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## Corporate Investment in Bank-Dependent Companies in Crisis Time

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### Abstract

The aim of this paper is to ascertain corporate investment reaction in bank-dependent companies in times of crisis. Our investigation covers the differences in corporate investment reaction due to the global financial crisis (GFC) of 2007–2009 and the COVID-19 crisis of 2020–2021. We utilized panel data of companies present on the Warsaw Stock Exchange during the GFC and COVID-19 crisis—932 firm-year observations. We found a negative relationship between bank dependence (static ratio) and corporate investment, but a statistical significance was found only for the GFC period. We also found a positive relationship between bank dependence (dynamic ratio) and corporate investment, but statistical significance was found only for the GFC period. Additionally, we found that during the COVID-19 crisis, the level of corporate investment was at its lowest level, but the biggest drop was noticeable during the GFC when compared to the pre-GFC period. Our article contributes to the existing research by being part of the research on corporate investment and capital structure. It consists of the research on one of the determinants of the corporate investment and capital structure decisions—macroeconomic turbulence manifested in economic crises.

### Keywords

corporate investment | corporate debt | crisis time

### JEL Codes

G3, M2, E5

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## 1. Introduction

Corporate investment plays important role in national economic wealth building, as it directly affects the gross domestic product and diminishes the unemployment rate. Hence, decision-makers' specific focus upon this and there are a lot of instruments included in macroeconomic policies (especially monetary policy) that affect corporate investment.

Recent years have shown a decline in corporate investment, and the attempt to increase this is one of the reasons for maintaining a monetary policy of zero-interest rates. One of the factors affecting corporate investment is the access to funds (especially to debt) that enable the implementation of investment projects. In contrast, debt is used as a tool mitigating

managerial empire building issues. In this way, agency theory explains the negative relation between debt and corporate investment (e.g., Aivazian et al., 2005).

There is abundant research on corporate investment, corporate debt, and the global financial crisis of 2007–2009. It should be noted that a significant group of the latest research relates to China, which is a country with different cultural, social, and economic conditions (Hasan et al., 2021; Jerban & Hen, 2022; Lee, 2022; Liu et al., 2022; Tut, 2022; Xia et al., 2022; Zheng, 2022). Therefore, they cannot be directly related to the situation in Poland. All the aforementioned studies display the interdependence of corporate investment and corporate debt. However, most of the research adopts static measures of debt. Still, there is scarcity of research showing changes in corporate investment and

the impact of corporate debt on capital expenditure during the COVID-19 crisis. Although the global financial crisis (GFC) and COVID-19 crisis have different causes, we believe that both the GFC and the COVID-19 crisis have had a strong impact on the real economy.

The aim of this paper is to compare the reaction of non-financial companies listed on the Warsaw Stock Exchange in terms of corporate investment and bank loan activity due to the GFC and to the COVID-19 crisis. In undertaking this, we ask several research questions and formulate several hypotheses referring to the differences between corporate investment and debt ratio changes and their interdependence during the two stated crises. Additionally, we compare company reaction to the GFC and COVID-19 crises in terms of corporate investment and debt financing. We define the aim of the paper as finding the impact of crises (of a different nature) on the corporate investment under different debt ratios. Thus, our research is a part of the research on corporate investment and capital structure decisions, which we recognize as one of the basic research areas of modern corporate finance.

We investigate the impact of different crises (the GFC and COVID-19 crises) on the real economy, especially on corporate investment, debt, and the relation between debt and corporate investment. We contribute to existing research in several ways. We explore microdata of Polish enterprises and use this to explain macro trends in economy. We adopt two alternative measures of bank dependence—static and dynamic. We construct models that explain the relation between corporate investment and bank dependence during crisis and during normal times. Our research points out the impact of both crises on corporate investments and bank dependence.

Our research findings might have both theoretical and practical implications. Our results show that during the COVID-19 crisis, the level of corporate investment was lower than during GFC, but the decrease was more rapid during GFC than during the COVID-19 crisis. We also found, which is consistent with the theory and earlier research, that debt level and bank debt level (static measure) are negatively correlated with corporate investment level. We also find a positive relation between dynamic measure of bank dependence and corporate investment. Thus, our models might be useful for policy-makers (especially monetary policy) in developing specific tools to steer the main economic components.

The remainder of the paper consists of several sections. The next section includes a literature review on corporate investment, bank loans, and crisis. The methodology section contains a description of the sample, variables, and models. The subsequent section presents our findings. The last part includes conclusions and a discussion.

## 2. Literature Review

### 2.1. Crisis

In history, there were many crises that affected the real economy. In the past, the reasons for the crises were war, famine, or natural disaster. Recently, we have been witnesses to the strong impact of the financial sphere and the financial crises on the real economy. Financial crisis might be the result of changes in asset prices and credit volume, booms in markets of assets and credits, disruption in financial intermediation, large-scale balance-sheet problems, large-scale government support (Claessens & Köse, 2013). With regard to the notion of financial crisis, many classifications exist. These include: a currency crisis connected with speculative attack, a sudden-stop crisis connected with limitation with international capital flow, a foreign debt crisis connected with the absence of possibilities for service foreign debt, domestic public debt, a systemic banking crisis connected with the probability of banks' bankruptcy, and bursting of financial bubbles on the assets market (Wang & Wen, 2012). The financial crises affect the real economy, and usually we can observe a spill-over effect from one type of crisis to another (financial to economic or economic to financial) or parallel appearances of different types of crisis (Reinhart & Rogoff, 2009).

In recent history, one can find the Great Recession in the '1930s, oil shocks in the 1970s, the dot-com bubble at the beginning of the 21st century, the GFC in 2007 and on, and now the COVID-19 crisis (Basco & Crespo, 2014; Bernanke, 2018; Reed, 2007; Reinhart & Rogoff, 2008). All these crises differed in causes, course, and effects (Roubini, 2008; van der Ven & Sun, 2021), albeit with some common features. What they have in common is that all of them affected the real economy, especially consumer and corporate demand (Bloom, 2009). The crisis in the real sphere is associated with sharp negative changes in many macroeconomics aggregates, among others GDP,

employment rate, inflation rate, consumption, and investment (Claessens & Köse, 2013).

The most important effect of crisis is the increase in uncertainty. The uncertainty affects microeconomic decisions; these result at an aggregated level in several macroeconomic variables (consumption, investment, industrial production, employment). In turn, the uncertainty resulting from crisis leads to higher company and consumer precautionary behaviour and a lowering of consumption expenditure and corporate investment. During crisis, most economic variables register significant declines (Claessens & Kose, 2014). Crisis affects the real sphere through two main channels. One is connected with the collapse in demand and trade; the other is connected with the decline in the access to funds (Blanchard et al., 2010).

Crises such as these hold several common features, despite differences in the specificity of crises (their reasons, course, impact of monetary, and fiscal policy), but the real economy might react differently to the GFC and the COVID-19 crisis. The GFC came from the financial sector and touched primarily the entities strongly connected with the banking sector. The COVID-19 crisis has, however, completely different causes not originating in the financial system. In spring 2020, in the first wave of the pandemic, many governments decided to apply severe economic restrictions, and, in turn, the financial system was hit by the deteriorating situation of the affected enterprises (Borio, 2020). The pandemic crisis (COVID-19) differs because it affected nearly all sectors and enterprises in the entire economy simultaneously, and the sources of crisis did not arise from the financial system or the real economy (Gregosz et al., 2020). The GFC affected the entire world through gradual financial contagion (Bekaert et al., 2014). The COVID-19 crisis hit the whole world suddenly (Borio, 2020), albeit to different degrees in different countries (the strength of the impact depending on the structure of domestic economy) (Mućk et al., 2021). The recent work of Batten et al. (2022) addresses this issue. In both crises, the level of uncertainty measured by VIX was similar, but there was a more rapid increase in the implied volatility index, reflecting itself in COVID-19. Still, we think that the reaction of the non-financial corporation sector due to the GFC and the COVID-19 crisis is similar in direction, despite their different causes. They differed, however, in the scope and depth.

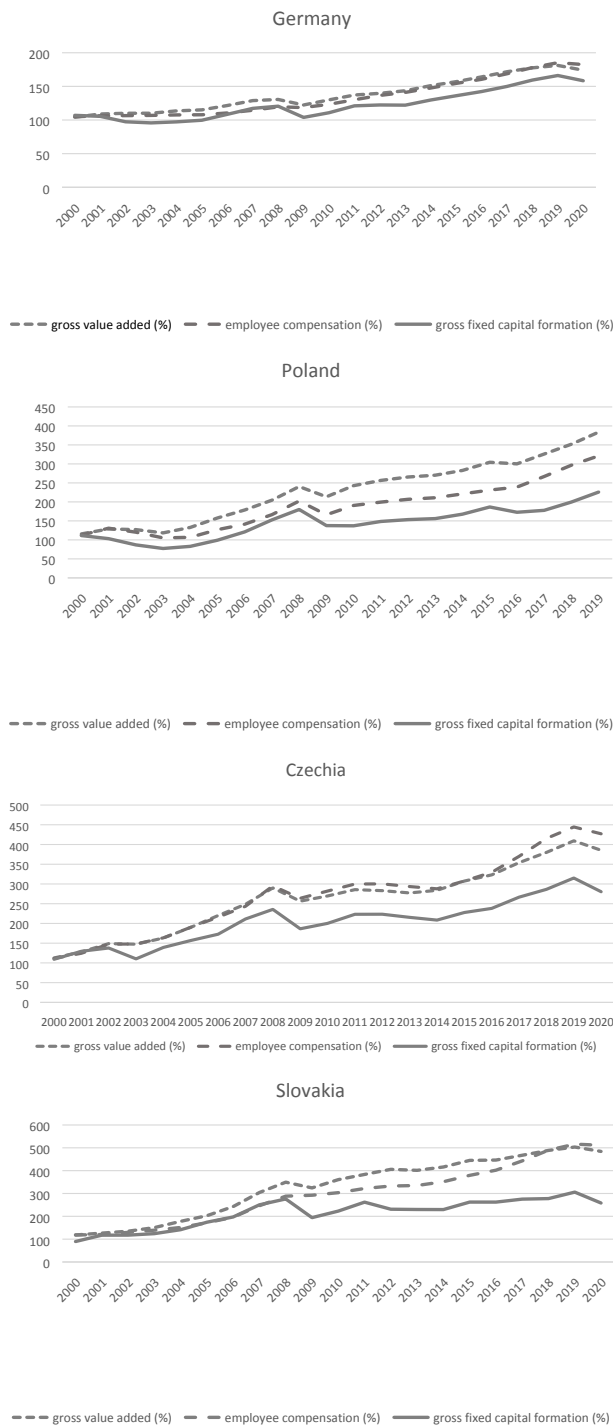
## 2.2. Corporate Investment and Crisis

The focus on corporate investment is justified, as corporate investments play an important role in economic wealth building. Corporate investments directly affect the gross domestic product of each country and diminish the unemployment rate. That is why there are many instruments included in macroeconomic policies (especially monetary policy) that are supposed to affect corporate investments.

