE firms stick to the pecking order theory as expected (H1.1.). Nonetheless, an increase on the profitability ratio during the GFC seems to have a greater impact on leverage than in the previous analyzed downturn. With financial institutions near insolvency, lending to businesses was almost dried up and the cost of it was massively increased. Therefore, in order to preserve corporate solvency, the negative relation with debt shows that any additional profit would lower their level of debt. In the same manner, firms avoided liquidity shocks by having cash available. The more negative sign on the coefficient of current ratio illustrates how firms, in need for financing, would prefer to liquidate their assets and avoid taking out loans that might induce additional risks (H2.1.). Larger NYSE firms however may have more advantageous interest rates and the coefficient shows that they take advantage of an easier access to financial markets, when financing is most needed. The positive relation with leverage supports once again H4.1. Tangibility and growth opportunities are, opposite to the period after September 11, significant predictors to leverage changes during the financial crisis. Changes in tangibility are positively related to leverage (supporting H3.1.), as firms with a higher proportion of tangible assets in their balance sheet can use them as collateral and thus carry less risk default risk. If the fraction of tangible assets on total assets was increased by 1 p.p. during the global financial crisis, debt levels would improve more 7.15 p.p. when comparing to the preceding years. Lastly, the negative relation between growth opportunities and leverage is not a shock. Since banks were facing a credit crunch, the decision to finance growing companies would be highly risky, as these firms are more sensitive to economic downturns and have a higher probability to run into financial distress (H5.1.).

When dividend payout is regressed as the dependent variable – regression (2) – profitability, tangibility, and volatility are significant at a 1% level. Growth opportunities is significant at 5% level, and non-debt tax shields at 1%.

Despite the increase of average dividend payout in relation to the 9/11 period, changes in profitability are once more negatively related to dividends, reinforcing the idea that NYSE firms increase cash-flows retention to consolidate financial reserves in times of risk. As in regression (1), its coefficient magnitude is also greater. On the other hand, the positive effect of tangibility seems to be much more substantial on payout changes than before, indicating that firms with a greater percentage of tangible assets are able to distribute more dividends. Growth opportunities is a significant variable in the GFC period, and its negative relation to dividends is identical to leverage, confirming Rozeff (1982); S. C. Myers and Majluf (1984); G. R. Jensen, Solberg, and Zorn (1992); and Fama and French (2001) empirical results. Identically, the negative relation between changes in non-debt tax shields and dividend payout aligns with H6.2. Lastly, stock price volatility still has a negative effect on dividend payout. However, its impact appears to be less expressive as in the terrorist attack. While the previous considered period was best characterized by the stock market shock, the 2008 economic downturn was mainly distinguished by the credit crisis and the breakdown of the financial system.

Table 3: Regression Results for the Global Financial Crisis period (2007-2009)

Variables	Fixed-effects model		Random-effects model	
	(1) LEV_GFC	(2) DPO_GFC	(3) LEV_GFC	(4) DPO_GFC
DPO_GFC	-0.00674 (0.0152)		-0.00956 (0.0178)	
LEV_GFC		-0.0119 (0.0400)		-0.0273 (0.0515)
PROF_GFC	-0.274*** (0.0621)	-0.284*** (0.119)	-0.435*** (0.0683)	-0.371*** (0.148)
LIQ_GFC	-0.0539** (0.00560)	0.000430 (0.00782)	-0.00420 (0.00654)	0.00821 (0.00944)
TANG_GFC	0.0715** (0.0299)	0.217*** (0.0444)	0.0515 (0.0691)	0.332*** (0.126)
SIZE_GFC	0.0269*** (0.00447)	0.00834 (0.00670)	0.0586*** (0.0175)	-0.00726 (0.0241)
GROW_GFC	-0.0197** (0.278)	-0.0286** (0.328)	-0.0167*** (0.318)	-0.0289** (0.369)
NDTS_GFC	-0.0322 (0.306)	-0.079* (0.414)	0.0319 (0.436)	-0.1004 (0.671)
VOL_GFC	0.0453	-0.128***	0.0509	-0.177***

