Impact of the European Central Bank's Corporate Sector Purchase Programme (CSPP) on corporate capital structures and investments

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ABSTRACT

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Since 2007, European Central Bank (ECB) began to launch various quantitative easing programs alongside normal monetary policy measures, such as changes in interest rates, to enhance the monetary policy and its effects. As inflation targets could not be met by standard- and light non-standard monetary policy measures, the ECB decided in 2015 to launch a so-called Expanded Asset Purchase Programme (APP). This program included Corporate Sector Purchase Programme (CSPP) where the ECB started to purchase directly non-financial company bonds. This program was started because non-financial companies had still limited access to central bank financing despite strong quantitative easing had already taken place in the past.

The aim of this thesis is to understand the impact of CSPP on company capital structure- and investment decisions. In addition, the purpose is to understand company internal factors determining capital structure decisions observed in traditional capital structure theories. The data of the study is for a period of ten years from 2010 to 2020, including 51 companies targeted by Banque de France which is one of the central banks implementing ECBs CSPP strategy.

Results shows that company bond ratios, leverage ratios and investments have all increased over the decade. However, the effect of CSPP on these variables is not statistically significant. Of the internal variables, growth has a statistically significant positive effect on company leverage. The largest increase in all these figures is observed in the last year of the reference period, 2020.

TIIVISTELMÄ

Lappeenrannan–Lahden teknillinen yliopisto LUT

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Kauppatieteet

Ken Nylander

Euroopan keskuspankin yrityssektorin velkapapereiden osto-ohjelman (CSPP) vaikutukset yritysten pääomarakenteisiin ja investointeihin

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Euroopan keskuspankki (EKP) on vuodesta 2007 lähtien käynnistänyt erilaisia määrällisen elvytyksen ohjelmia tavanomaisten rahapoliittisten toimien, kuten korkomuutosten, ohella rahapolitiikan ja sen vaikutusten tehostamiseksi. Koska inflaatiotavoitteita ei ole saavutettu tavanomaisilla ja kevyillä epästandardeilla rahapolitiikan toimenpiteillä, EKP päätti vuonna 2015 käynnistää niin sanotun laajennetun omaisuuserien osto-ohjelman (APP). Ohjelmaan sisältyi yrityssektorin velkapapereiden osto-ohjelma (CSPP), jossa EKP alkoi ostaa suoraan muiden yritysten kuin rahoitusyhtiöiden joukkovelkakirjoja. Tämä ohjelma käynnistettiin, sillä finanssisektorin ulkopuolisten yritysten mahdollisuus saada keskuspankkirahoitusta oli edelleen rajallista, vaikka voimakasta määrällistä elvytystä oli jo aiemmin tehty.

Tämän tutkimuksen tavoitteena on ymmärtää CSPP:n vaikutuksia yritysten pääomarakenne- ja investointipäätöksiin. Lisäksi tavoitteena on ymmärtää perinteisissä pääomarakenneteorioissa havaittuja yrityksen sisäisiä pääomarakennepäätöksiin vaikuttavia tekijöitä. Tutkimuksen aineisto kattaa kymmenen vuoden ajanjakson vuodesta 2010 vuoteen 2020, sisältäen 51 yritystä, jotka ovat yksi EKP:n CSPP-strategiaa toteuttavan keskuspankin Banque de Francen kohteena.

Tulokset osoittavat, että yritysten joukkovelkakirjalainojen suhteet kokonaisvelkaan, velkavipuasteet ja investoinnit ovat kasvaneet vuosikymmenen aikana. CSPP:n vaikutus näihin muuttujiin ei kuitenkaan ole tilastollisesti merkitsevä. Sisäisistä muuttujista kasvulla on tilastollisesti merkitsevä positiivinen vaikutus yrityksen velkavipuasteeseen. Suurin nousu kaikissa näissä muuttujissa on tarkastelujakson viimeisenä vuonna, vuonna 2020.

Contents

Appendices

Figures

Tables

1. Introduction

The first paragraph is an introduction which first thoroughly introduces the background and motivation of the thesis to understand why the thesis has been started on this particular topic. This is followed by a discussion of the research questions and objectives, which deals with the core of the thesis, to which answers are sought and examined at a later stage. Finally, the introduction deals with the limitations and presents the structure of the whole thesis.

1.1 Background and motivation

The aim of this thesis is to understand the impact of monetary policy performed by European Central Bank (ECB) on company actions and behavior. On January 2015, European Central Bank launched a program named Expanded Asset Purchase Programme (APP) as a new monetary policy instrument. The purpose of the program was to impact on economic growth and inflation rates, which had remained low for prolonged time. These asset purchases were introduced as non-standard monetary policy instruments among the other non-standard ones, because the margins and effects for standard monetary policies had been impaired. The APP program was later extended and re-optimized in various situations, increasing the length and total amount of purchases. The program has continued from its beginning in 2015 until this day (Gambetti & Musso 2017) This APP program is a continuation of the long-standing range of traditional and non-traditional monetary policy measures pursued by the ECB for decades. Reflecting history, the monetary policy measures of the last decade have been different in nature and in a different scale than before. The amount of M2 money in the market has grown significantly each year. The amount of M2 money in the market grew especially in 2020, when the growth was more than 20% in both United States and Europe, which was significantly higher than in previous years. The ratio of debt to gross domestic product (GDP) in the world has also risen sharply. Although the money supply has grown each year as result of various monetary policy measures, this has not been significantly reflected in the economy, for example in the form of rising inflation. (Mandelman 2021)

These monetary policy developments have led to the emergence of a new monetary theory called Modern Monetary Theory (MMT). According to MMT, governments can basically become indebted indefinitely with central bank money. Thus, in practice, the central bank finances the governments. (Mitchell & Wray 2016) This is what has been basically done in the APP, when the ECB has financed governments directly and expanded its own balance sheet with government bonds. In 2016, the ECB also began to finance companies directly. This was a new program called Corporate Sector Purchase Programme (CSPP) and is a program under APP, further increasing the amount of bonds in its balance sheet and the money supply in the market.

All these changes in the market have not only caused changes in the economy, but also in the behavior of companies. Companies are part of the economy and form an important whole with the public sector, private consumers, and financiers. It would be therefore natural to think that changes in the economy would affect the way companies obtain finance, operate, and invest. This thesis is also based on these themes. Historically, company financing decisions have been studied more from the perspective of traditional capital structure theories. Capital structure theories take a stand on the effects of various variables, such as taxation, profitability, and growth, on financing decisions. (Myers 2001) However, less attention has been paid to assessing the impact of monetary policy in corporate financing decisions. The effects of government fiscal policy have been extensively analyzed through the traditional capital structure theories, but central banks' monetary policy effects to company financing have not been to the same extent. One reason may be that these strong macroeconomic and monetary policy changes aimed at directly affecting governments and companies are a relatively new phenomenon started in the 2010s.