The statistical data from Eurostat reveals that in the past two decades, corporate investment has declined more strongly in times of crisis and increased more weakly during the growth phase. Figures 1–4 present the changes in gross value added, gross fixed capital formation (GFCF), and employee compensation in Germany, Poland, Czechia, and Slovakia in the period of 2000–2020.

Research has indicated changes in corporate investment in fixed assets (called also fixed assets formation, capital expenditure or property, plant, and equipment investment) during and after the GFC. The GFC of 2007–2009 led to an unprecedented drop in aggregate investment in the euro area in 2009; and GFCF declined by 13% in real terms between 2008 and 2009 (Rodríguez-Palenzuela et al., 2013). In the group comprising Greece, Ireland, Italy, Portugal, and Spain, the investment downturn has been unusually deep and long (Bending et al., 2014). Hall (2010) finds that after the GFC, in the United States, components of its GDP reacted in different ways. Among others, net exports and government purchases increased in reaction to fiscal impulses, while consumption declined, but not as sharply. The GDP components that deeply declined were investments by households (car purchases, furniture, among others) and enterprises (plant, equipment), as well as residential investments—all of them financed mostly by debt. Moreover, during the GFC, corporate investment declined much more rapidly than output and has subsequently recovered relatively slowly (Lewis et al., 2014).

Vanlaer et al. (2021) noted that private investment in the EU dropped significantly when the GFC erupted, and has failed to recover to pre-GFC levels ever since. Between 2007 and 2013, real GDP dropped by 0.12% in the EU, 1.51% in the euro area, and 9.40% for Portugal, Ireland, Italy, Greece, and Spain (the so called PIIGS countries). Similarly, private GFCF, expressed in constant prices, decreased by 13.73% in the EU, 15.58% in the euro area, and 21.62% in the PIIGS countries. For OECD countries, an investment



**Figure 1- 4.** The gross value added, employee compensation and gross fixed formation annual growth rates over the 2000–2020 for Germany, Poland, Czechia and Slovakia (1999=100)  
Source: Eurostat database (<https://ec.europa.eu/eurostat/data/database>)

gap was also identified (Lewis et al., 2014). Overall, researchers found that the GFC led to a downturn in fixed investment among advanced economies—a gap of two percentage points of GDP or more. This downturn has been unusually severe, widespread, and

long-lasting relative to comparable episodes in the past.

Taking the above findings into account, we formulate hypothesis H1 on corporate investment by including the different nature of the GFC and COVID-19 crises:

**H1: Corporate investment level in COVID-19 crisis is lower than in the GFC.**

In Poland, during the GFC of 2007–2009, the growth rate of real GDP was positive (but the growth was much slower than in previous years). In 2009, investments (GFCF) in enterprises declined (by 1.5% in each quarter), but in the whole economy, decrease of investment was limited by very strong public sector investments (Polish National Central Bank, 2010).

The COVID-19 crisis also had a great impact on the GDP level and its elements (including corporate investment). But the channels of the impact are varied. The shutdown sectors of economy have been affected by the decrease in mobility (people and goods) and a decrease in the activities of enterprises. The impact of COVID-19 crisis is connected with shocks on the demand and on the supply side of the economy. Household consumption has been limited and enterprise investments have been reduced. Furthermore, the course of the pandemic and the subsequent waves have increased uncertainty. Although it is too early to describe the full picture of the economy after the crisis, some research has been already published. König and Winkler (2021) found that GDP has decreased in European countries by an average of  $-0.57\%$  in Q1 of 2020, by  $-11.01\%$  in Q2 of 2020, and by  $-3.90\%$  in Q3 of 2020. Makridis and Hartley (2020) estimate that GDP decreased 5% each month of economy shutdown. Barrett et al. (2021), Hoang et al. (2022), Jiang et al. (2021), and Tut (2022) suggest that during the current crisis, slower physical capital accumulation could be observed. In contrast, many enterprises have improved their digitalization and have implemented technological innovation that is not necessarily related with investment expenses in tangible assets. At this stage, it is difficult to evaluate the full impact of the COVID-19 crisis on corporate investments. Assessments are so far based on estimates of a short impact.

There is abundant research on corporate investment and the GFC of 2007–2009 and a scarcity of research referring to the relation between corporate investment and the COVID-19 crisis. Knowing that



corporate investment decreases in times of crisis, and knowing the differences between the GFC and COVID-19 crisis, we expect that in the COVID-19 crisis, firms will demonstrate a greater reduction in corporate investment than during the GFC. Hence, we expect to find a lower investment ratio during the COVID-19 crisis than in the GFC of 2007–2009.

### 2.3. Corporate Investment and Debt

There are several factors affecting changes in corporate investment, but the most important is access to external financing, especially debt financing. Indeed, for many companies, debt is an important source of financing, and the role of debt has increased in many countries since the 1970s (Kaplan, 2019). In countries with a bank-based model of finance, banks are the main source of external funds for enterprises. In that type of economy, the role of bank debt is crucial.

Companies might expand faster and invest more by using debt than just by relying on internal funds. Companies using only equity are found to be smaller, with little growth opportunity (Saona et al., 2020). Another advantage of using debt is the presence of a tax shield. This makes the debt cheaper than the equity. An additional advantage is that debt serves as a signal of growth and good financial standing. Debt is also used as a tool for diminishing agency problems (Fama & French, 2002; Saona et al., 2020).

However, the use of debt is justified only for companies with high profitability, as these companies can exercise the positive effects of financial leverage. The operating profitability measured by basic earning power should exceed the cost of debt for a positive impact of financial leverage on the return on equity. In turn, worsening financial standing makes the indebtedness the main reason for increasing financial risk and the probability of bankruptcy. In addition, highly indebted companies are more vulnerable to changes in economic environment. With higher debt, higher debt service comes hand in hand, and any small changes in demand and sales revenues result in lower operating income and difficulties in servicing the debt (Kose et al., 2020). The disadvantages of debt include potential bankruptcy costs and agency conflicts between stockholders and bondholders (Fama & French, 2002; Saona et al., 2020).

Debt also influences corporate investment. One source of impact is interest rates. An increase in debt interest rates brings about a decline in corporate

investment due to discounting of new projects at higher costs of capital (Greenwood, 2003). In turn, the increase in the interest rating of debt and the subsequent rejection of investment projects diminishes the demand for external financing, including debt. Moreover, the increase in interest rates makes the debt more expensive, and companies therefore refrain from acquiring it.

Another source of debt impact on corporate investment is the accessibility of debt. High requirements are imposed on the companies applying for external capital discourage borrowing. Under financial crisis and weak economic performance, credit rationing increases, and consequently, some firms are excluded from the debt market (Korajczyk & Levy, 2003). This phenomenon highlights the pro-cyclical character of bank activities. In the phase of economic growth, the propensity of bank to grant loans increases, but in the phase of recession (or crisis), the bank's aversion to risk increases, and the propensity to grant loans rapidly decreases.

The relation between debt, and, especially, bank dependence and corporate investment is important for European countries. In European countries, the most important sources of corporate debt are bank loans. Most debt comes from banks (a bank-based economy). In contrast, in the U.S., this results from issuing bonds (a market-based economy) (Langfield & Pagano, 2016). According to statistics (theglobaleconomy.com), the bank credit to GDP ratio in Poland, Slovakia, and Czechia increased from 40% in 2000 to more than 60% in 2019, while in Germany and France, this was higher than 100% for the whole period of 2000–2019. At the same time, market capitalization for Slovakia and Czechia was lower than 20% of GDP, for Poland and Germany approximately 50% of GDP, and for France, 80% of GDP (worldbank database).

Existing research on the relation between debt ratio and corporate investment shows that firms with high levels of leverage are more likely to forgo valuable growth opportunities due to the fear of overhanging debt (Myers, 1977). Thus, corporate investment may be limited by high levels of debt. High debt ratios put at risk future profits and as a result, debt overhang discourages corporate investment more severely. Another explanation for this negative relation is connected with agency problems. Usually, managers tend to expand the scale of the firms even at the cost of shareholders (empire building). In order to restrict the overinvestment problem, shareholders control this conflict by limiting the free cash flow so

that managers must issue more debt. Consequently, leverage could be used as an important mechanism to control the overinvestment problem (Vo, 2019). The results of existing research for “normal” times show a negative link between leverage and corporate investment (Aivazian et al., 2005; Borensztein & Ye, 2018; Cevik & Miryugin, 2020; Das & Tulin, 2017; International Finance Corporation, 2016; Kalemli-Özcan et al., 2015; Magud & Sosa, 2015; Phan, 2018; Singh & Faircloth, 2005; Vo, 2019).

Due to the negative impact of debt on companies during crisis, the negative relations between leverage and corporate investment become even stronger. Research into corporate borrowing and corporate investment during crisis, especially the GFC of 2007–2009, indicates that highly leveraged companies have the tendency to decrease corporate investment to a greater extent than do lowly leveraged companies. Duchin et al. (2010) found a decline in investment of 0.333% of assets per quarter for external finance-dependent companies during the GFC. Gebauer et al. (2018) noted a significantly negative leverage-investment link both for high- and low-debt companies. However, they saw that in “normal” times there is a threshold level of leverage below which there is no negative relation between leverage and corporate investment. In contrast, Kalemli-Özcan et al. (2018) revealed that a one standard deviation increase in firm leverage reduces investment by 20%. Here, the corporate leverage channel can explain 40% of the cumulative decline in aggregate investment. Blickle and Santos (2020) demonstrate that firms with debt overhang experience an asset growth 2% lower during ordinary times and up to 3% lower during a crisis than do comparable firms without debt overhang. This means that a financial crisis makes the negative relationship between leverage and investment more pronounced. However, Kahle and Stulz (2013) find that firms that are unleveraged before a crisis decrease capital expenditures during a crisis more than do highly leveraged firms.

The research also reveals that bank-dependent companies decrease capital expenditure to a greater extent (e.g., Borensztein & Ye, 2018). This is especially true for euro area countries (e.g., Buca & Vermeulen, 2017; Cingano et al., 2016; Crnigoj & Verbic, 2014; Farinha et al. 2019; Gebauer et al., 2018), for U.S.-based companies (e.g., Chava & Purnanandam, 2011), for Latin America (Juca & Fishlow, 2021) and Japan (Iwaki, 2019; Uchino, 2013). Cingano et al. (2016) find that a 10 percentage point fall in credit growth

triggers, on average, a 2.6 percentage point fall in the investment rate. Their research suggests also that investment expenditure at an average firm would have increased by 25–35 cents per additional euro of available credit during the GFC of 2007–2009.