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(Table continued)

	(0.0296)	(0.0439)	(0.0385)	(0.0675)
Constant	-0.126*	0.293**	-0.641**	0.402
	(0.0743)	(0.115)	(0.270)	(0.375)
Observations	1,574	1,574	1,574	1,574
R-squared	0.132	0.134	0.092	0.102
Number of Firms	557	557	557	557

Fixed-effects model and random-effects model regressions (1) and (3) estimate for leverage determinants, while (2) and (4) regress dividend payout as the dependent variable. Each coefficient describes, in a comparison approach, the effect of the respective predictor on the dependent variable in relation to the period pre-crisis (2004-2006). Leverage (LEV) is computed as the ratio of Total Debt to Total Assets. Dividend Payout (DPO) is estimated by dividing Dividends Paid to Net Income. Profitability (PROF) is the ratio of EBIT to Total Assets. Liquidity (LIQ) represents the Current Ratio. Tangibility (TANG) quantifies the proportion PPE (property, plant and equipment) on Total Assets. Size is the natural logarithm of Total Assets. Growth opportunities (GROW) are calculated as the ratio of Market Value of Assets to its Book Value. Non-debt tax shields (NDTS) results from the ratio of Depreciation and Amortization to Total Assets. Stock price volatility (VOL) is estimated as the standard deviation of firm's stock price (deviation from the mean). Standard errors are reported in parenthesis. Significance levels: ***: $p < 0.01$, **: $p < 0.05$, *: $p < 0.1$, where "p" stands for p-value.

4.3. COVID-19 pandemic

Table 4 portrays how independent variables interact for the last two years with financial corporate policy, in comparison with the period before the beginning of the pandemic.,

In regression (1) profitability is, equally to the two preceding adverse phases, significant at 1% level, while growth opportunities is a significant predictors at 5% level. For the first time, results empirically point for a relation between changes in dividend payout policy and leverage, as DPO is also significant at 5% level. Lastly, stock price volatility is statistically significant at 10% level.

The positive coefficient on dividend payout predictor confirms Chang and Rhee's (1990) empirical evidence of firms with a higher payout ratio tending to be more leveraged. The pecking order theory is a reasonable logical foundation for the direction of this relation. If companies use retained earnings to try to give a positive signal to the market in this time of uncertainty in the form of dividends, the next source of funding hierarchically is debt. While the effects of the pandemic on the profitability determinant maintain negative as analyzed on previous crises, the relation of growing firms with level of debt is positive during the COVID-19 pandemic, opposite to GFC results. This effect is consistent with the trade-off theory (although inverse to [H5.1.](#)), as growing firms have less retained earnings available and require

external funding to expand. However, the coefficient can also be justified by the world's reality at the time. As countries entered in lockdown and reality changed, firms had the opportunity to adapt their business model and present new ideas that could increase their value. Likewise, banks that now had the sufficient credit to lend thanks to government's liquidity programs, would probably be more receptive to fund disruptive companies. The effect of stock market volatility is similar to the September 11 terrorist attack. The sudden shock on the stock market intensified the uncertainty in trade conditions, which increased the probability of financial distress of firms and consequently had a larger influence in reducing their level of debt.

Profitability is also statistically significant in regression (2) at 1% level. Leverage and liquidity are significant predictors at 5% level, while size is at 10%.

Business activities during COVID-19 initial period were severely affected, which decreased companies' cash flow. As a result, the average profitability ratio of NYSE firms decreased from 8.1% to 7%. Therefore, the negative relation indicates that an increase in this ratio would cause a higher dividends suppression to shareholders after the pandemic started, as firms try to maintain a healthy state. In the same manner, as a response to the heavy impact on cash flows, firms with liquid assets would avoid paying dividends, contrary to the signaling theory, the free cash flow hypothesis, and H2.2. prior established. Unlike the terrorist attack and different to several empirical studies, COVID causes an inverse relation between size and dividend payout. The coefficient indicates that an increase of the natural logarithm of total assets by 1 would cause a greater decrease in sample companies' payout ratio of 8.07 p.p., meaning that the larger the firm, the greater the burden.