The purpose of this paper is to research the Extended Asset Purchase Programme (APP) and more precisely the Corporate Sector Purchase Programme (CSPP) and its effects on corporates capital structure decisions and investments after attending to the program. The CSPP has been chosen as a key theme because ECB has focused its purchases on companies and their bonds rather than on governments in this program. It can therefore be assumed that companies and their activities have been directly affected by the CSPP. In addition, the

thesis introduces traditional internal company variables and their impact on capital structure decisions.

1.2 Objectives and research questions

The purpose of this thesis is to examine the effects of the CSPP program in company behavior. In the past years, the quantitative easing provided by ECB has been extremely strong and different from the standard monetary policy instruments that have been used to seeing in the past decades. The CSPP quantitative easing strategy has also only been implemented for the last few years, so this makes it even more interesting to study. The first step in this thesis is to research the capital structure decision making of the European companies targeted by the program. This is covered by the first two research questions. The second step is to research the investments of the targeted companies and is covered by the last third research question. The first research questions of the thesis is:

Do the companies targeted by the CSPP increase their bond ratio?

According to recent studies, companies targeted by the program begin issuing more eligible bonds compared to the companies not yet targeted (Galema & Lugo 2019; Pinto, Kanda & Silva 2021; Arce, Gimeno & Mayordomo 2018). Bond ratio refers to the share of the value of a company's outstanding bonds in total debt. The ratio thus measures how much the company uses market-based debt financing in relation to total debt financing. (Galema et al. 2019) We therefore assume in this thesis that we can find statistical significance in bond ratio. The null hypothesis is that the CSPP doesn’t have a statistically significant effect on the company bond ratio. If the null hypothesis is rejected, the period has a statistically significant effect. The second research question is:

Do the companies targeted by the CSPP increase their leverage ratio?

According to recent study conducted by Rocha & Gonçalves (2019), the leverage ratio hasn't increased statistically significantly in the targeted companies. This may be because the total amount of debt has not increased, but the new market debt has replaced the traditional bank credit. The leverage ratio describes the proportion of debt in total capital. The higher the share of debt in total capital, the more leveraged the company's financing. The null hypothesis is that the CSPP doesn't have a statistically significant effect on the company leverage ratio. For this research question, the effect of internal company variables on leverage is also studied. The third and final research question is:

Have companies targeted by CSPP increased investments?

One of the main goals of the CSPP has been to increase investments in the economy. Investing in this study from a company perspective means a capital expenditure. Capital expenditure refers to the use of a company's capital for investments, such as machinery and equipment or intangible assets. However, the effects of CSPP on investments has been studied less than the effects on capital structures. Only few research was found, which showed that CSPP doesn't increase investments statistically significantly in targeted companies. (Arce & Gimeno 2018) This fact makes the research question even more interesting.

1.3 Thesis structure and limitations

The aim of this thesis is to study the impact of monetary policy pursued by the ECB and traditional internal company variables on the operations of companies. Traditionally, capital structures have been studied through internal variables and through external fiscal policy factors such as taxation. The impact of monetary policy on capital structures has only been studied extensively in recent years as monetary policy has taken greater power on the market. The effects of both internal and external factors in same studies, on the other hand, have been studied very little. This thesis examines both internal and external factors for the second research question, considering both the internal traditional capital structure variables and the external CSPP program in explaining the debt ratio. However, for the first and third research

questions, the bond ratio and the level of investment are explained only by the CSPP program. This thesis features with different perspectives making the thesis suitable and interesting for this time, bringing something new to the world of research that has not been studied much before.

The thesis begins with a literature review. The literature review first deals with monetary policy and the ECB's quantitative easing strategies at a general level. This is followed by previous studies on the effects of CSPP on business operations. Finally, the literature review discusses traditional capital structure theories and previous studies on the effects of traditional variables on capital structures. After the literature review, the third chapter deals with the data used in the study and the data analysis methods. The fourth chapter explains the research results. Following the results, the fifth section draws conclusions from the research findings.

2. Literature review of monetary policy and asset purchase program

The second paragraph thoroughly introduces the theory, on which the research part of the thesis to be made at a later stage is based. The theory section first deals with monetary policy in general, quantitative easing, and the ECB's purchasing programs. This is followed by a discussion of traditional capital structure theories. Both sections also deal with previous researches related to the research questions in the thesis.

2.1 Monetary policy and quantitative easing

Monetary policy is originally based on Monetarism, which is an economic theory emphasizing the importance of money supply and its regulation in the economy. Monetarism became a competing school alongside Keynesian economic theory, emphasizing the importance of total demand and supply in the economy. Governments can influence total demand and supply through their fiscal policies, but monetarism brought monetary policy as a strategy alongside fiscal policy. (De Long 2000)

Monetary policy refers to the economic policy pursued by central bank, in which various goals are pursued by regulating the amount of money in circulation in economy. The main goal of these monetary policies is price stability. It is generally defined as stable inflation, which helps to maintain trust in the monetary system and in the value and stability of the central banks currency. Inflation is defined as a general rise in the prices of goods and services that leads to a depreciation of money, that is, a decline in purchasing power. Price stability is generally defined as a situation in which changes in general price levels don’t need to be considered in consumption and investment decisions. Thus, price increases are moderate and predictable. Too fast inflation and the opposite of inflation, deflation, are poor things for the economy. There are many disadvantages to inflation being too fast. A change in the rate of inflation brings uncertainty to economic decision-making and thus weakens the economic growth. Unstable price developments are also unfair, as they change the value of savings unpredictably and thus damage the position of savers. Uncertainty about inflation

also leads to uncertain interest rate policies. Deflation is seen even as a worse option than rapid inflation. In it, prices and wages generally fall, and the value of money increases. In the context of deflation, debt is more valuable than at the time of borrowing, and therefore deflation has often led to debt crises and an increase in the number of bankruptcies. (Bank of Finland 2021)

Monetary policy instruments are instruments used by central banks to control interest rates or money supply in the economy. Interest rates and inflation tends to move in opposite directions. Raising interest rates reduces inflation and vice versa. This is because at higher interest rates, the cost of borrowing becomes higher, which weakens access to credit and thus the amount of money in the economy and consumption. Higher interest rates also increase savings from consumption, causing the same effect. (Tillmann 2008) In European Union (EU), the ECB makes monetary policy decisions, and the national central banks follow the ECBs guidelines. (Jahan 2014)

In addition to changes in interest rates, another option for central banks to maintain price stability is to directly influence the money supply in the market. This is called quantitative easing (QE) For example, central bank increases the amount of money in the economy for accelerating inflation. It is implemented by buying financial assets, which raises the prices of those assets in the market and thus lowers their yield. This simultaneously increases the money supply in the economy. However, in the past, the marginal benefit of adjusting the interest rate as the sole strategy has been low, so asset purchases have provided an additional stimulus to economic activity and thus increased inflation. An optimal inflation level has often been considered as two percent. The central bank therefore maintains this inflation target. Simply, if inflation rises above target, the central bank tightens monetary policy to reduce spending and through it, inflation. Similarly, if inflation falls below two percent, the bank loosens monetary policy to increase spending and through it, inflation. (Benford & Berry 2009) The APP conducted by ECB is referred as QE and works as money supply monetary policy strategy.