Vithessonthi et al. (2017) point out that the supply of bank loans plays a more pivotal role in determining a firm’s investment planning than does the lending rate. However, Kahle and Stulz (2013) note that bank-dependent firms did not decrease capital expenditures more than did matching firms in the first year of the crisis or in the two quarters after Lehman Brothers’ bankruptcy.

On the basis of literature studies and research results published so far, we formulate hypothesis H2 by including the different nature of GFC and COVID-19 crisis:

**H2: Stronger negative relationship between indebtedness and corporate investment exists for COVID-19 crisis than for the GFC.**

During economic turmoil, with the increase in uncertainty, financing decisions are also impacted by slowdowns. There are, therefore, recognizable cycles in financing decisions (Dittmar & Dittmar, 2008; Erel et al., 2012; Korajczyk & Levy, 2003; McLean & Zhao, 2014). This change in volume of capital raised is true for both equity (shares issuing) and debt (bonds issuing and bank loans acquiring) (Butler et al., 2006; Cai et al., 2013; Hale & Santos, 2008; Jung et al., 1996).

There are two approaches used to explain the waves in access to capital in the business cycle: the hypotheses of capital supply and capital demand. Research indicates that the capital supply hypothesis is more useful for explaining corporate investment during the GFC of 2007–2009, while the capital demand hypothesis is more appropriate for bringing about an understanding of the COVID-19 crisis.

The capital demand hypothesis asserts that variation in financing volume is caused by changes in private firms’ aggregate demand for capital. Capital demand is affected by the changes in the business cycle and economic conditions, as general economic conditions vary over time. When conditions are better and the expected growth in the economy is higher, companies tend to have higher demands for their goods, and they have a higher demand for capital, but in slowdowns or crises, a decrease in demand for goods reduces capital expenditures, as some growth

opportunities are no longer profitable (Kahle & Stulz, 2013).

The capital supply hypothesis states that variation in financing volume is caused by the behavior of lenders and investors. Herein, increasing uncertainty makes lenders and investors more cautious. This was especially true for the GFC of 2007–2009. The crisis affected the banks' situation. Banks had in their portfolios different type of assets: securities, credits, equity, and real estate. These are characterized by different types and levels of risk. During turmoil, risk and prices of different types of assets change. A bank's portfolio being wrongly structured affects its ability to adjust credit supply (Bottero et al., 2020; Ivashina & Scharfstein, 2010; Iyer et al., 2014). Lenders therefore restrict access to funds and, in turn, companies reduce investment due to the restricted access to funds (Aldasoro & Unger, 2017; Altavilla et al., 2015; Bending et al., 2014; Corporate indebtedness in the euro area, 2012; De Fiorey & Uhlig, 2015; Demirguc-Kunt et al., 2015; Deutsche Bundesbank, 2018; Ferrando & Mulier, 2015; Lhuissier & Szczerbowicz, 2017; Pattani et al., 2011). Some assessments show that credit frictions in 2008 and 2009 led to a decrease in the GDP by 1.5% (Brzoza-Brzezina & Makarski, 2011). Hall (2010) finds that it was a disruption of financial flow that strongly affected material investments.

Both the capital supply and capital demand hypotheses explain the positive relation between dynamic of corporate investment and bank financing, and so we formulate hypothesis H3:

**H3: Stronger positive relation between these changes in the volume of corporate investment and bank loans exists for the COVID-19 crisis than for the GFC.**

We expect to find pro-cyclical changes, both in the volume of corporate investment and bank loans. Knowing that higher leverage and higher bank dependence leads to a bigger decrease in corporate investment in times of crisis, and knowing the differences between the financial crisis of 2007–2009 and the current COVID-19 crisis, we expect that the drop in corporate investment for more indebted and more bank-dependent companies will be bigger for the COVID-19 crisis than for the GFC of 2007–2009. In the COVID-19 crisis environment, firms with high leverage and higher bank dependence have a greater reduction in corporate investment compared to the GFC of 2007–2009.

### 3. Methodology

In this section, the methodology of our research is presented. To verify hypotheses, we conducted research using quantitative statistical methods. We realized our research procedure in several stages: choosing the model and statistical method, variables selecting, sampling, data collecting, and data verifying.

#### 3.1. Models: Ways of Hypotheses Verification

In our research, we constructed several hypotheses and we used different statistical methods to verify each of them.

Hypothesis 1 assumes that during the COVID-19 crisis, corporate investments were lower than during the GFC. This hypothesis was tested with a statistical test that compares two paired groups. The test allows establishing whether two paired groups are statistically and significantly different from one another. We applied the Wilcoxon test, as it does not require that the distribution of the difference between two sample means must be assumed to be normally distributed. On comparing the level of corporate investment during the GFC and the COVID-19 crisis, and testing this level with the Wilcoxon test, we determined whether these levels differed significantly.

Hypotheses 2 and 3, referring to the relation between corporate investment and bank dependence, were tested by the Pearson correlation coefficient. We calculated the correlation coefficient for the total sample and separately for each period (preGFC, GFC, preCOV, and COV).

Hypotheses 2 and 3, referring to the relation between corporate investment and bank dependence were also tested by means of the generalized method of moments (GMM) for panel data. To estimate parameters, we included in the model dummy variables to indicate the periods of interest in the paper (GFC crisis, COVID-19 crisis, pre-GFC crisis, and pre- COVID-19 period). These dummies were also interacted with bank lending to check the effect of the lending on the investment in these crisis periods. The explanatory variables were lagged.

To do this we employed the following equation:

$$CorpInv_{it} = \beta_0 + \beta_1 CorpInv_{it-1} + \beta_2 IND_{it-1} + \beta_3 YearDummy + \beta_4 IND_{it} * YearDummy + \beta_3 CV_{it-1} + \varepsilon_i$$



CorpInv – dependent variable vector, reflecting proxies for: corporate investment

IND – independent variables vector, reflecting proxies for indebtedness: debt ratio and for bank dependence: bank debt ratio and increase in bank loans

YearDummy – Dummy variable for pre-GFC crisis (preGFC), GFC crisis (GFC), pre-COVID-19 crisis (preCOV), and COVID-19 crisis (COV)

CV – control variables vector, reflecting proxies for size, sales growth, tangibility, profitability, dividend ratio, and cash ratio

$\beta$  – coefficient estimate for the independent variables

$\varepsilon_i$  – random variable.

### 3.2. Variables Definition

To verify hypotheses, certain financial ratios were selected and analysed. All these ratios were treated as variable. The dependent variable is corporate investment. A quite abundant number of papers define corporate investment as CAPEX to Total Assets (e.g., Aivazian et al., 2005; Phan, 2018). CAPEX reflects fixed assets formation, i.e., change in the value of fixed assets (especially property, plant, equipment (PPE)). It is scaled by total assets to show the relative value of this increase. Relative value of corporate investment makes possible comparison across companies and over time.

There are two independent variables. One refers to indebtedness, and the other to bank dependence of the companies. As for indebtedness, the debt ratio (total liabilities to total assets) is employed in all the research that was referred to in this paper (e.g., Gonzalez, 2016).

As for bank dependence, there are several different approaches implemented in existing research. Chava and Purnanandam (2011) assume that a firm without market debt will be classified as a bank-dependent firm, since such firms do not have public debt ratings. These firms may be completely rationed by the debt market due to informational frictions. It is also possible that they may have chosen not to rely on bank debt financing even though they could have accessed the debt market. Kahle and Stulz (2013), therefore, take into account firms with bank relationships. They include all firms that have two or more loan

facilities with the same U.S.-led bank in the five years before the end of the second quarter of 2006. Gonzalez (2016) classifies as bank-dependent those firms with a ratio of bank debt to total assets above the median in the respective country at the end of the 2006. The dummy variable BANKDEBTHIGHPRE takes the value 1 to identify these firms, and takes the value 0 for firms with a bank debt ratio below the median in that country at the end of 2006. Buca and Vermeulen (2017), but also Fernández et al. (2013) and Zubair et al. (2020) use bank debt leverage as the relations of bank liabilities (both long and short term) to total assets. Following the existing research, we implemented the ratio representing the relationship between bank liabilities (both long and short term) to total assets: here, the higher the ratio, the bigger the bank dependence. A high level is connected with higher financial risk and limited opportunities to finance future investments by debt. On the basis of a literature review on the relations between debt ratio and corporate investment, we expect to find a negative relationship between these two variables.

As for bank dependence, we also employed an alternative independent variable—dynamic—reflecting change in bank loans to total assets (to make it comparable with corporate investment as CAPEX reflects change in fixed assets, especially in property, plant, equipment). Dynamic attitude towards bank dependence differs from existing research. Most of the research focuses on static measures of bank dependence (e.g., bank loan ratio). We attempt to expand existing knowledge by including a dynamic measure of corporate investment and dynamic measure of bank dependence. This independent variable included in our research is defined as the relation of change in the bank loans to total assets. We expect to find a positive relationship between this measure of bank dependence and corporate investment both in crisis and normal times (following the research that identified waves in investment and financing).

We also employed several control variables. These variables refer to size, sales growth, tangibility, profitability, dividend ratio, and cash ratio.

The size variable is used quite often in research on corporate investment, for example, that by Adelegan and Ariyo (2008), Jangili and Kumar (2010), Ruiz-Porras and Lopez-Mateo (2011) and Phan and Nguyen (2020). Existing research shows that size might have negative relations (e.g., Borensztein & Ye, 2018; Cevik & Miryugin, 2020; Kalemli-Özcan et al., 2018) or positive, but that which is not statistically significant.

We assume that in normal times, the relations might be positive, and negative during economic crisis. In normal times, the bigger company, the bigger the corporate investment that is needed to develop the business. In economic crisis times, bigger companies have greater capabilities to weather the storm and greater access to resources to maintain higher levels of investment. However, it is also possible that bigger companies might note larger drops in corporate investment during crisis. We expect to find both positive and negative effects in this variable. Following existing research, size is calculated as a natural logarithm of total assets.

Sales growth is another control variable. Existing research find a positive link between sales growth and investment rate (Bokpin & Onumah (2009); Carpenter & Guariglia (2008); Erickson & Whited (2000); Gomes (2001); Nair (2011); Phan & Nguyen (2020); Ruiz-Porras & Lopez-Mateo (2011); and Saquido (2003). The sales growth ratio is treated a measure of growth opportunity. The growth of sales is connected with growth of assets (tangible and non-tangible) and growth of capital requirements. Investment (e.g., new machinery) leads to an increase in sales revenues, but increase in sales revenues makes the activity attractive and induces new investment. We assume we would find positive feedback between sales growth and corporate investment. Following existing research, we define sales growth as the relationship between increase in sales revenue and sales revenue.