Table 4: Regression Results for the COVID-19 pandemic (2020-2021)

Variables	Fixed-effects model		Random-effects model	
	(1) LEV_COV	(2) DPO_COV	(3) LEV_COV	(4) DPO_COV
DPO_COV	0.0500** (0.0219)		0.00760 (0.0178)	
LEV_COV		0.154** (0.163)		-0.0444 (0.0558)
PROF_COV	-0.120*** (0.0835)	-0.271*** (0.219)	-0.332*** (0.0758)	-0.0953 (0.127)
LIQ_COV	-0.0535 (0.00834)	-0.0224** (0.0253)	-0.00809 (0.00722)	-0.0249** (0.0103)
TANG_COV	-0.249	0.160	0.0332	0.164***

(Continued on the next page)

(Table continued)

	(0.209)	(0.255)	(0.0336)	(0.0472)
SIZE_COV	0.0457	-0.0807*	0.0328***	0.0178**
	(0.0442)	(0.0600)	(0.00504)	(0.00755)
GROW_COV	0.0240**	0.000293	0.0166**	0.0281**
	(0.0104)	(0.0243)	(0.00791)	(0.0119)
NDTS_COV	-1.517	0.262	-0.728	-0.999
	(1.014)	(1.600)	(0.463)	(0.616)
VOL_COV	-0.0585*	0.00132	0.0250	-0.596***
	(0.0319)	(0.0833)	(0.0270)	(0.0542)
Constant	-0.234	1.490	-0.153*	0.232*
	(0.706)	(0.967)	(0.0854)	(0.133)
Observations	993	993	993	993
R-squared	0.232	0.121	0.160	0.028
Number of Firms	568	568	568	568

Fixed-effects model and random-effects model regressions (1) and (3) estimate for leverage determinants, while (2) and (4) regress dividend payout as the dependent variable. Each coefficient describes, in a comparison approach, the effect of the respective predictor on the dependent variable in relation to the period pre-pandemic (2018-2019). Leverage (LEV) is computed as the ratio of Total Debt to Total Assets. Dividend Payout (DPO) is estimated by dividing Dividends Paid to Net Income. Profitability (PROF) is the ratio of EBIT to Total Assets. Liquidity (LIQ) represents the Current Ratio. Tangibility (TANG) quantifies the proportion PPE (property, plant and equipment) on Total Assets. Size is the natural logarithm of Total Assets. Growth opportunities (GROW) are calculated as the ratio of Market Value of Assets to its Book Value. Non-debt tax shields (NDTS) results from the ratio of Depreciation and Amortization to Total Assets. Stock price volatility (VOL) is estimated as the standard deviation of firm's stock price (deviation from the mean). Standard errors are reported in parenthesis. Significance levels: ***: $p < 0.01$, **: $p < 0.05$, *: $p < 0.1$, where "p" stands for p-value.

5. Conclusions

Based on a sample of 617 firms listed in the New York Stock Exchange between 1999 and 2021, this study tests the effects of known capital structure determinants on corporate policy during crises, when compared to prior stable years. Moreover, it explores how these impacts vary within the examined shock periods and investigates if managers behaved differently accordingly to the specific macroeconomic situation. To address the research questions, this thesis considers the periods where firms were struggling with the consequences of the September 11 attack, the Global Financial Crisis and the COVID-19 pandemic, and respective preceding years.

Sample companies decreased the percentage of leverage in the period of the Global Financial Crisis and presented the lowest average debt ratio among the three studied periods of shock. Prior, there was also indication of a small decline after the terrorist attack. On the other hand, NYSE firms raised their levels of debt and achieved the highest proportion of leverage in their capital structure during the coronavirus period.