2.2 The background of Extended Assets Purchase Programme (APP)

Since 2007, the economy in the euro area has experienced financially many unstable economic periods which have been different in terms of nature, origin and duration. These unstable and difficult conditions like the financial- and euro crisis have put in place various monetary policy operations lead by ECB. The central bank has lowered interest rates on several occasions through the years and the interest rates have even been reduced to negative to accelerate economic growth and inflation. In the years since 2007, the ECB also accelerated strong quantitative easing to achieve these economic growth goals. (Gambetti & Musso 2017)

After 2007, the ECB began launching various quantitative easing programs alongside normal monetary policy measures, such as changes in interest rates, to enhance the monetary policy and its effects. ECB started with Covered Bond Purchase Programme (CBPP) and Securities Markets Programme (SMP). These programs started in 2010 and were mainly targeted at the banking sector which plays a significant role in the transmission of monetary policy. The aim of these programs was therefore to strengthen the banking sector and the functioning of the financial markets, thereby facilitating access to finance for institutions and companies. (Beirne & Dalitz 2011)

As inflation targets could not be met by standard- and light non-standard monetary policy measures, the ECB decided in 2015 to launch a so-called Expanded Asset Purchase programme (APP). The Governing Council of the ECB decided to start stronger monetary policy actions, because inflation expectations were low despite the Euro Interbank Offered Rate (Euribor) was negative at the time, so interest rate cuts alone were no longer seen as useful enough. The APP started with a new Public Sector Purchase Programme (PSPP) and continued with Asset-Backed Securities Purchase Programme (ABSPP) which had already started in 2014. CBPP continued also. The aim of the PSPP was to allocate purchases directly to bonds issued by governments and other private institutions. Initially in the program, the ECB purchased 60 billion euros worth of bonds on monthly basis, but in March 2016 raised purchases to 80 billion euros. Re-calibration was made several times due to persistently low inflation expectations and ECB started to target also non-financial corporate bonds in

addition to public sectors ones. This new program was named to Corporate Sector Purchase Programme (CSPP). (Gambetti et al. 2017)

In 2020, the ECB began implementing its latest purchase program called Pandemic Emergency Purchase Programme (PEPP). This program was started due to coronavirus (COVID-19) outbreak which made it considerably more difficult for countries and corporates to operate. This program was quicky designed to strengthen every purchase strategy under the APP, so all purchase categories were eligible under the PEPP. The value of the PEPP package was gradually increased from an initial 750 billion euros to a total of 1 850 billion euros in December 2020. (European Central Bank 2020)

2.3 Corporate Sector Purchase Programme (CSPP) and its objectives

ECB started the CSPP in June 2016, where it started to buy directly non-financial company bonds. This program was started because non-financial companies had still limited access to central bank debt despite strong quantitative easing had already taken place in the past. The liquidity provided by the central bank was not transmitted properly to the system. A large proportion of securities purchased by ECB in the early stages of APP were purchased from foreign investors and not from European credit institutions. Thus, the liquidity provided by the ECB was not passed on to companies through bank lending. Also, the APP consisted mainly of government bonds in the beginning of the purchase programs. ECB aimed to buy around 60 million euros of bonds per month until the end of 2017. The six national central banks under ECB started to execute purchases on the primary and secondary markets. In the primary market, ECB ensures that the market keeps functioning properly. In secondary market, in addition to the primary market goal, it considers the scarcity of debt instruments and general market conditions. (Galema et al. 2019)

ECB defines the purpose of CSPP to make it easier for companies to receive credit, create jobs and boost investments and thus general economic growth in Euro area. If these CSPP targets are met, inflation is expected to return to close to the two percent target. (European Central Bank 2018) Simplified, access to affordable finance for businesses is increased through the CSPP program. Because interest rates are low, it’s not remunerative for a

company to increase its cash balance, as the cash produces nothing due to the low interest rates. High interest rates also increase the requirement of return on investment, which makes investments riskier. Lower interest rates therefore reduce investment risk and companies start to invest more in fixed assets. (Sharpe & Suarez 2013) Thus, the amount of money in circulation grows. As the demand for corporate investment targets increases, so do their prices. These prices will eventually flow into consumer prices. This is called cost-push inflation where inflation is rising as result of rising commodity prices. This form of inflation can be thought of as a target of the CSPP. Thus, a favorable supply of money increases the amount of money in the economy, and ultimately also the circulation of money, and increases inflation. (Totonchi 2011) These objectives of the CSPP can be illustrated by the following figure 1, which shows in a diagram the above-mentioned effects on the market.

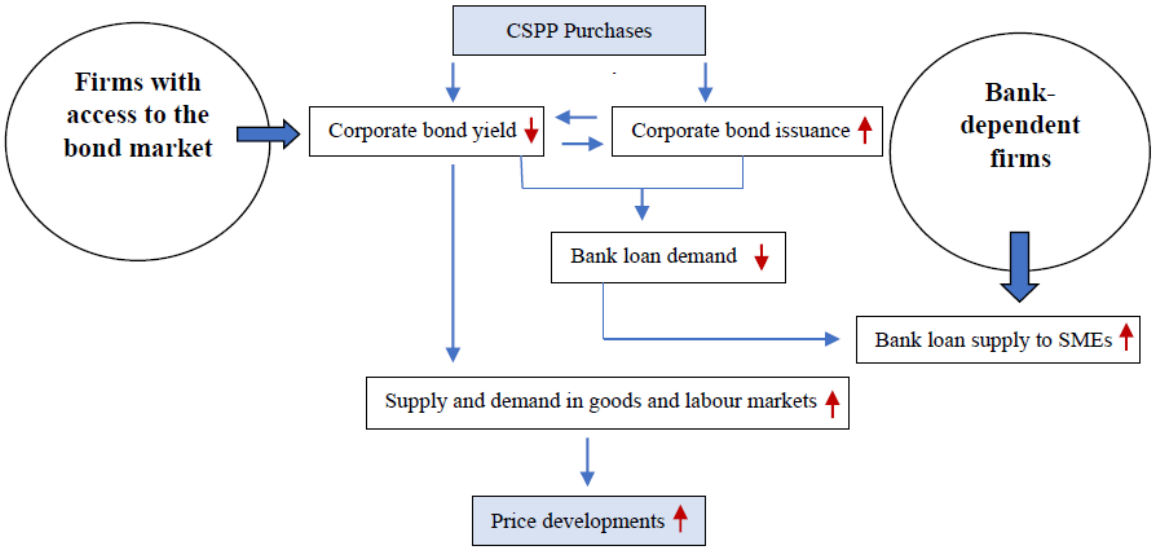

Figure 1. The CSPP at work (Figure adapted by Betz, De Santis & Zaghini 2021)

The thing to look at in the chart is how ordinary small and medium-sized enterprises (SMEs) also benefit from the program. Larger companies with access to the bond market should reduce regular bank lending according to the theory, which leaves more money for banks to lend to smaller companies, making it easier for smaller companies to borrow as well. Finally, therefore, all types of companies benefit, although large direct CSPP purchases are mainly limited to bonds of large companies. (Betz, Santis & Zaghini, 2021)

Another form of inflation, demand-pull inflation through consumers, also has a general effect on inflation. As the value of money declines with inflation, it is not profitable for consumers to keep money in their bank accounts because of low interest rates but prefer to put it into consumption. Through this, the economy grows as the production and demand for goods and services increases. (Totonchi 2011) This is an indirect effect of CSPP that is not in itself related to the effects seen in figure 1.