Tangibility is also important factor affecting corporate investment (e.g., Firth et al., 2012; Kalemli-Özcan et al., 2018). Researchers have found positive interaction between tangibility and corporate investment: the higher the tangibility, the more fixed assets the company has, and bigger corporate investments are needed to maintain the existing machinery pool. We assume we would find positive connections between tangibility and corporate investment. Following existing studies, we define tangibility as the relationship of fixed assets to total assets.

Profitability is quite often used in previous research (Cevik & Miryugin, 2020; Cingano et al., 2016; Gebauer et al., 2018; Singh & Faircloth, 2005; Vithessonthi et al., 2017;). All these studies demonstrate a positive relationship between profitability and corporate investment. Herein, high levels of profitability enhance development opportunities, sales growth, and growth of capital requirements. We expect to find a positive impact of profitability on

corporate investment. Following existing research, we include in our research ROA calculated as the interaction between net profit and total assets.

Dividends are also an important factor affecting corporate investment decisions. This is because they are an alternative way of operating cash flow distribution. Recent studies provide evidence that shows the negative impact of dividends on investments, leading to corporate underinvestment problems (Brav et al., 2005). Brav et al. (2005) document that financial managers are reluctant to cut dividends. Indeed, the surveyed managers stated that they might even forgo positive net present value investments for the sake of maintaining their dividend payouts to avoid declines in stock prices. Harakeh (2020) and Abor and Bokpin (2010) also show a negative association between dividends and investments. This is because cash flows might be distributed for corporate investment or, alternatively, for dividend payment. We assume we would find a negative relationship between dividend payment and corporate investment. Following existing research, we calculate the dividend ratio as the interplay between dividend payment and total assets.

Cash ratio is included in our research as another control variable. Cash holdings are a company's opportunity to finance investments. This indicates a positive relationship between cash holdings and corporate investment. However, Opler et al. (1999) find that firms can reduce investment activities to gain more funds when facing a shortage of capital. This finding is supported in research on the Asian financial crisis of the late 1990s (Song & Lee, 2012), and also in that of the more recent GFC of 2007–2009 (Duchin et al., 2010; Kahle & Stulz, 2013; Shiao et al., 2018). We assume we would find both positive and negative interaction with corporate investment. Following existing research, we calculate the cash ratio as the relationship of cash holdings to total assets.

Table 1 presents the definition of the variables included in the research.

### 3.3. Sampling and Data Sources

The next step of our research was to choose the sample of enterprises to analyse. As many other authors have conducted research on listed enterprises (e.g., in the U.S.) (Cleary et al., 2007) or in the UK (Guariglia, 2008) or China (Firth et al., 2012), we decided to undertake comparative research on Polish enterprises

**Table 1.** Definition of the Variables Included in the Research

| Variables                    |                           | Formula   | Expected sign |
|------------------------------|---------------------------|---|---------------|
| <b>Dependent Variable</b>    |                           |   |               |
| Corporate investment         | Investment ratio          | CAPEX to total assets (%)   | NA            |
| <b>Independent Variables</b> |                           |   |               |
| Company indebtedness         | Debt ratio                | Total liabilities (both long and short-term) to total assets (%)                | -             |
| Bank dependence              | Bank debt ratio           | Bank total liabilities (both long and short-term) to total assets (%)           | -             |
| Bank dependence              | Change in bank debt ratio | Change in bank total liabilities (both long and short-term) to total assets (%) | +             |
| <b>Control Variables</b>     |                           |   |               |
| Size                         |                           | Natural logarithm of total assets   | -/+           |
| Sales growth                 |                           | Sales revenue change to sales revenue (%)                                       | +             |
| Tangibility                  |                           | Fixed assets to total assets (%)  | +             |
| Profitability                |                           | Net profit to total assets (%)  | +             |
| Dividend ratio               |                           | Dividend payment to total assets (%)  | -             |
| Cash ratio                   |                           | Cash holdings to total assets (%)   | -/+           |

**Table 2.** Classes of Periods

| Class | Years     | Characteristic                        | Name   |
|-------|-----------|---------------------------------------|--------|
| 1     | 2007–2008 | Period before global financial crisis | PreGFC |
| 2     | 2009      | Global financial crisis period        | GFC    |
| 3     | 2018–2019 | Period before COVID-19 crisis         | PreCOV |
| 4     | 2020      | COVID-19 crisis period                | COV    |

that are listed on the Warsaw Stock Exchange (WSE). The main reasons for this selection are that:

- they are representative of the whole economic character of activity of Polish-based enterprises;
- financial data are available: each enterprise has an obligation to publish financial statements on their website;
- financial data are reliable: published financial statements are audited.

We collected data in June and July of 2021. At this time, 427 companies were listed on the WSE. Of these, we chose to analyse only non-financial companies. Financial companies such as banks, financial services, insurance, and investments funds are not typical enterprises. The specificity of their activity and the structure of their balance sheets differ from those of regular enterprises, as they hold a relatively small level

of tangible assets and equity. What is more, the reaction of financial companies to crisis is different from non-financial companies. In total, the sample of non-financial companies consisted of 383 enterprises listed at the end of June 2021. To verify our hypotheses, we used financial data from four periods of time. Table 2 presents the definition of the four periods included in our research.

As most current research takes 2008 as the start year of the GFC, we decided to consider both 2007 and 2008 as periods before the GFC. This is because in Poland, the presence and impact of the GFC of 2007–2009 was delayed (Drozdowicz-Bieć, 2010; Pawelec, 2016). In our analysis, we created a balanced panel data sample, which means that we chose non-financial companies listed in all the aforementioned periods. As a result, we ultimately obtained a sample of 232 companies. Data were collected from the Notoria DataBase. The data for each company were

taken from their released financial statements: balance sheet, income, and cash flow statements. In total, we gathered 1,392 firm-year observations—six years of analysis and 232 companies.

## 4. Findings

### 4.1. Descriptive Statistics

Table 3 presents the descriptive statistics of the variables (dependent, independent, and control). Additionally, we display the results of the Wilcoxon test, which allowed us to determine whether the differences in the value of the variables were statistically significant. We compared the value of variables for each class of period, but we decided to exclude outliers for each ratio. We, therefore, adopted the standard procedure to exclude the highest 5% and the lowest 5% of the values of observation. These results were applied to verify hypothesis H1 (assuming that in the COVID-19 crisis, firms had lower levels of corporate investment than during the GFC).

The data presented in Table 3 show that the investment ratio was the highest in the first class of periods (before the GFC)—more than 7%. Later on, the investment ratio declined both in the second class period (during the GFC) – to the level of a little bit higher than 4%, and in third class period (before COVID-19 crisis) – to the value of 3.5%. The lowest level of Investment Ratio was during the fourth class period (during the COVID-19 crisis) – a little higher than 3.0%. The differences between Investment Ratio in each period were statistically significant, as the value of Wilcoxon test revealed a p-value lower than 0.05. This outcome is strong evidence supporting hypothesis H1: the Investment Ratio during the COVID-19 crisis was lower than during the GFC. What, however, is really interesting, is that the level of Investment Ratio before the GFC was more than twice higher than before the COVID-19 crisis. Hence, the decline in Investment Ratio was bigger for the GFC (drop from 7.3% to 4.3%) than for the COVID-19 crisis (drop from 3.5% to 3.1%).

The low level of corporate investment in 2018 and 2019 (before the COVID-19 crisis) might have been triggered by deteriorating economic activity. In 2019, signs from the global economy pointed to a stabilisation of activity growth at a relatively low level. Indicators of business confidence were slowly rising, although

they remained below their historical averages (Polish National Central Bank, 2020). Gutiérrez and Philippon (2017), however, think that the low rate of investment was not affected by the situation of the market after the financial crisis; they think that it was affected by reluctance to invest, by rising intangible assets, and by changes in the governance of corporations. They concluded that globalization and long-term trends in the modern economy had a greater impact on investments than did other factors. Kotz (2011) believes that the decline in investment in this time period is not a consequence of financial friction, but results from the overinvestment in previous periods that finally must lead to a decline in profit rate and investment rate. Weak corporate investment might be also the effect of secular stagnation. As argued by Jones and Philippon (2016), low levels of corporate investment (in spite of low interest rates) and lack of willingness of enterprises to invest is connected with decreasing competition on goods markets.

Our research indicates that the debt ratio fluctuated in the analysed periods, with the highest mean level before the COVID-19 crisis (the third class of the period) and during the COVID-19 crisis (the fourth class of the period), with an average value of 47%, and the lowest during the GFC (the second class of the period), with a value of 40%. The debt ratio before and during the COVID-19 crisis (the third and fourth classes of the period) shows similar levels, while the debt ratio before the GFC (the first class of the period) was higher than during the GFC and demonstrates statistical significance (the second class of the period). This means that the GFC led to a decline in debt ratio, while the COVID-19 crisis did not affect the debt ratio.

When comparing the debt ratio with the bank debt ratio, the bank debt ratio for the analysed companies is quite low. The average level of bank dependence is approximately 11%. This means that only 11% of total assets are financed by way of bank loans (both long and short-term). The quite big difference between the debt ratio and the bank debt ratio means that Polish companies rely on trade credit to a large extent—more than 30% of total assets are financed by trade credit.