Results show that capital structure determinants have a similar effect on leverage decisions in times of crises and their impact on firms' debt level is sharper than in previous stable years. Thus, capital structure theories still apply to contexts of shock. Nonetheless, details in the outcomes reflect each crisis own characteristics. Profitability has a negative effect in every period, but it is most impactful during the GFC. As lending to businesses was scarce, firms would retain additional profits to preserve corporate solvency and lower their debt levels, following the pecking order theory. Stock market volatility is only significant after the September 11 attack and during the COVID-19 pandemic. The sudden shock caused by both events damaged trade conditions, which increased uncertainty around firms and consequently, to avoid financial distress risks, influenced negatively leverage taken. There is only evidence of a determinant's relation being distinct to common theories for one of the three analyzed periods. Growth opportunities has a negative coefficient during the GFC, which goes in accordance with expectations, since the decision to finance growing companies would be highly risky. However, during the pandemic its relationship with debt ratio is positive. Because banks had the sufficient credit to lend, disruptive companies had now the opportunity to get external funds. Liquidity, tangibility, and size, when significant, follow the anticipated relationships (negative, positive, and positive, respectively). Non-debt tax shields is the only predictor that is not significant in any period.

Companies used a bigger fraction of net income to pay dividends during the coronavirus pandemic, in comparison to the other critical times. However, this context is not a follow up of an increase in the ratio since firms in 2018-2019 paid more dividends to shareholders. Therefore, there was in fact a cut/omission of dividends during this phase. In the past, studied sample also decreased their payout ratio after the September 11 attack, showing that in times of sudden shock companies value cash conservation. Nonetheless, when facing a huge recession during the Global Financial Crisis, sample behavior followed the signaling hypothesis. To communicate an important positive signal to the market, firms showed resilience to a payout decline and increased the amount of dividends paid.

Unlike the capital structure model, some underlying factors influence payout policy in a different manner than what dividends' theory state in steady periods. NYSE firms that increase their profitability ratio (in all three analyzed crises), ignore the signaling theory and become more conservative, paying less dividends. This relation shows that in times of uncertainty and risk, companies increase cash-flows retention to consolidate financial reserves. Furthermore, there is a contrast in other relationships among the studied periods. After the terrorist event, firms who increase their liquidity status are more willing to distribute dividends to shareholders. Yet, as a response to the heavy impact on cash flows, firms with more liquid assets during the coronavirus stage would decrease their payout ratio to previous years, opposite to the fundamentals of the signaling theory and the free cash flow hypothesis. Likewise, size determinant also reveals mixed relations during both shocks. Larger firms increase their payout ratio after the September 11 as they have more resources to meet shareholders' interests and give confidence signs to the market after the tragedy. However, the negative sign during the pandemic illustrates that these firms carry a bigger burden in this period, distributing less dividends. Tangibility, growth opportunities, non-debt tax shields and stock market volatility have the expected interactions with payout policy in the significant timespans.

Lastly, there was only evidence of a relation between leverage and dividends during the COVID-19 period. Results imply that firms, when more indebted, increase their payout ratio and vice-versa.

6. Limitations and Future Research

Explaining corporate policy decisions empirically has its complications. As seen by the regressions' R^2 , the models have a relatively weak explanatory power. This suggests that increases/decreases of debt and payout ratios among the studied crises are not fully explained by firms' characteristics. External factors, such as macroeconomic conditions (e.g. inflation), debt market conditions (e.g. term spread), or political influences are not accounted in the model and may contribute to such variations in behavior. Precisely, the reduced percentage of debt level during the Global Financial Crisis matches with the timespan when banks were facing a credit crunch and cost of loans suffered a substantial increase. In contrast, firms became more indebted when there was an economic stimulus through government and bank regulations as a response to the COVID-19 pandemic (such as liquidity injection programs).

Furthermore, the study's data does not represent in its best the harsh reality of crises. Firstly, by only examining firms that survived the three periods of shock, it could be argued that the sample has a survivorship bias. In addition, effects on smaller businesses are not studied in this dissertation. As stock markets can act as a "spare tire" during crises, firms are given alternative corporate financing channels to mitigate banking systems failures.