2.3.1 Research findings on the effects of CSPP

Although it's only about six years since the launch of the ECBs extended APP, several studies have already been carried out on its effects on corporate actions. Galema et al. (2019) researched companies financial decision making after been targeted by ECB asset purchases. They set a research question, asking whether there is any direct impact on financing decisions of targeted companies versus eligible but not targeted companies, or are all companies which have issued eligible bonds to the market equally affected by the program. By eligible companies, they meant companies whose bonds are eligible for purchase as defined by the ECB and its criteria. They stated a hypothesis, that the companies, whose bonds are purchased under CSPP, will get a direct exogenous shock. This shock would affect directly of the purchased bonds, and thus the financing decisions of the company. The eligible, but non-targeted companies would get only an indirect shock, which would be significantly weaker than the direct shock. This would then create a signal to the companies already targeted by the program, that ECB would also buy their new bonds issued in the market. Non- targeted companies wouldn't experience this signal and could not rely on the central bank to buy their new bonds either. Thus, they hypothesized that companies in direct shock would increase the amount of market-based debt more than companies in indirect shock. They found that firms that received a direct shock did indeed increase the amount of market-based debt compared to firms that received an indirect shock. However, no significant differences in leverage ratio were observed between these groups. Thus, the amount of liabilities in relation to equity did not increase in the targeted companies compared to the non-targeted companies.

The same conclusion was reached by Pinto et al. (2021) when examining the financial data of euro area companies from 2000 to 2019. According to them, the CSPP targeting increased the likelihood of companies swapping syndicated corporate loans for market-based bond financing. They also examined the effect of traditional variables on the bond ratio, finding that profitable and growing companies prefer bank loans over bond financing. In addition, they found that bond spreads decreased significantly during the CSPP period. The yield requirement on bonds of riskier companies decreased, thus reducing the financing costs of riskier companies. This is very consistent with the objectives of the CSPP, making it easier for all companies to access finance and its costs.

Rocha et al. (2019) studied the effect of CSPP on the companies' equity to liabilities ratio, so called leverage ratio. At the same time, he analyzes the effect of variables used in traditional capital structure theories, such as tax benefit, growth, and firm size, on capital structure in addition to CSPP. The period for the study was 2009-2018, including variables and data for 129 different euro area companies. However, he didn’t find any statistical significance on the CSPPs effect on leverage ratio.

Arce et al. (2018) studied the effect of the CSPP on Spanish companies. They found out that after CSPP was announced, the companies that could have issued CSPP-eligible bonds had 31 percent increase in the probability of issuing new bonds during the first quarter after the announcement of the CSPP. These companies also reduced their volume of bank credit and modified their liability structure by replacing bank loans with market bonds. They also analyzed the levels of investments, liquidity holdings and dividend distributions of these same companies in the first quarter after the CSPP announcement. However, they didn’t find any significant increase in these three activities in the first quarter of these companies.

2.4 Literature review of traditional capital structure theories

In addition to the monetary policy and asset purchase programs discussed in the first paragraphs of the literature review, the fundamentals of traditional capital structure theories must also be understood, as the effects of the variables the theories contain are also

examined. The remainder of the literature review deals with these traditional capital structure theories.

Company strategy and the use of capital have been studied a lot over the years, and several theories of capital structure have emerged. The capital structure studies try to explain on what basis companies chooses between different financing sources to finance their investments and operations. Most of the studies compares particularly equity and debt financing and how the decision on this financing has been made. One prevailing theory or conclusion has not been formed, but a few parallel competing theories dominate the research of the topic. Over time, history has gained more understanding of, for example, tax strategies for certain sources of financing than the strategy of a larger picture of the capital structure. (Myers 2001). The following introduces the most common theories.

2.4.1 The Modigliani-Miller theorem

The first known capital structure theorem is Modigliani-Miller theorem published in 1958. Prior to this theorem, there was no generally accepted theory of business financing. The simple assumption of the theorem is that the distribution of financing sources between equity and debt doesn't matter, so the optimal capital structure can in principle be anything in between. Companies are primarily interested in the weighted average cost of capital (WACC), as it is the price they must pay on average for their investments and for financing their activities in general. Debt as a source of financing is primarily cheaper, as creditors are at an advantage over equity investors in a company profit-sharing situation. This would lead companies to increase the amount of debt to lower the average cost of capital. However, this results in the cost of equity increasing as the relative decrease in amount of equity so much that the average cost of capital remains the same. Thus, according to the theorem, the company doesn't benefit at all from different capital structure strategies. According to the theory, companies are also interested in increasing the value of the company, and the use of leverage doesn't increase the value of the company relatively more compared to equity financing. (Myers 2001)

The problem with the original Modigliani-Miller model is that it's very naive. For example, it assumes that capital markets are perfect, and taxes and transaction costs are not considered. In the real world, however, there are these different costs, and the tax benefit received by companies would affect both to the value of the company and the cost of capital. If taxes were included in the model, a relative increase in debt would increase the share distributed to equity financiers, as the cost of debt can be deducted in taxation. As the pie grows, so does the value of the company. This is also reflected in the average cost of capital which would also fall to a certain extent in the relative increase in debt. This is because the tax benefit counterbalances part of the increase in the cost of equity. (Myers 2001)

2.4.2 The trade-off theory

The trade-off theory originated very soon after the Modigliani-Miller theorem to fill the gaps left by it and to be able to better explain capital structure decisions in the real world, which is not perfect as the original theory assumes. The problem with the original capital structure theory is that, in an imperfect world of transaction costs and taxes, companies would finance their operations 100 percent with debt. This is because of the tax advantage they derive from it. Because of this, trade-off theory further adds bankruptcy costs to the analysis. As debt increases, so does the likelihood of financial distress. This is because creditors have the precedence, and their obligations must be paid unlike those of equity investors. The amount of debt in the balance sheet thus increases the amounts of mandatory obligations and thus the probability of financial distress. The model takes this financial distress into account and reduces these increasing bankruptcy costs from the company value pie. These bankruptcy costs therefore reduce future returns to shareholders and thus company value. Company seeks to optimize the amount of debt to such an extent that the tax benefit from the debts is in balance with the costs of bankruptcy. If too much debt is taken, the cost of bankruptcy exceeds the tax benefits, and the value of the company turns downward. (Frank & Goyal 2008)