The highest level of the bank debt ratio is noticeable before the COVID-19 crisis and the lowest for the GFC period. Statistically significant differences are present when comparing the bank debt ratio before the GFC (lower ratio) with the period before the COVID-19 crisis (higher ratio), and when comparing the bank debt ratio before the COVID-19 crisis (higher ratio)



**Table 3.** Descriptive Statistics for Dependent, Independent, and Control Variables With Wilcoxon Test Results

| Classes of periods                    | 1<br>preGFC | 2<br>GFC | 3<br>PreCOV | 4<br>COV | Wilcoxon<br>test results<br>1 v. 2 | Wilcoxon test<br>results<br>1 v. 3 | Wilcoxon test<br>results<br>3 v. 4 | Wilcoxon test<br>results<br>2 v. 4 |
|---------------------------------------|-------------|----------|-------------|----------|------------------------------------|------------------------------------|------------------------------------|------------------------------------|
| <b>Dependent Variables</b>            |             |          |             |          |                                    |                                    |                                    |                                    |
| <b>Investment ratio</b>               |             |          |             |          |                                    |                                    |                                    |                                    |
| Mean                                  | 7.3         | 4.3      | 3.5         | 3.1      | -7.887***                          | -9.293***                          | -3.582***                          | -4.277***                          |
| Median                                | 6.8         | 3.3      | 2.7         | 2.0      |                                    |                                    |                                    |                                    |
| Min                                   | 0.1         | 0.0      | 0.0         | 0.0      |                                    |                                    |                                    |                                    |
| Max                                   | 24.5        | 17.4     | 10.8        | 11.9     |                                    |                                    |                                    |                                    |
| Sd                                    | 4.9         | 3.8      | 2.8         | 2.9      |                                    |                                    |                                    |                                    |
| <b>Independent Variables</b>          |             |          |             |          |                                    |                                    |                                    |                                    |
| <b>Debt ratio</b>                     |             |          |             |          |                                    |                                    |                                    |                                    |
| Mean                                  | 44.3        | 40.7     | 47.1        | 47.0     | -2.996**                           | -2.303*                            | -0.609                             | -3.410**                           |
| Median                                | 46.5        | 40.0     | 46.3        | 45.8     |                                    |                                    |                                    |                                    |
| Min                                   | 3.5         | 1.4      | 2.8         | 0.5      |                                    |                                    |                                    |                                    |
| Max                                   | 82.1        | 86.2     | 96.0        | 97.3     |                                    |                                    |                                    |                                    |
| Sd                                    | 16.7        | 17.5     | 18.4        | 19.5     |                                    |                                    |                                    |                                    |
| <b>Bank debt ratio</b>                |             |          |             |          |                                    |                                    |                                    |                                    |
| Mean                                  | 11.1        | 10.5     | 12.3        | 11.2     | -0.196                             | -2.309*                            | -2.868**                           | -0.591                             |
| Median                                | 6.2         | 5.3      | 10.6        | 7.7      |                                    |                                    |                                    |                                    |
| Min                                   | 0.0         | 0.0      | 0.0         | 0.0      |                                    |                                    |                                    |                                    |
| Max                                   | 42.5        | 40.17    | 37.6        | 50.0     |                                    |                                    |                                    |                                    |
| Sd                                    | 12.1        | 11.9     | 10.6        | 11.4     |                                    |                                    |                                    |                                    |
| <b>Change in bank debt ratio</b>      |             |          |             |          |                                    |                                    |                                    |                                    |
| Mean                                  | 7.6         | 4.1      | 2.7         | 2.8      | -4.289***                          | -4.501***                          | -0.744                             | -0.785                             |
| Median                                | 0.4         | 0.0      | 0.0         | 0.0      |                                    |                                    |                                    |                                    |
| Min                                   | 0.0         | 0.0      | 0.0         | 0.0      |                                    |                                    |                                    |                                    |
| Max                                   | 97.3        | 97.3     | 60.3        | 134.4    |                                    |                                    |                                    |                                    |
| Sd                                    | 14.1        | 11.1     | 6.9         | 9.9      |                                    |                                    |                                    |                                    |
| <b>Control Variables</b>              |             |          |             |          |                                    |                                    |                                    |                                    |
| <b>Profitability</b>                  |             |          |             |          |                                    |                                    |                                    |                                    |
| Mean                                  | 6.1         | 1.7      | 1.3         | -7.9     | -5.083***                          | -0.959                             | -5.797***                          | -0.016                             |
| Median                                | 5.9         | 3.5      | 3.0         | 3.3      |                                    |                                    |                                    |                                    |
| <b>Sales growth</b>                   |             |          |             |          |                                    |                                    |                                    |                                    |
| Mean                                  | 29.5        | 4.1      | 10.1        | 1.5      | -7.399***                          | -5.940***                          | -2.714**                           | -0.533                             |
| Median                                | 14.6        | -2.4     | 2.9         | -1.0     |                                    |                                    |                                    |                                    |
| <b>Tangibility</b>                    |             |          |             |          |                                    |                                    |                                    |                                    |
| Mean                                  | 44.6        | 48.0     | 51.9        | 51.8     | -5.143***                          | -5.481***                          | -1.310                             | -1.821*                            |
| Median                                | 44.0        | 50.3     | 50.8        | 50.8     |                                    |                                    |                                    |                                    |
| <b>Cash ratio</b>                     |             |          |             |          |                                    |                                    |                                    |                                    |
| Mean                                  | 10.7        | 9.8      | 7.7         | 9.7      | -1.731*                            | -0.040                             | -4.240***                          | -5.084***                          |
| Median                                | 7.5         | 6.8      | 5.2         | 6.1      |                                    |                                    |                                    |                                    |
| <b>Dividend ratio</b>                 |             |          |             |          |                                    |                                    |                                    |                                    |
| Mean                                  | 1.9         | 1.7      | 1.7         | 1.2      | -0.501                             | -0.945                             | -1.402                             | -5.144***                          |
| Median                                | 0.1         | 0.0      | 0.3         | 0.0      |                                    |                                    |                                    |                                    |
| <b>Total assets (Millions of PLN)</b> |             |          |             |          |                                    |                                    |                                    |                                    |
| Mean                                  | 3,200       | 3,800    | 5,604       | 5,818    | -5.665***                          | -3.539***                          | -5.454***                          | -8.461***                          |

Source: Author's own calculations.

\*p&lt;0.1; \*\*p&lt;0.01; \*\*\*p&lt;0.001.

**Table 4.** Correlation Coefficients With Investment Ratio

|                           | Whole Period    | PreGFC          | GFC             | PreCOV          | COV    |
|---------------------------|-----------------|-----------------|-----------------|-----------------|--------|
| Debt ratio                | <b>-0.070**</b> | <b>-0.127**</b> | 0.041           | <b>-0.127**</b> | -0.088 |
| Bank debt ratio           | <b>-0.051*</b>  | <b>-0.070*</b>  | 0.051           | -0.031          | -0.058 |
| Change in Bank Debt Ratio | <b>0.091**</b>  | 0.022           | <b>0.204 **</b> | <b>-0.120*</b>  | -0.001 |
| N                         | 928             | 232             | 232             | 232             | 232    |

Source: Author's own calculations.

\* $p < 0.1$ ; \*\* $p < 0.01$ ; \*\*\* $p < 0.001$ .

with the COVID-19 crisis period (lower ratio). We find no statistically significant differences between the bank debt ratio before and during the GFC and during the GFC and during the COVID-19 crisis. This means that the GFC did not affect the bank debt ratio, while the COVID-19 crisis led to a decrease in the bank debt ratio.

We find that the change in bank loans was the highest before the GFC and lowest before and during the COVID-19 crisis. Even during the GFC, the change in bank loans was higher than before and during the COVID-19 crisis. It is worth noting that during the GFC and later, half of companies did not get extra bank loans, as the median is 0.0.

The changes in control variables show similar patterns. The highest level is present for all ratios before the GFC and with a strong drop during the GFC. This low level from the GFC period is present for the years before the COVID-19 crisis, and then a further decrease is noticeable—to the lowest levels—during the COVID-19 crisis.

We discerned a decrease in profitability both for the GFC and COVID-19 crises. What is interesting is that profitability before the COVID-19 crisis is lower than before the GFC. Sales growth demonstrates a similar pattern. As for tangibility, we saw a systematic change in fixed assets share. However, this might be the result of investment in other companies (mergers and acquisitions). To our surprise, we did not find an increase in cash ratio during both crises: cash ratio during the GFC was lower than before the GFC, but cash ratio during the COVID-19 crisis was higher than before the COVID-19 crisis, but still lower than before the GFC. The dividend ratio was kept quite low and at similar level in all classes of periods regardless of the macroeconomic situation (before or during the crises). However, a slight decreasing trend is noticeable, with the lowest level during the COVID-19 crisis.

## 4.2. Correlation Matrix

To verify hypotheses H2 and H3, we implemented a Pearson correlation analysis. Table 4 present the results of the correlation analysis.

We find that the debt ratio and the bank debt ratio are negatively related with corporate investment, while a change in bank debt ratio is positively related with corporate investment. This is in line with previous research and our hypotheses H2 and H3. When including economic conditions in the analysis, we find that the strongest negative relation between the debt ratio and the investment ratio is present before the GFC and before the COVID-19 crisis. This contradicts our hypothesis H2, which assumes a stronger negative relation for the COVID-19 crisis. We find that the strongest negative relation between the bank debt ratio and the investment ratio is present before the GFC. This, again, contradicts our hypothesis H2, which assumes a stronger negative relation for the COVID-19 crisis. We find that the strongest positive relation between the change in bank debt ratio and the investment ratio is present for the GFC period. This, again, contradicts our hypothesis H3, which assumes a stronger positive relation for the COVID-19 crisis.

However, our findings undermine the interest rate channel and might be evidence that traditional monetary policy instruments are not the most effective tools in today's economy. A large empirical literature has provided evidence that aggregate investment and credit are very sensitive to changes in monetary policy. On the theoretical side, bank loans and fixed capital formation and financing play key roles in the transmission mechanisms of monetary policy. According to neoclassical economics, monetary policy affects interest rates, which in turn influences the cost of capital and, consequently, spending on fixed investment. Our findings show that decreases in interest rates are translated into a lower increase

in bank loans and lower corporate investment. This is especially true for the period before the COVID-19 crisis, with a zero-interest rate monetary policy. However, our findings are not the first showing disruption between monetary policy and corporate investment (e.g., Chatelain et al., 2003; Ottonello & Winberry, 2018). The effectiveness of monetary policy thus depends on the ability of monetary authorities to reduce uncertainty via expectations-based monetary tools (de la Horra et al., 2021).

### 4.3. GMM Analysis Results

To verify hypotheses H2 and H3 we also implemented GMM analysis. Table 5 presents the results of the GMM models.

We found that both debt ratio and bank debt ratio are negatively (with statistical significance) related to corporate investment. This is in line with our expectations (H2) and with previous findings (e.g., Aivazian et al., 2005; Singh & Faircloth, 2005). These findings support the agency theory explanation. According to agency theory, corporate debt is used as a mechanism to control the overinvestment problem (Vo, 2019). High debt ratios put at risk future profits and as a result, debt overhang discourages corporate investment more severely.

We also found that change in bank debt ratio is positively (with statistical significance) related with corporate investment. This is in line our expectations (H4) and with previous findings (e.g., Aldasoro & Unger, 2017; Demirguc-Kunt et al., 2015; Kahle & Stulz, 2013). These findings support both capital supply and capital demand hypotheses and prove that bank debt is an important source of financing investment projects.

We found a negative impact of company size on corporate investment. This is in line with our expectations and previous research. This means that the bigger the company, the more mature it is, and that lower corporate investment is needed.

We found that profitability has a positive impact on corporate investment. Positive impact of profitability is in line with our expectations and previous research. High levels of profitability enhance development opportunities.

We also find that cash ratio has a positive impact on corporate investment. This is in line with our

expectations and previous research. Cash holdings are a company's opportunity to finance investments.