Therefore, future research could improve this study by adding firms that went bankrupt during shock events. This would allow to analyze possible differences on the impact of the determinants on corporate policy during crises between successful firms and companies that became insolvent. It could also be interesting to apply this research to different European stock exchanges. Since the coronavirus pandemic hit countries as Italy or Spain in an unprecedented manner, companies listed in the Borsa Italiana or Bolsa de Madrid are appealing to be subjects to research.

Unfortunately, the war between Russia and Ukraine is quickly proceeding to be the next period of shock. With hopes that such event does not develop, future researchers should consider these tensions with particular attention.

7. Remaining Tables

Table 5: Descriptive statistics for the entire sample (September 11 period, Global Financial Crisis, and COVID-19 pandemic)

Table 5 summarizes the variables in each analyzed shock/crisis and its precedent years (bef). Panel A corresponds to the entire sample, Panel B to the September 11 terrorist attack assessment (SEP11), Panel C to the Global Financial Crisis (GFC) and Panel D to the COVID-19 pandemic (COV). Statistics include number of observations, mean, standard deviation, 25th percentile, median, 75th percentile, skewness, and kurtosis. Leverage (LEV) is computed as the ratio of Total Debt to Total Assets. Dividend Payout (DPO) is estimated by dividing Dividends Paid to Net Income. Profitability (PROF) is the ratio of EBIT to Total Assets. Liquidity (LIQ) represents the Current Ratio. Tangibility (TANG) quantifies the proportion PPE (property, plant and equipment) on Total Assets. Size is the natural logarithm of Total Assets. Growth opportunities (GROW) are calculated as the ratio of Market Value of Assets to its Book Value. Non-debt tax shields (NDTS) results from the ratio of Depreciation and Amortization to Total Assets. Stock price volatility (VOL) is estimated as the standard deviation of firm's stock price (deviation from the mean).

Panel A: Descriptive statistics for the entire sample (1999-2002, 2004-2009, 2018-2021)

	N	Mean	Std. Dev.	p25	Median	p75	skewness	kurtosis
LEV	9436	.27	0.167	.148	.264	.383	.187	2.255
DPO	7991	.246	0.251	0	.189	.419	.748	2.378
PROF	9308	.093	0.073	.049	.087	.136	.221	2.824
LIQ	8889	1.793	0.957	1.07	1.56	2.27	.976	3.228
TANG	9368	.357	0.243	.155	.3	.542	.557	2.151
SIZE	9439	14.957	1.660	13.696	14.914	16.206	.032	2.143
GROW	8107	1.113	0.882	.474	.856	1.421	1.68	5.294
NDTS	9388	.042	0.020	.027	.038	.054	.558	2.627
VOL	9436	.261	0.149	.215	.26.6	.344	.844	2.839

Panel B: Descriptive statistics for the pre-September 11 period (1999-2000) and September 11 period (2001-2002)

	N	Mean	Std. Dev.	p25	Median	p75	skewness	kurtosis
bef_LEV_SEP11	1352	.284	0.166	.162	.286	.404	.057	2.224
bef_DPO_SEP11	1170	.231	0.247	0	.169	.391	.84	2.54
bef_PROF_SEP11	1320	.109	0.065	.064	.1	.147	.569	2.824
bef_LIQ_SEP11	1264	1.74	0.960	.995	1.5	2.24	.969	3.144
bef_TANG_SEP11	1327	.373	0.234	.185	.33	.539	.491	2.216
bef_SIZE_SEP11	1352	14.416	1.610	13.244	14.34	15.646	.104	2.173
bef_GROW_SEP11	607	1.113	0.821	0.455	0.788	1.459	1.669	4.853
bef_NDTS_SEP11	1337	.046	0.021	.03	.044	.06	.345	2.361
bef_VOL_SEP11	1366	.285	0.145	.211	.29	.343	.781	2.675
LEV_SEP11	1357	.280	0.166	.167	.279	.397	.061	2.237
DPO_SEP11	1135	.212	0.255	0	.131	.396	.853	2.433
PROF_SEP11	1332	.09	0.066	.05	.085	.13	.247	2.813
LIQ_SEP11	1277	1.772	1.008	1	1.49	2.28	1.055	3.424
TANG_SEP11	1346	.374	0.237	.18	.325	.544	.497	2.216
SIZE_SEP11	1357	14.567	1.616	13.371	14.504	15.814	.112	2.103
GROW_SEP11	1209	1.111	0.824	.469	.781	1.463	1.886	4.973
NDTS_SEP11	1345	.045	0.021	.029	.043	.059	.448	2.434
VOL_SEP11	1366	.343	0.186	.243	.383	.52	.712	2.53