The theory can be further divided into dynamic- and static theory. Static theory the above-mentioned optimization decision-making at a given point in time, while the dynamic model also considers the future. For example, a company may need to consider the relationship

between its investment and profit distribution to maximize the growth of the company value pie. For example, it might not be worth distributing earnings out as dividends now if it is considered likely that a large investment will be made next year. A company may also choose to hold earnings in cash and strengthen equity instead of putting the capital to produce or distributing it to the owners. These are strategic questions that companies need to consider when making decisions. Dynamic thinking thus considers the continuity of business operations and the difficult predictability of operations. (Frank et al. 2008)

2.4.3 The pecking order theory

The pecking order theory is a competing theory to trade-off theory. According to the theory, companies try to make it as far as possible with internal financing. In practice, internal financing means income directly from business operations. When internal financing is not sufficient, the company prefers debt financing over equity. Equity financing is then the last way to finance investment and operations. This finance order, in which debt takes precedence over equity, is based on asymmetric information between company management and investors. The company always wants to act in the best interests of the current owners and according to the theory, asymmetric information leads to an undervaluation of the shares issued. This decline in stock prices occurs because any negative information that investors interpret is weighted more than good information. Thus, if the company were to issue shares, new investors would receive undervalued shares, which would also lower the prices of existing shares. New investors would thus act at the expense of old investors what the company doesn’t want to happen. The company is not looking for a decrease in the value of its company either. When the company announces that it is applying for debt financing, the asymmetric information remains smaller, so that the company's valuation doesn’t decrease as much either. This in turn leads the company to issue shares only when debt is very expensive. For example, debt may be too expensive when the amount of debt becomes too large in the balance sheet. The debt ratio thus reflects the company's need for external debt financing. Thus, the debt ratio is not tax-optimized as trade-off theory suggests but is formed externally through business activity. (Myers 2001)

2.4.4 Factors affecting the capital structure and summary of earlier findings

In the course of history, the effect of many different factors on company capital structures has been studied. These studies may not be directly related to the traditional capital structure theories described earlier, but these theories provide a good basis for these analyzes. This section examines a few variables that, according to past research, have an impact on companies' capital structures. The variables that will be used later in this thesis have been selected for review.

The first variable affecting the capital structure is profitability. According to the traditional static trade-off model, profitability and leverage have a positive correlation. This is because profitable companies have lower costs for asymmetric information and benefit more from the tax benefits of debt financing than unprofitable companies. Dynamic trade-off theory in turn shows different results. Companies passively accumulate income between periods, reducing the need for debt financing in the future, leading to a negative correlation between leverage and profitability. Also, according to pecking order theory, profitable companies are less leveraged. According to the theory, investments and dividend payments are constant over time, so as profitability increases, companies may finance its operations mainly internally, requiring less debt. (Frank et al. Goyal 2009)

Numerous studies have been found on the effect of profitability on leverage. The topic has been on the surface for a long time and is reflected in the number of studies. Forsberg & Gosh (2006) studied New York Stock Exchange (NYSE) companies' data for five different sample years in 1985-2003. They concluded that the amount of the debt remained quite stable in the capital structure through the years, but the profitability and leverage ratio showed strong inverse relationship. (Fosberg & Ghosh 2006)

Shubita & Alsawalhah (2012) studied the relationship between profitability and leverage of Jordanian industrial companies for 2004-2009 period. In the study, they divided the amount of debt into short- and long-term debt and thus into a short- and long-term leverage ratio. According to them, there is a significant negative correlation between profitability and short-

and long-term leverage. As profitability increases, the relative amount of debt in industrial companies falls sharply.

Danis, Rettl & Whited (2014) studied the relationship between profitability and leverage ratio from the perspective of dynamic trade-off theory. They tried to challenge the results of numerous previous capital structure studies in which the positive correlation between profitability and leverage ratio according to the static trade-off theory doesn't materialize and the correlation is inverse according to pecking order theory. According to them, the relationship between the variables is in line with pecking order theory when data is analyzed statically, but in dynamic financing situations where firms make large financing decisions, more profitable companies end up using more leverage than less profitable ones. Dynamically, the ratio of variables is thus positive. According to them, companies that have decided to increase leverage in their business will increase their profitability way before the financing decision is made. As profitability increases before the decision, the leverage also decreases, as the amount of equity in the balance sheet increases with free cash flows. Then, when it's time to finance, a profitable company decides to use more debt than to issue shares. Thus, the time series appear to have an inverse relationship between the variables according to the pecking order theory. When companies optimize their capital structures, profitable companies choose to use more debt for financing.

Another variable, which has been studied to be related to capital structure is company size. According to the trade-off theory, larger companies are more diversified and have better reputation than smaller companies, leading to lower agency costs. Lower agency costs lead to better loan terms and thus higher relative debt making larger companies more leveraged. Pecking order theory supports this, emphasizing that larger companies are better known and thus get better loan terms. (Frank et al. 2009)

Also, the size of the company as an explanator of the capital structure has been extensively studied and has been a popular variable in many statistical analyzes as part of multivariate models. Bevan & Danbolt (2004) studied more than a thousand United Kingdom (UK) companies from 1991-1997 using different methods such as ordinary least squares (OLS), random- and fixed effects models. According to them, the larger size of companies leads to higher levels of debt according to different capital structure theories. However, in their study,

they distinguished between long- and short-term debt as well as different types of debt. According to the OLS model, they found that size correlated negatively with short-term bank debt but positively with market-based debt. One explanation for this would be that smaller companies will have more difficulties accessing market-based financing, and as the size of the company grows, so will the different options for obtaining financing. Larger companies thus finance their operations more with market-based debt, which reduces the amount of bank debt in the balance sheet. Financiers also see smaller companies as riskier. This results in a shorter maturity of bank debt than for larger companies. As a result, the smallest companies have higher amounts of short-term bank debt than the largest companies. What makes the results special, however, is that the fixed effects model in the study gave completely opposite results for short-term debt, significantly reversing the signs of the coefficients. Overall, however, the positive ratio of company size to total debt remains the same in both the OLS and fixed effects models, supporting both trade-off and pecking order theories.

The strength of company growth has also been found to be related to the level of leverage. The trade-off theory says that growth increases financial distress costs which leads to agency problems. Growth companies also value investments from different stakeholders, so this value and higher financial costs reduces the amount of leverage. According to the pecking order theory, companies make more investments in the growth phase than in the stable phase. However, investments require capital while turnover remains constant in this growth phase. In this case, income financing is not enough to cover investments, leading to debt financing in the financing hierarchy pecking order theory determines. This means more leverage. (Frank et al. 2009)

Gerke-Teufel (2019) studied extensively financial management of companies having different growth rates. He studied how investment behavior and capital structures change in companies of different growth categories and which variables in general explain different capital structures. There were 570 companies from Central Europe in the study and the reference period was 10 years. The research method was regression analysis. Growth variable was determined as turnover growth in the study. The group of growing companies was defined as all companies with an average annual turnover growth (AAGR) of more than 20 percent. The study showed that growing companies are much smaller than all companies

on average and focus more on the knowledge sector, making more research and development (R&D) investments than average. However, the main finding of the study was that growth-class companies don't use more debt than average for financing but prefer internal financing more conservatively. Growth companies are therefore more likely to be in the technology sector, investing heavily in product development. This result is in principle in line with the trade-off theory, according to which growing companies prefer more equity financing due to agency costs. According to pecking order theory, for growing companies, internal financing is not enough to finance growth, which is why companies then resort to debt financing. However, the conclusion of this study was that internal financing is sufficient to finance growth. These growing companies therefore don't have to issue shares or new loan. This shows that these growing companies are profitable enough to finance their own growth by reducing the amount of debt, which is in line with the pecking order theory.