In light of the positive impact of profitability and cash ratio on corporate investment, the negative impact of debt and bank debt ratio might be explained otherwise. Higher profits lead to higher cash holdings, which gives companies better creditworthiness and allows them to apply for new bank loans. That is why the companies have a positive change in bank debt ratio (as they gain new bank loans), but this increase is lower than the increase in equity (due to high profits), which leads to a decrease in debt and bank debt ratios. As a result, the increase in corporate investment is faced with an increase in new bank loans but with a decrease in debt and bank debt ratios.

## 5. Conclusions

The aim of this paper was to investigate how using debt affects the changes in corporate investment during normal and crisis times. We took into account two different crises: the GFC of 2007–2009 and the COVID-19 crisis. We assumed that the lowest level of investment was during the COVID-19 crisis (H1). We also assumed that during the COVID-19 crisis, the more indebted/bank-dependent companies would decrease their investments to a greater extent (H2).

We found that, indeed, the lowest level of corporate investment was noticed for the COVID-19 crisis (3.1%). Thus, we confirmed hypothesis H1, but the decline in corporate investment was bigger for the GFC (a drop from 7.3% to 4.3%) than for the COVID-19 crisis (a drop from 3.5% to 3.1%). It is worth noting that the highest level of investment ratio was for the period before the GFC. Additionally, we discovered that before the COVID-19 crisis, corporate investments were lower than during the GFC.

Additionally, we saw a negative and statistically significant relation between investment ratio for the debt and bank debt ratio. This means that the lower debt and bank debt ratio, the higher the corporate investment. This finding supports our H2 hypothesis on the direction of the impact. As for the strength of the impact, contradictory to our assumptions, we find the strongest negative relation for preGFC period.

We found that dynamic bank dependence ratio positively relates with corporate investment. This is in line with our expectations and pro-cyclical waves of

**Table 5.** Results of GMM Analysis With Investment Ratio as Dependent Variable

| Dependent variable            | Investment Ratio           | Investment Ratio          | Investment Ratio           |
|-------------------------------|----------------------------|---------------------------|----------------------------|
| Independent variables         |                            |                           |                            |
| Debt ratio t-1                | <b>-0.377**</b><br>(0.133) | X                         | X                          |
| Bank debt ratio t-1           | X                          | <b>-1.299*</b><br>(0.516) | X                          |
| Change in bank debt ratio t-1 | x                          | X                         | <b>0.884***</b><br>(0.218) |
| Investment ratio t-1          | <b>0.827***</b><br>(0.153) | -0.554<br>(1.896)         | 0.208<br>(0.229)           |
| Size t-1                      | <b>-0.070*</b><br>(0.032)  | 0.217<br>(2.998)          | -0.025<br>(0.027)          |
| Sales growth t-1              | 0.000<br>(0.001)           | 0.000<br>(0.001)          | -0.001<br>(0.001)          |
| Tangibility t-1               | -0.888<br>(0.662)          | 0.052<br>(1.331)          | -0.176<br>(0.239)          |
| Profitability t-1             | <b>0.466**</b><br>(0.187)  | 0.254<br>(0.499)          | 0.137<br>(0.419)           |
| Dividend ratio t-1            | 2.130<br>(1.741)           | 1.176<br>(2.361)          | -1.243<br>(2.139)          |
| Cash ratio t-1                | <b>1.154**</b><br>(0.456)  | -0.835<br>(7.513)         | 0.471<br>(0.526)           |
| PreGFC                        | -0.038<br>(0.035)          | 0.012<br>(0.014)          | <b>-0.072**</b><br>(0.021) |
| GFC                           | <b>0.145**</b><br>(0.058)  | 0.059<br>(0.042)          | <b>0.193***</b><br>(0.033) |
| PreCOV                        | -0.027<br>(0.043)          | <b>-0.047*</b><br>(0.029) | <b>0.237**</b><br>(0.087)  |
| COV                           | 0.009<br>(0.034)           | -0.005<br>(0.025)         | <b>0.205**</b><br>(0.067)  |
| PreGFC*IND                    | <b>-0.035*</b><br>(0.020)  | 0.088<br>(0.071)          | <b>-1.657*</b><br>(0.781)  |
| GFC*IND                       | <b>0.111*</b><br>(0.060)   | <b>0.298 *</b><br>(0.141) | <b>6.600 *</b><br>(3.062)  |
| PreCOV*IND                    | 0.035<br>(0.032)           | -0.100<br>(0.082)         | <b>6.021*</b><br>(2.849)   |
| COV*IND                       | 0.013<br>(0.011)           | 0.039<br>(0.091)          | 2.041<br>(1.290)           |
| No. of companies              | 232                        | 232                       | 232                        |
| No. of periods                | 4                          | 4                         | 4                          |
| Total no. of observations     | 928                        | 928                       | 928                        |

In parentheses: Standard error.

Source: Author's own calculations.

\*p<0.1; \*\*p<0.01; \*\*\*p<0.001.



economic and financing activities. This means that an increase in bank loans is accompanied by an increase in corporate investment and vice versa. The positive relation between a dynamic bank dependence ratio and corporate investment shows that bank loans are an important source of funds for corporate investment. This finding supports our H3 hypothesis on procyclical changes of investment and indebtedness. As for the strength of this relation, contrary to our expectations, we find that the strongest positive relation is present for GFC period.

Our research is not free of limitations. One is the composition of our sample. Our sample created a panel data sample. This means that the same companies are present for both periods: the period of 2007–2009 and the period of 2018–2020. These companies might be bigger and stronger than any other companies and thus not representative for the whole Polish economy.

Our research limitations, however, indicate directions for future research. We found only some of the factors affecting corporate investment. Hence, research should be undertaken to find the other factors affecting corporate investment that are responsible for 80% of the variance for corporate investment. It is therefore worth investigating changes in investment structure (from tangible to intangible) and the behavioural aspects of financial decisions (managerial optimism and attitudes toward increasing uncertainty). Additionally, as investment decisions are made with long-term attitudes, we think that our research should be repeated in the future when the long-term consequences of the COVID-19 crisis are fully observable. This is especially true in 2022, with the prospect of stagnation (low corporate investment and economic growth) and high inflation all over the European countries.

## References

Abor, J., & Bokpin, G. A. (2010). Investment opportunities, corporate finance, and dividend payout policy: Evidence from emerging markets. *Studies in Economics and Finance*, 27(3), 180–194.

Adelegan, O. A., & Ariyo, A. (2008). Capital market imperfections and corporate investment behavior: A switching regression approach using panel data for Nigerian manufacturing firms. *Journal of Money, Investment and Banking*, 2, 16–38.

Aivazian, V. A., Ge, Y., & Qiu, J. (2005). The impact of leverage on firm investment: Canadian evidence. *Journal of Corporate Finance*, 11, 277–291.

Aldasoro, I., & Unger, R. (2017). External financing and economic activity in the euro area: Why are bank loans special? SSRN. <https://ssrn.com/abstract=2941209>

Altavilla, C., Paries, M. D., & Nicoletti, D. (2015). *Loan supply, credit markets and the euro area financial crisis*. (ECB Working Paper Series, No 1861/2015). European Central Bank. <http://hdl.handle.net/10419/154294>

Barrett, P., Das, S., Magistretti, G., Pugacheva, E., & Wingender, P. (2021). *After-effects of the COVID-19 pandemic: Prospects for medium-term economic damage*. (IMF Working Paper, WP/21/203). International Monetary Fund.

Basco, S., & Crespo A. (2014). Productivity and asset prices: An empirical analysis of the dot-com bubble. [https://icmaif.soc.uoc.gr/~icmaif/Year/2014/papers/paper\\_2\\_82.pdf](https://icmaif.soc.uoc.gr/~icmaif/Year/2014/papers/paper_2_82.pdf)

Batten, J. A., Choudhury, T., Kinatader, H., & Wagner, N. F. (2022). Volatility impacts on the European banking sector: GFC and COVID-19. *Annals of Operations Research*, 1–26.

Bekaert, G., Ehrmann, M., Fratzscher, M., & Mehli, A. (2014). The global crisis and equity market contagion. *The Journal of Finance*, 69(6), 2597–2649.

Bending, T., Berndt, M., Brutscher, P., Nelvin, O., Revoltella, D., Slacik, T., & Wolski, M. (2014). *Unlocking lending in Europe*. European Investment Bank. [https://www.eib.org/attachments/efs/economic\\_report\\_unlocking\\_lending\\_in\\_europe\\_en.pdf](https://www.eib.org/attachments/efs/economic_report_unlocking_lending_in_europe_en.pdf)

Bernanke, B. S. (2018). The real effects of disrupted credit: Evidence from the global financial crisis. *Brookings Papers on Economic Activity*, 2018(2), 251–342

Blanchard, O. J., Faruquee, H., Das, M., Forbes, K. J., & Tesar, L. L. (2010). The initial impact of the crisis on emerging market countries [with comments and discussion]. *Brookings Papers on Economic Activity*, 263–323.

Blickle, K., & Santos, J. A. C. (2020). The costs of corporate debt overhang. SSRN. <https://doi.org/10.2139/ssrn.3708502>

Bloom, N. (2009). The impact of uncertainty shocks. *Econometrica*, 77(3), 623–685.

Bokpin, G., & Onumah, J. (2009). An empirical analysis of the determinants of corporate investment

decisions: Evidence from emerging market firms. *International Research Journal of Finance and Economics*, 33, 134–141.

Borensztein, E., & Ye, L. S. (2018). *Corporate debt overhang and investment firm-level evidence*. (World Bank Policy Research Working Paper No. 8553). SSRN. <https://ssrn.com/abstract=3238397>

Borio, C. (2020). The Covid-19 economic crisis: Dangerously unique. *Business Economics*, 55, 181–190. <https://doi.org/10.1057/s11369-020-00184-2>

Bottero, M., Lenzu, S., & Mezzanotti, F. (2020). Sovereign debt exposure and the bank lending channel: Impact on credit supply and the real economy. *Journal of International Economics*, 126, 103328. <https://doi.org/10.1016/J.JINTECO.2020.103328>

Brav, A., Graham, J. R., Harvey, C. R., & Michaely, R. (2005). Payout policy in the 21st century. *Journal of Financial Economics*, 77(3), 483–527. <https://doi.org/10.1016/j.jfineco.2004.07.004>

Brzoza-Brzezina, M., & Makarski, K. (2011). Credit crunch in a small open economy. *Journal of International Money and Finance*, 30(7), 1406–1428.

Buca, A., & Vermeulen, P. (2017). Corporate investment and bank-dependent borrowers during the recent financial crisis. *Journal of Banking and Finance*, 78, 164–180.