Panel C: Descriptive statistics for the pre-GFC period (2004-2006) and GFC period (2007-2009)

	N	Mean	Std. Dev.	p25	Median	p75	skewness	kurtosis
bef_LEV_GFC	2044	.244	0.158	.129	.233	.345	.312	2.353
bef_DPO_GFC	1828	.226	0.230	0	.173	.37	.835	2.604
bef_PROF_GFC	2017	.11	0.068	.062	.097	.151	.586	2.692
bef_LIQ_GFC	1917	1.798	0.907	1.13	1.58	2.25	.975	3.296
bef_TANG_GFC	2033	.344	0.239	.147	.277	.516	.594	2.207
bef_SIZE_GFC	2044	14.898	1.611	13.714	14.825	16.113	.013	2.173
bef_GROW_GFC	1825	1.063	0.852	.329	.882	1.275	1.286	3.973
bef_NDTS_GFC	2039	.04	0.019	.026	.037	.052	.489	2.565
bef_VOL_GFC	2049	.257	0.151	.204	.261	.303	.999	3.22
LEV_GFC	2044	.224	0.170	.105	.211	.345	.334	2.359
DPO_GFC	1671	.255	0.260	0	.201	.428	.885	2.934
PROF_GFC	2017	.09	0.081	.045	.086	.138	.008	2.844
LIQ_GFC	1917	1.835	0.910	1.12	1.63	2.33	.794	2.756
TANG_GFC	2033	.347	0.246	.139	.285	.546	.561	2.074
SIZE_GFC	2044	15.109	1.627	13.949	15.076	16.343	-.004	2.159
GROW_GFC	1825	0.994	0.886	.326	.817	1.255	1.269	3.806
NDTS_GFC	2039	.04	0.019	.026	.037	.052	.489	2.565
VOL_GFC	2049	.288	0.161	0.206	.264	.311	.999	3.22

Panel D: Descriptive statistics for the pre-COVID-19 period (2018-2019) and COVID-19 period (2020-2021)

	N	Mean	Std. Dev.	p25	Median	p75	skewness	kurtosis
bef_LEV_COV	1347	.297	0.173	.183	.303	.421	.101	2.33
bef_DPO_COV	1137	.321	0.265	.05	.302	.523	.356	1.964
bef_PROF_COV	1336	.081	0.062	.042	.074	.114	.418	3.038
bef_LIQ_COV	1286	1.768	1.033	1.02	1.495	2.23	1.197	3.844
bef_TANG_COV	1338	.345	0.259	.126	.262	.552	.661	2.105
bef_SIZE_COV	1349	15.708	1.554	14.566	15.639	16.831	.064	2.176
bef_GROW_COV	1348	1.107	0.881	.475	.826	1.451	1.393	4.341
bef_NDTS_COV	1339	.04	0.020	.026	.036	.05	.812	3.166
bef_VOL_COV	1348	.232	0.110	.199	.253	.333	1.097	3.426
LEV_COV	1292	.315	0.170	.196	.299	.438	.053	2.359
DPO_COV	1050	.287	0.270	0	.243	.494	.519	2.028
PROF_COV	1286	.07	0.077	.031	.065	.113	.003	3.057
LIQ_COV	1228	1.784	0.983	1.07	1.54	2.23	1.09	3.513
TANG_COV	1291	.346	0.252	.136	.26	.527	.663	2.149
SIZE_COV	1293	15.872	1.511	14.76	15.794	16.975	.071	2.136
GROW_COV	1293	1.109	0.896	.465	.797	1.479	1.269	3.806
NDTS_COV	1289	.038	0.019	.025	.034	.047	.886	3.37
VOL_COV	1348	.248	0.151	.192	.254	.305	1.038	3.154