The leverage has been found to be more correlated between companies within an industry than between industries. Trade-off theory says, that the higher the average growth in a company's industry, the greater the leverage the company also has, and vice versa. Pecking order theory doesn't give any direct view of different industries. Nor can the differences between industries be analyzed directly within the framework of trade-off theory. Only indirect conclusions can be drawn using these theories. (Frank et al. 2009)

MacKay & Phillips (2005) studied industry-specific effects for corporate financing decisions. They obtained data from Compustat database, and the final data formed unbalanced panel data including 3074 companies operating in 315 competitive industries and 309 companies operating in 46 concentrated industries. The research method in the study was a fixed effect regression model. They found that firm-specific fixed effects explained the capital structure significantly more than industry-specific fixed effects. This means that companies 'own characteristics and differences, regardless of industry, explain the capital structure more than the companies' industry. They also found no differences between industries but observed significant effects within the industry. They found that companies are looking to position themselves within the industry in their capital structures. For example, companies which have their capital – labor ratios near to their industry's median ratio uses relatively less debt than companies that are further away from the industry median ratio. They also found that capital structure choices, risk, and technology are determined

simultaneously. Thus, if a company has decided to deviate from the average of the same industry in its capital structure choices, it is often associated with choices about technology or risk.

The last variable also used in this study is risk. Risk is often defined in financial theories as volatility. When company's earnings volatility is high, uncertainty increases, which in turn increases the amount of financial distress costs. High earnings volatility also undermines the full utilization of the tax benefit. Trade-off theory thus assumes that high volatility leads to lower leverage. Even for this variable, the pecking order theory gives the opposite view. The theory starts from the perspective of adverse selection, according to which volatility represents different views and beliefs about the company. Adverse selection and the need for a risky company to seek financing from the market increase the amount of leverage. (Frank et al. 2009).

Keefe & Yaghoubi (2016) studied the relationship between company cash flow volatility and use of equity and debt in financing activities. They used annual data from different US companies from 1974-2012 time-period and analyzed the data with non-linear models. They found out that the more uncertainty, or volatility, in companies' cash flows, the less companies will resort to debt financing and increase the amount of equity financing. They found out that increase of one standard deviation of mean cash flow decreases approximately 24% of the long-term debt ratio and decrease of 26% in probability of holding over 10-year maturity debt. They also found out that an increase of one standard deviation of mean cash flow decreases 39% probability of using either short- or long-term debt. Thus, the increasing risk has a significant effect on the degree of leverage. The also concluded, that the riskier companies are more growing companies, less profitable and invest more in research and development than the average. The study thus follows the behavior of a risky company according to trade-off theory. The increasing volatility of cash flows is leading to higher agency costs and the consequent rising borrowing costs. This leads to a preference for equity.(Keefe & Yaghoubi 2016) Table 1 summarizes the theories 'predictions as to whether the variable has a positive or negative effect on the relative amount of debt.

Table 1. A summary of the variables and how they affect the leverage within the theories

Factors	Trade-off	Pecking-order
Profitability	+	-
Company size	+	+
Company growth	-	+
Risk	-	+
Industry	?	?

As shown in table 1, both trade-off and pecking order theories give a different prediction for each variable. This only highlights how these two theories have a different view of corporate strategies and especially the financing of operations and investments.

3. Data and methodology

The third paragraph deals with the data and methodology used in the thesis. First, the data and its sources are discussed and. The chosen research methodology is then introduced first at the theoretical level and then at the research question level. In this context, the variables used in the research questions and what they consist of are also discussed. Finally, the possible limitations of the research method are examined.

3.1 Data and its sources

The companies in this thesis are limited to the CSPP bond purchases carried out by the Banque de France. The Banque de France is the central bank of France and conducts the ECB's monetary policy operations. In other words, the data include all companies whose bonds have been purchased by the Banque de France. France was selected as the country for this study, as a large proportion of purchases have been made on the French market. The companies and the bonds targeted by Banque de France can be found on their website. (Banque de France 2021) A quarterly list was downloaded from the bank's website, showing all the companies that have been the targeted for the purchase program. These quarter lists were then consolidated to include all companies targeted to the purchase program, as well as when these purchases have taken place. The data were collected from the beginning of the CSPP, from 2016 onwards. The companies were divided in the study into ten different industries based on the industry classification benchmark (ICB) (FTSE Russell 2021). Table 2 shows the numbers of companies by industry used as data in this thesis. As can be seen from table, the largest groups are the industrial and financial sectors, which together represent almost half of all enterprises.

Table 2. Number of companies per industry

Industry	Amount	Share
Consumer Goods	9	17,65 %
Consumer Services	3	5,88 %
Industrials	14	27,45 %
Basic Materials	3	5,88 %
Financials	10	19,61 %
Technology	3	5,88 %
Utilities	5	9,80 %
Telecommunications	2	3,92 %
Health Care	1	1,96 %
Conglomerates	1	1,96 %
Total	**51**	**100,00 %**

There are a total of 51 companies in the study as can be seen in the table 2. There were more than 51 companies included in the original data downloaded from the Banque the France's website, but some of these purchases were directed directly at subsidiaries. Thus, these purchases of subsidiary bonds were consolidated into purchases of the parent company to reduce the data and improve its quality. In addition, these ten industries also include industry conglomerates. This means a company that operates in a wide variety of different industries and classification into one of these was impossible. There is one conglomerate in the data of this study. The company is Bouygues and operates in the construction, media, telecommunications, real estate development and transportation industries.

Detailed information about the companies was retrieved from the Thomson Reuters Datastream. The data is on a quarterly basis and was used for calculating the variables then used in the models. The data was collected from 2010 to 2020, which serves as the basis for the analysis. Some of these retrieved data are market-based values, such as stock market value, price to book value (P/B) and bond market value. The rest are balance sheet / income statement based, such as total shareholders' equity, total debt, earnings before interests and taxes, capital expenditures and total assets. All other variables were obtained from a single download of company-specific data, but bond market values were obtained by retrieving the outstanding bonds of each company and their market values separately. Bond values were then summed up to obtain the company-specific market value of the bonds. Only euro-

denominated bonds were included in the study, as only a very small proportion of the bonds issued were found to be in another currency. In addition, data collection was a lot easier due to this defining.

After downloading the data from Datastream, it was found that some of the balance sheet-based values appears for large number of companies only semi-annually. For these companies, it was assumed that the value of Q1 is the same as Q2 and the value of Q3 is the same as Q4. All market-based values were automatically derived from Datastream on a quarterly basis. In addition, market-based and balance sheet-based values was changed to the same unit to make analysis and results reliable and meaningful.