Butler, A., Grullon, G., & Weston, J. (2006). Can managers successfully time the maturity structure of their debt issues? *Journal of Finance*, 61(4), 1731–1758.

Cai, K. N., Jiang, X., & Lee, H. W. (2013). Debt IPO waves, investor sentiment, market conditions, and issue quality. *Journal of Financial Research*, 36(4), 435–452. <https://doi.org/10.1111/jfir.12018>

Carpenter, R. E., & Guariglia, A. (2008). Cash flow, investment, and investment opportunities: New tests using UK panel data. *Journal of Banking & Finance*, 32(9), 1894–1906. <https://doi.org/10.1016/j.jbankfin.2007.12.014>

Cevik, S., & Miryugin, F. (2020). *Leverage shocks: Firm-level evidence on debt overhang and investment*. (IMF Working Paper, WP/20/287). SSRN. <https://ssrn.com/abstract=3772493>

Chatelain, J.-B., Generale, A., Hernando, I., von Kalckreuth, U., & Vermeulen, P. (2003). New findings on firm investment and monetary transmission in the euro area. *Oxford Review of Economic Policy*, 19(1), 73–83, <https://doi.org/10.1093/oxrep/19.1.73>

Chava, S., & Purnanandam, A. (2011). The effect of banking crisis on bank-dependent borrowers. *Journal of Financial Economics*, 99(1), 116–135.

Cingano, F., Manaresi, F., & Sette, E. (2016). Does credit crunch investment down? New evidence on the real effects of the bank-lending channel. *The Review of Financial Studies*, 29(10), 2737–2773. <https://doi.org/10.1093/rfs/hhw040>

Claessens, S., & Köse, M. A. (2013). Financial crises: Review and evidence. *Central Bank Review*, 13(3), 1–23.

Claessens, S., & Kose, M. A. (2014). Financial crises: Explanations, types, and implications. In S. Claessens, M. A. Kose, L. Laeven, and F. Valencia (Eds.) *Financial crises: Causes, consequences, and policy responses*, (pp. 3–59). International Monetary Fund.

Cleary, S., Povel, P., & Raith, M. (2007). The U-shaped investment curve: Theory and evidence. *Journal of Financial and Quantitative Analysis*, 42(1), 1–40.

Corporate indebtedness in the euro area (2012). *European Central Bank Monthly Bulletin*. [https://www.ecb.europa.eu/pub/pdf/other/art2\\_mb201202en\\_pp87-103en.pdf](https://www.ecb.europa.eu/pub/pdf/other/art2_mb201202en_pp87-103en.pdf)

Crnigoj, M., & Verbic M. (2014). Financial constraints and corporate investments during the current financial and economic crisis: The credit crunch and investment decisions of Slovenian firms. *Economic Systems*, 38, 502–517.

Das, S., & Tulin, V. (2017). *Financial frictions, underinvestment, and investment composition: Evidence from Indian corporates*. (Working Paper 17/134). International Monetary Fund.

De Fiore, F., & Uhlig, H. (2015). Corporate debt structure and the financial crisis. *Journal of Money, Credit and Banking*, 47(8), 1571–1598.

de la Horra, L. P., Perote, J., & de la Fuente, G. (2021). Monetary policy and corporate investment: A panel-data analysis of transmission mechanisms in contexts of high uncertainty. *International Review of Economics and Finance*, 75, 609–624.

Demirguc-Kunt, A., Martinez-Peria, M. S., & Tressel, T. (2015). The impact of the global financial crisis on firms' capital structure: The role of financial markets and institutions. (Policy Research Working Paper, No. 7522/2015). World Bank. <https://openknowledge.worldbank.org/bitstream/hand->

le/10986/23623The0impact0of00s00capital0structure.pdf;sequence=1

Deutsche Bundesbank. (2018). Developments in corporate financing in the euro area since the financial and economic crisis, *Monthly Report* (January). <https://www.bundesbank.de/resource/blob/707690/3e7ab307f6449252a49c8a3402b2fb45/mL/2018-01-developments-data.pdf>

Dittmar, A. K., & Dittmar, R. (2008). The timing of financing decisions: An examination of the correlation in financing waves. *Journal of Financial Economics*, 90(1), 59–83.

Drozdowicz-Bieć, M. (2010). Reasons why Poland avoided the 2007-2009 recession. Instytut Rozwoju Gospodarczego (SGH). *Prace i Materiały*, 86(2), 39–66. [https://ssl-kolegia.sgh.waw.pl/pl/KAE/struktura/IRG/publikacje/Documents/pim86\\_2.pdf](https://ssl-kolegia.sgh.waw.pl/pl/KAE/struktura/IRG/publikacje/Documents/pim86_2.pdf)

Duchin, R., Ozbas, O., & Sensoy, B. A. (2010). Costly external finance, corporate investment, and the subprime mortgage credit crisis. *Journal of Financial Economics*, 97(3), 418–435.

Erel, I., Julio, B., Kim, W., & Weisbach, M. (2012). Macroeconomic conditions and capital raising. *The Review of Financial Studies*, 25(2), 341–376.

Erickson, T., & Whited, T. M. (2000). Measurement error and the relationship between investment and  $q$ . *Journal of Political Economy*, 108(5), 1027–1057.

Fama, E. F., & French, K. R. (2002). Testing trade-off and pecking order predictions about dividends and debt. *The Review of Financial Studies*, 15(1), 1–33.

Farinha, L., Spaliara, M. E., & Tsoukas, S. (2019). Bank shocks and firm performance: New evidence from the sovereign debt crisis. *Journal of Financial Intermediation*, 40, 1–11.

Fernández, A. I., González, F., & Suárez, N. (2013). The real effect of banking crises: Finance or asset allocation effects? Some international evidence. *Journal of Banking & Finance*, 37, 2419–2433.

Ferrando, A., & Mulier, K. (2015). *The real effects of credit constraints: Evidence from discouraged borrowers in the euro area*. (ECB Working Paper Series No 1842/2015). SSRN. <http://dx.doi.org/10.2139/ssrn.2650453>

Firth, M., Malatesta, P. H., Xin, Q., & Xu, L. (2012). Corporate investment, government control, and financing channels: Evidence from China's listed companies. *Journal of Corporate Finance*, 18(3), 433–450. <https://doi.org/10.1016/j.jcorpfin.2012.01.004>

Gebauer, S., Setzer, R., & Westphal, A. (2018). Corporate debt and investment: A firm-level analysis for stressed euro area countries. *Journal of International Money and Finance*, 86, 112–130. <https://doi.org/10.1016/j.jimonfin.2018.04.009>

Gomes, J. F. (2001). Financing investment. *American Economic Review*, 91(5), 1263–1285.

Gonzalez, F. (2016). Creditor rights, bank competition, and corporate investment during the global financial crisis. *Journal of Corporate Finance*, 37, 249–270. <https://doi.org/10.1016/j.jcorpfin.2016.01.001>

Greenwood, R. M. (2003). *Evidence for a debt financing channel in corporate investment*. SSRN. <https://doi.org/10.2139/ssrn.406704>

Gregosz, D., Köster, T., Morwinsky, O., & Schebesta, M. (2020). *Coronavirus infects the global economy: The economic impact of an unforeseeable pandemic*. Konrad Adenauer Stiftung. [www.jstor.org/stable/resrep25284](http://www.jstor.org/stable/resrep25284)

Guariglia, A. (2008). Internal financial constraints, external financial constraints, and investment choice: evidence from a panel of UK firms. *Journal of Banking and Finance*, 32, 1795–1809.

Gutiérrez, G., & Philippon, T. (2017). Investment-less growth: An empirical investigation. *Brookings Papers on Economic Activity*, 89–169. [www.jstor.org/stable/90019456](http://www.jstor.org/stable/90019456)

Hale, G., & Santos, J. (2008). The decision to first enter the public bond market: The role of firm reputation, funding choices, & bank relationships. *Journal of Banking and Finance*, 32, 1928–1940.

Hall, R. E. (2010). Why does the economy fall to pieces after a financial crisis? *The Journal of Economic Perspectives*, 24(4), 3–20.

Harakeh, M. (2020). Dividend policy and corporate investment under information shocks. *Journal of International Financial Markets, Institutions and Money*, 65, 101184. <https://doi.org/10.1016/j.intfin.2020.101184>

Hasan, I., Marra, M., To, T. Y., Wu, E., & Zhang, G. (2021). COVID-19 pandemic and global corporate CDS spreads. SSRN. <https://doi.org/10.2139/ssrn.3858059>

Hoang, K., Arif, M., & Nguyen, C. (2022). Corporate investment and government policy during the COVID-19 crisis. *International Review of Economics and Finance*, 80(December), 677–696. <https://doi.org/10.1016/j.iref.2022.03.005>