Table 6: Pearson's Correlation Matrix

Table 6 displays the pairwise correlations between studies' variables. Leverage (LEV) is computed as the ratio of Total Debt to Total Assets. Dividend Payout (DPO) is estimated by dividing Dividends Paid to Net Income. Profitability (PROF) is the ratio of EBIT to Total Assets. Liquidity (LIQ) represents the Current Ratio. Tangibility (TANG) quantifies the proportion PPE (property, plant and equipment) on Total Assets. Size is the natural logarithm of Total Assets. Growth opportunities (GROW) are calculated as the ratio of Market Value of Assets to its Book Value. Non-debt tax shields (NDTS) results from the ratio of Depreciation and Amortization to Total Assets. Stock price volatility (VOL) is estimated as the standard deviation of firm's stock price (deviation from the mean).

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
(1) LEV	1.000								
(2) DPO	0.056	1.000							
(3) PROF	-0.251	0.064	1.000						
(4) LIQ	-0.369	-0.218	0.052	1.000					
(5) TANG	0.217	0.178	-0.104	-0.333	1.000				
(6) SIZE	0.270	0.242	-0.063	-0.433	0.144	1.000			
(7) GROW	-0.074	0.129	0.475	-0.092	-0.139	0.029	1.000		
(8) NDTS	-0.004	-0.081	-0.031	-0.156	0.355	-0.018	-0.042	1.000	
(9) VOL	-0.031	-0.506	-0.198	0.214	-0.050	-0.329	-0.181	0.167	1.000

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9. Appendices

Appendix 1: Breusch-Pagan Lagrange multiplier test – Capital Structure Model (Output from Stata)

Breusch and Pagan Lagrangian multiplier test for random effects

$$\text{Lev}[\text{ID},t] = \text{Xb} + u[\text{ID}] + e[\text{ID},t]$$

Estimated results:

	Var	sd = sqrt(Var)
Lev	.0331648	.1821121
e	.0103245	.1016095
u	.0190067	.1378647

Test: Var(u) = 0

chibar2(01) = 10040.11
Prob > chibar2 = 0.0000

Appendix 2: Breusch-Pagan Lagrange multiplier test – Dividend Payout Model (Output from Stata)

Breusch and Pagan Lagrangian multiplier test for random effects

$$\text{DPO}[\text{ID},t] = \text{Xb} + u[\text{ID}] + e[\text{ID},t]$$

Estimated results:

	Var	sd = sqrt(Var)
DPO	.0641594	.2532971
e	.0206616	.1437416
u	.0278475	.1668757

Test: Var(u) = 0

chibar2(01) = 5153.15
Prob > chibar2 = 0.0000

Appendix 3: Hausman test (Output from Stata)

	Coefficients		(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
	(b) fe	(B) re		
DPO	.0471287	.0543039	-.0071752	.0032742
PROF	-.1452404	-.0110194	-.134221	.0177781
LIQ	-.0038955	-.0019812	-.0019144	.0005008
TANG	-.0620579	.0005542	-.062612	.0136662
SIZE	.0146431	.0216611	-.007018	.0015989
GROW	.0086664	.0094196	-.0007532	.
NDTS	.4013795	.5254248	-.1240454	.0544947
VOL	.1185129	.1401245	-.0216115	.0037955

b = consistent under Ho and Ha; obtained from xtreg
 B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

chi2(8) = (b-B)'[(V_b-V_B)^(-1)](b-B)
 = 104.60
 Prob>chi2 = 0.0000
 (V_b-V_B is not positive definite)