The generated data set to be examined is panel data. The panel data combines cross-sectional and time series features. This means that there is data from different units for several different time periods. These units can be, for example, people, states, countries, or companies. The units in this study are these 51 companies. This structure can be defined as longitudinal data. Panel data offers many benefits compared to cross-sectional data alone. For example, panel data provide natural protection against time-invariant endogeneity. It also useful for detecting the heterogeneity among units and allows for more dynamic modeling. (Hansen 2009) Dynamics helps to understand different phenomena over time. Panel data also increases the variability of the data, making it more efficient in analysis. As data varies between units in different time series, collinearity also decreases. For example, within a unit, different variables may correlate with each other over time, but bringing new units into an analysis where such a relationship is not similar reduces the collinearity of the entire dataset. The use of panel data also includes weaknesses or challenges that are mainly related to data collection and its reliability. Because the panel data contains different units, it can be difficult to draw conclusions about the representativeness of the subset of the population. In addition, questions are raised about the lack of data and the aging of data over time. Understanding the connections between different units is also challenging. If they cannot be considered, the conclusions drawn from the results may be incorrect. (Baltagi 2008) The management of these problems and the studies of the panel data are discussed in more detail in the following section on research methods.

3.2 Methodology and variables

The study is based on the statistical significance of the effect of the independent variable on dependent variable. Statistical significance in statistics means that the result is unlikely to be a coincidence. Statistical significance only means that there can be found a statistically significant relationship between the variables but doesn't comment on the strength of the statistical significance. Statistical significance is tested by statistical tests. Tests often give a p-value that indicates how probable an observation is under the assumption that the null hypothesis is true. The limit is often considered to be 0.05, below which the null hypothesis is rejected, and the relationship between variables is considered statistically significant. 0.05 means that the probability of observed relationship between variables occurring by coincidence is less than 5 percent. Testing for statistical significance is important because the entire population is rarely available in a statistical study, but only a sample of it. There are always random fluctuations in the sample compared to the whole population, so the relationships between variables must be proved statistically significantly to draw valid conclusions from the study. (Holopainen & Pulkkinen 1999)

The aim is to answer previously identified research questions, i.e., which factors have a significant impact on companies' capital structure decisions and whether the ECBs purchase program has affected financing strategies and investment volumes. The study thus combines the effects of traditional capital structure theories with the effects of loose monetary policy in recent years. The thesis therefore seeks to combine the traditional internal variable approach studied a lot in recent decades with the newer external monetary policy approach on companies' operations.

Linear regression analysis is used as the research method. The purpose of regression analysis is to create a mathematical model that seeks to explain the relationships between different variables. The simplest model has one independent and one dependent variable. However, there can be several independent variables, in which case it is a multivariate model. The purpose is to try to explain the variation of the dependent variable explained by the independent variable. (Seber & Lee 2012) The starting point for regression analysis is variables belonging to the distance or ratio scale, but using dummy variables, variables

belonging to the order and nominal scale can also be studied using the same method. Of the different regression models, it is the linear regression models that have been chosen as the methods to be considered for this study, as the dependent variables (bond ratio, leverage ratio, investments) of each research question are continuous variables, yielding several different values. In order to use linear regression, certain conditions must be met. If the conditions are not met, changes must be made to the original data or the model. These are discussed in more detail in section 3.2.1 In this study will be used either the ordinary least squares model (pooled OLS), the fixed effects model or the random effects model. All of these are different linear regression methods which can be used to analyze panel data if certain conditions allow it. These will also be discussed in more detail at a later stage.

The pooled OLS model is the most common and best-known linear regression model in econometrics. The reason it is called "pooled" is because it is just an ordinary model commonly used in cross-sectional or time series data, but in this case, it is used in panel data which combines these cross-sectional and time series features. It is therefore not a specific model tailored to the panel data, but only a standard least squares method that can be applied to the panel data if certain conditions are met. (Hansen 2009)

The OLS model minimizes the sum of the distances calculated from the regression line. The aim is to find a line between the dependent and the independent variable such that the sum of the squares of the differences between these distances is as small as possible. If there are several independent variables, the line model can be represented by the following formula: (Heikkilä 2008)

$$y = a + b_1x_1 + b_2x_2 + b_3x_3 + \varepsilon \quad (1)$$

In the formula, the standard term a indicates the intersection of the line and the y axis. The regression coefficient b tells how much the dependent variable y changes as x increases by one unit. At the end of the formula is residual term ε , which tells all the information about the variation of y, which the model is unable to explain. (Heikkilä 2008)

In addition to standard pooled OLS model, customized models, such as fixed effect and random effect models, can be used to analyze panel data. The models of fixed and random effects assume that the units in the study have differences that individually affect the parameters of the model. As mentioned earlier, OLS doesn't take these individual differences into account but only operates in the traditional way but only applied to panel data. The units in this study are the companies targeted by the CSPP, with or without individual differences. These differences in this study would mean, for example, that the bond ratio of one company increases more when it becomes a target of the CSPP than the other company bond ratio when it becomes targeted. Fixed- and random effects methods model these differences, but basic OLS doesn't. It would therefore be natural to think that there are individual differences.

The differences between fixed- and random effects models, in turn, culminate in modeling these unit specific differences. In the fixed effects model, the model parameters are fixed. The model studies the relationship between independent and dependent variables within units. Each unit has its own individual features, which may affect to the dependent variables. When using the fixed effects model, it is assumed that something within the individual can make an impact to the dependent variable. Because these individual properties are constant over time, the model seeks to remove these individual features to reliably estimate the effect of the independent variable on the dependent variable. The model captures unit-specific differences to fixed unit-specific standard terms. The fixed- and random effects model can be represented by the following formula (Baltagi 2008):

$$y_t = b_{it}x_{it} + u_i + \varepsilon_{it} \quad (2)$$

In the fixed effects model, y_t is the dependent variable and x_{it} is the independent variable and b_{it} its coefficient. u_i is the standard term which reflects all the differences between the units and ε_{it} is the error term. The model thus breaks down the unit-specific fixed effects into standard unit-specific terms to isolate these effects from the independent variable and its coefficient.

The random effects model also models unit-specific differences. However, the difference with the fixed effects model is that these unit-specific differences are not modeled as fixed

standard terms, but in the model the standard terms describe random variation between units. The random effects model can be represented by the same formula than for the fixed effects. Only difference is that u_i is divided in two. It contains an unknown parameter that represents the population average standard term. In addition, it includes a random error term that is responsible for the differences between units. ε_{it} is the common error term, so, as will be noted, the random effects model includes two separate error terms, a common error term and an inter-unit random error term. (Baltagi 2008) The first research question to be answered is:

Do the companies targeted by the CSPP increase their bond ratio?