- International Finance Corporation (2016). *A new look at the determinants of investment in emerging markets*. World Bank.
- Ivashina, V., & Scharfstein, D. (2010). Bank lending during the financial crisis of 2008. *Journal of Financial Economics*, 97(3), 319–338. <https://doi.org/10.1016/j.jfineco.2009.12.001>
- Iwaki, H. (2019). The effect of debt market imperfection on capital structure and investment: Evidence from the 2008 global financial crisis in Japan. *The Quarterly Review of Economics and Finance*, 74, 251–266.
- Iyer, R., Peydró, J-L., da-Rocha-Lopes, S., & Schoar, A. (2014). Interbank liquidity crunch and the firm credit crunch: Evidence from the 2007–2009 crisis. *The Review of Financial Studies*, 27(1), 347–372. <https://doi.org/10.1093/rfs/hht056>
- Jangili, R., & Kumar, S. (2010). *Determinants of private corporate sector investment in India*. Reserve Bank of India Occasional Papers, 31(3), 67–89.
- Jebran, K., & Chen, S. (2022). Corporate policies and outcomes during the COVID-19 crisis: Does managerial ability matter? *Pacific Basin Finance Journal*, 73(November), 101743. <https://doi.org/10.1016/j.pacfin.2022.101743>
- Jiang, J., Hou, J., Wang, C., & Liu, H. Y. (2021). COVID-19 impact on firm investment: Evidence from Chinese publicly listed firms. *Journal of Asian Economics*, 75(February), 101320. <https://doi.org/10.1016/j.asieco.2021.101320>
- Jones, C., & Philippon, T. (2016). *The secular stagnation of investment?* [Unpublished manuscript] New York University. [https://pages.stern.nyu.edu/tphilipp/papers/Q\\_ZLB.pdf](https://pages.stern.nyu.edu/tphilipp/papers/Q_ZLB.pdf)
- Juca, M., & Fishlow, A. (2021). Corporate investment in the global financial crisis. *Journal of Business Economics and Management*, 22(3), 636–655. doi:10.3846/jbem.2021.14548
- Jung, K., Kim, Y-C., & Stulz, R. (1996). Timing, investment opportunities, managerial discretion, and security issue decisions. *Journal of Financial Economics*, 75, 159–185.
- Kahle, K. M., & Stulz, R. M. (2013). Access to capital, investment, and the financial crisis. *Journal of Financial Economics*, 110, 280–299.
- Kalemli-Özcan, S., Laeven, L., & Moreno, D. (2018). Debt overhang, rollover risk and corporate investment: evidence from the European crisis. (No. w24555). National Bureau of Economic Research. <http://www.nber.org/papers/w24555>
- Kaplan, R. S. (2019). *Corporate debt as a potential amplifier in a slowdown*. Federal Reserve Bank of Dallas. <https://www.dallasfed.org/research/economics/2019/0305.aspx>
- König, M., & Winkler, A. (2021). COVID-19: Lockdowns, fatality rates and GDP growth. *Intereconomics*, 56, 32–39. <https://doi.org/10.1007/s10272-021-0948-y>
- Korajczyk, R., & Levy, A. (2003). Capital structure choice: Macroeconomic conditions and financial constraints. *Journal of Financial Economics*, 68, 75–109.
- Kose, M. A., Ohnsorge, F., & Sugawara, N. (2020). *Benefits and costs of debt: The dose makes the poison*. (CEPR Discussion Paper No. DP14439). SSRN.<https://ssrn.com/abstract=3547372>
- Kotz, D. M. (2011). Over investment and the economic crisis of 2008. *World Review of Political Economy*, 2(1), 5–25.
- Langfield, S., & Pagano, M. (2016). Bank bias in Europe: Effects on systemic risk and growth. *Economic Policy*, 31(85), 51–106.
- Lee, S. (2022). Internal capital markets, corporate investment, and the COVID-19 pandemic: Evidence from Korean business groups. *International Review of Financial Analysis*, 80(December), 102053. <https://doi.org/10.1016/j.irfa.2022.102053>
- Lewis, C., Pain, N, Strasky, J., & Menkyna, F. (2014). *Investment gaps after the crisis*, (OECD Economics Department Working Papers, No. 1168). OECD Publishing. <https://doi.org/10.1787/5jxvvgg76vqg1-en>
- Lhuissier, S., & Szczerbowicz, U. (2017). *Corporate debt structure and unconventional monetary policy in the United States*. [https://www.bde.es/f/webbde/INF/MenuHorizontal/SobreElBanco/Conferencias/2017/papers/171010\\_12.00-13.30\\_2\\_SZCZERBOWICZ.pdf](https://www.bde.es/f/webbde/INF/MenuHorizontal/SobreElBanco/Conferencias/2017/papers/171010_12.00-13.30_2_SZCZERBOWICZ.pdf)
- Liu, H., Jiang, J., Xue, R., Meng, X., & Hu, S. (2022). Corporate environmental governance scheme and investment efficiency over the course of COVID-19. *Finance Research Letters*, 47(PB), 102726. <https://doi.org/10.1016/j.frl.2022.102726>
- Magud, N., & Sosa S. (2015). *Investment in emerging markets: We are not in Kansas anymore ... or are we?* (Working Paper 15/77). International Monetary Fund.



- Makridis, C., & Hartley, J. (2020). *The cost of COVID-19: A rough estimate of the 2020 US GDP impact*. SSRN. <https://ssrn.com/abstract=3570731>
- McLean, R., & Zhao, M. (2014). The business cycle, investor sentiment, and costly external finance. *Journal of Finance*, 69(3), 1377–1409.
- Mućk, J., Rubaszek, M., & Szafranek, K. (2021). A note on the heterogeneous economic effects of COVID-19 on GDP via the sectoral structure. *Bank & Credit*, 52(3), 253–265.
- Myers, S. (1977). Determinants of corporate borrowing. *Journal of Financial Economics*, 5, 147–175.
- Nair, P. (2011). Financial liberalization and determinants of investment: A study of Indian manufacturing firms. *International Journal of Management of International Business and Economic Systems*, 5(1), 121–133.
- National Bank of Poland. Monetary Policy Council. *Inflation Report, February 2010*. , [https://www.nbp.pl/en/publikacje/raport\\_inflacja/iraport\\_february2010.pdf](https://www.nbp.pl/en/publikacje/raport_inflacja/iraport_february2010.pdf)
- Nonfinancial sector: Loose financial conditions, rising leverage, and risks to macro-financial stability. (2021). In *Global financial stability report, April 2021: Preempting a legacy of vulnerabilities* (Chapter 2). International Monetary Fund.
- Opler, T., Pinkowitz, L., Stulz, R., & Williamson, R. (1999). The determinants and implications of corporate cash holdings. *Journal of Financial Economics*, 52(1), 3–46. [https://doi.org/10.1016/S0304-405X\(99\)00003-3](https://doi.org/10.1016/S0304-405X(99)00003-3)
- Ottonello, P., & Winberry, T. (2018). Financial heterogeneity and the investment channel of monetary policy. (NBER Working Paper No. 24221). National Bureau of Economic Research. <http://www.nber.org/papers/w24221>
- Pattani, A., Vera, G., & Wackett, J. (2011). Going public: UK companies' use of capital markets. *Bank of England Quarterly Bulletin*, 51(4), 319–330.
- Pawelec, W. (2016). Poland's economy during the global financial crisis. *Research Journal of Economics and Business Studies*, 06(01). [www.theinternationaljournal.org/ojs/index.php?journal=rjeb&page=article&op=view&path%5B%5D=5533&path%5B%5D=pdf](http://www.theinternationaljournal.org/ojs/index.php?journal=rjeb&page=article&op=view&path%5B%5D=5533&path%5B%5D=pdf)
- Phan, D. T., & Nguyen, H. T. (2020). Factors affecting corporate investment decision: Evidence from Vietnamese economic groups. *The Journal of Asian Finance, Economics and Business*, 7(11), 177–184. <https://doi.org/10.13106/JAFEB.2020.VOL7.NO11.177>
- Phan, Q. T. (2018). Corporate debt and investment with financial constraints: Vietnamese listed firms. *Research in International Business and Finance*, 46, 268–280.
- Reed, L. W. (2007). *Great Myths of the Great Depression*. Mackinac Center for Public Policy. L. Ilie, Economic considerations regarding the first oil shock, 1973-1974. (MPRA Paper No. 6431). <https://mpra.ub.uni-muenchen.de/6431/>
- Reinhart, C. M., & Rogoff, K. S. (2008). Is the 2007 U.S. sub-prime financial crisis so different? An international historical comparison. *American Economic Review*, 98(2), 339–344.
- Rodriguez-Palenzuela, D., Darracq Paries, M., Carboni, G., Ferrando, A., Köhler Ulbrich, P., Zachary, M. D. ... Karma, B. (2013). Corporate finance and economic activity in the euro area: Structural issues, 2013. <https://www.ecb.europa.eu/pub/pdf/scpops/ecbocp151.pdf>
- Roubini, N. (2008). The US recession: V or U or W or L-shaped? <https://web.archive.org/web/20090717062330/http://www.rgemonitor.com/blog/roubini/252460>
- Ruiz-Porras, A., & Lopez-Mateo, C. (2011). *Corporate governance, market competition and investment decisions in Mexican manufacturing firms*. <https://mpra.ub.uni-muenchen.de/id/eprint/28452>
- Saona, P., Vallelado, E., & San Martin, P. (2020). Debt, or not debt, that is the question: A Shakespearean question to a corporate decision. *Journal of Business Research*, 115, 378–392. doi:10.1016/j.jbusres.2019.09.061
- Saquido, A. P. (2003). Determinants of corporate investment. *Philippine Management Review, Discussion Paper*, 402, 1–15. [cba.upd.edu.ph/docs/DP/0402\\_saquido.pdf](http://cba.upd.edu.ph/docs/DP/0402_saquido.pdf)
- Shiau, H-L., Chang, Y-H., & Yang, Y-J. (2018). The cash holdings and corporate investment surrounding financial crisis: The cases of China and Taiwan. *The Chinese Economy*, 51(2), 175–207. <https://doi.org/10.1080/10971475.2018.1447833>
- Singh, M., & Faircloth, S. (2005). The impact of corporate debt on long term investment and firm performance. *Applied Economics*, 37(8), 875–883. <https://doi.org/10.1080/00036840500076762>

Song, K., & Lee, Y. (2012). Long-term effects of a financial crisis: Evidence from cash holdings of East Asian firms. *Journal of Financial and Quantitative Analysis*, 47(3), 617–641. <https://doi.org/10.1017/S0022109012000142>

Tut, D. (2022). Investment, Q and epidemic diseases. *Finance Research Letters*, 47(PB), 102943. <https://doi.org/10.1016/j.frl.2022.102943>

Uchino, T. (2013). Bank dependence and financial constraints on investment: Evidence from the corporate bond market paralysis in Japan. *Journal of the Japanese and International Economies*, 29, 74–97.

van der Ven, H., & Sun, Y. (2021). Varieties of crises: Comparing the politics of COVID-19 and climate change. *Global Environmental Politics*, 21(1), 13–22. [https://doi.org/10.1162/glep\\_a\\_00590](https://doi.org/10.1162/glep_a_00590)

Vanlaer, W., Picarelli, M., & Marneffe, W. (2021). Debt and private investment: Does the EU suffer from a debt overhang? *Open Economies Review*, 32(4), 789–820. <https://doi.org/10.1007/s11079-021-09621-x>

Vithessonthi, C., Schwaninger, M., Matthias, O. & Müller, M. O. (2017). Monetary policy, bank lending and corporate investment. *International Review of Financial Analysis*, 50, 129–142.

Vo, X. V. (2019). Leverage and corporate investment – Evidence from Vietnam. *Finance Research Letter*, 28, 1–5.

Wang, Pengfei, & Wen, Yi. (2012). Speculative bubbles and financial crises. *American Economic Journal: Macroeconomics*, 4(3), 184–221. <https://doi.org/10.1257/mac.4.3.184>

Xia, Y., Qiao, Z., & Xie, G. (2022). Corporate resilience to the COVID-19 pandemic: The role of digital finance. *Pacific-Basin Finance Journal*, 74(May), 101791. <https://doi.org/10.1016/j.pacfin.2022.101791>

Zheng, M. (2022). Is cash the panacea of the COVID-19 pandemic: Evidence from corporate performance. *Finance Research Letters*, 45(May), 102151. <https://doi.org/10.1016/j.frl.2021.102151>

Zubair, S., Kabir, R., & Huang, X. (2020). Does the financial crisis change the effect of financing on investment? Evidence from private SMEs. *Journal of Business Research*, 110, 456–463. <https://doi.org/10.1016/j.jbusres.2020.01.063>