There is only one independent variable in the first research question. The purpose is to explain the bond ratio only with whether the company is under the ECBs purchase program (CSPP). So, bond ratio is the dependent variable, and the independent variable is a dummy variable. The dummy variable gets a value of 1 when a company is in the target of CSPP. If the central bank has not (yet) purchased corporate bonds, the dummy variable is set to 0. For this research question, the OLS formula can be presented as following:

$$Bond\ ratio_t = a + B_1 CSPPD_t + \varepsilon_t \quad (3)$$

In the formula, the dependent variable $Bond\ ratio_t$ is the company bond ratio at time t. The standard term a is the average bond ratio outside the CSPP period. The coefficient B is the bond ratio increment of its average when the dummy variable is set to 1 so the company is targeted. D_t is the dummy variable and ε_t the error term. Bond ratio is calculated by the market value of outstanding bonds issued by the company divided by the book value of total debt including both the short and the long-term debt. The figure thus gives a ratio of bonds as a share of the company's total debt. To facilitate data collection, only euro-denominated corporate bonds was selected. In the data collection, only a fraction of some of the company's bonds were found to be in another currency so this limitation is not seen to significantly affect the thesis results. The second research question to be answered is:

Do the companies targeted by the CSPP increase their leverage ratio?

The second research question is answered by multivariate regression analysis. The analysis is based on the same independent dummy variable used in the first research question, but other variables affecting capital structure according to the traditional financial theories are also added to the model as independent variables. The dummy variable gets a value of 1 when a company is in the target of CSPP. If the central bank has not (yet) purchased corporate bonds, the dummy variable is set to 0. For this research question, the OLS formula can be presented as following:

$$Leverage\ ratio_t = a + B_1 CSPPD_t + B_2 Size_t + B_3 Profitability_t + B_4 Growth_t + B_5 Risk_t + \varepsilon_t \quad (4)$$

In the formula, the dependent variable $Leverage\ ratio_t$ is the company debt to equity ratio at time t. It is calculated by dividing the book value of debt with the book value of equity. The standard term a is the average leverage ratio when independent variables are zero. $CSPPD_t$ is the CSPP dummy variable at time t. $Size_t$ is the is the company size at time t. Company size is defined in this study as the company total assets. $Profitability_t$ is the company profitability at time t and is defined as the return of invested capital (ROI). $Growth_t$ is the company growth at time t and is defined as the ratio between company market to book value (P/B). $Risk_t$ is the company risk at time t and is defined as the variance of earnings before interests and taxes. The B is the coefficient for every variable at time t and ε_t the error term at time t. The third research question to be answered is:

Have companies targeted by CSPP increased investments?

There is only one independent variable in the third research question similarly to the first research question. The purpose is to explain company investments volumes only with whether the company is targeted under the central bank purchase program (CSPP). The company investment volume is the dependent variable, and the independent variable is a dummy variable. Investment volumes in this study means the company's capital expenditure. The dummy variable gets a value of 1 when a company is in the target of CSPP. If the central bank has not (yet) purchased corporate bonds, the dummy variable is set to 0. For this research question, the OLS formula can be presented as following:

$$Investments_t = a + B_1 CSPPD_t + \varepsilon_t \quad (5)$$

In the formula, the dependent variable $Investments_t$ is the company capital expenditure increase at time t. The standard term a is the average capital expenditure outside the CSPP period. The coefficient B is the average capital expenditure increment when the company is targeted. D_t is the dummy variable and ε_t the error term. Capital expenditure in this study is the additions to company fixed assets. A summary of the variables and their use in the different research questions can be seen in table 3.

Table 3. Summary of variables used in research questions

Variable type	Variable	Research Question	Calculation formula
Y	Bond ratio	1	Value of outstanding bonds / total book value of debt
Y	Leverage ratio	2	Total book value of debt / total book value of equity
Y	Investments	3	Additions to fixed assets (capital expenditure)
X	CSPP (D)	1,2,3	Company in the target of CSPP or not (dummy variable)
X	Company size	2	Total assets
X	Profitability	2	Return of invested capital (ROI)
X	Growth	2	Market to book ratio (P/B)
X	Risk	2	Variance of earnings before interests and taxes (EBIT)

As can be seen from table 3, the variable types can be divided into y and x variables. Y is the dependent variable and x is the independent variable explaining y. As can also be seen from the table, most of the independent variables are related to research question 2. This is because research question 2 is studied using a multivariate model unlike the other two research questions which only have one independent variable. This setup is because traditionally the effects of the internal independent variables has been studied on the second research question dependent variable, leverage ratio. The analysis is performed with Matlab software.

3.2.1 Background assumptions of regression analysis

To draw relevant conclusions from a linear regression model, certain conditions need to be considered. Otherwise, the coefficients of the model may be biased, and their mean errors may become incorrect. All models, whether a standard OLS model, a fixed effect model, or

a random effects model, must meet certain common assumptions. First, it is important that the independent variables make sense, that is, for example, one must be able to justify why this specific variable is intended to explain the variation of another variable. In addition, there should be 5-10 times more observations than independent variables so that the model receives enough data to create reliable coefficients. The third important condition is the uncorrelation of the independent variables. Thus, it is important that there is no multicollinearity among the independent variables, but it is tentatively desired to know that the independent variables correlate with the dependent variable. Before linear regression, it is also worthwhile to study the linearity between the independent and dependent variable, for example with a scattering plot. In addition, it is good to study some distributions. It is desired that the dependent variable and the error term are normally distributed. It's also good, that the error terms are evenly distributed, and their variance doesn't increase or decrease when observations increase. It is therefore desired that the model is homoskedastic. It is also not desired that the error terms correlate with each other, i.e the possible autocorrelation must also be considered. (Heikkilä 2008)

As mentioned earlier, homoskedasticity means that the variance of the error term is constant. Homoscedasticity can be defined by the following formula (Hill & Griffiths 2018):

$$Var(\varepsilon_i) = \sigma^2 \tag{6}$$

If the variance of the residual term is not constant, the phenomenon is called heteroskedasticity. The appearance of heteroskedasticity increases the mean errors, so that the ordinary least squares estimator (OLS) is no longer the best. Heteroskedasticity can be detected, for example, statistically. For this, White's test can be used. In White's test, an auxiliary regression is used, in which the squares of the independent variables explain the error term of the model. Another common way to test homoscedasticity is the Breusch-Pagan test, which is designed to test the relationship between error term variances and independent variables. In the test, a regression is generated in which the independent variables of the model explain the variances of the residual terms. The null hypothesis in the model is homoscedasticity. This study uses the Breusch-Pagan test to detect heteroskedasticity. (Breusch & Pagan 1979)

Possible autocorrelation must also be considered. Autocorrelation means that the residual terms of the model correlate with each other. In other words, the observations in the time series should not correlate with each other. Thus, if the new observations depend on the old observations, the time series cannot be called random, in which case autocorrelation occurs. Autocorrelation can lead to incorrect mean errors, which impairs the reliability of the results. This background assumption can be represented by the following formula (Hill et al. 2018):

$$cov(y_t, y_s) = cov(\varepsilon_t, \varepsilon_s) = 0 \quad (7)$$

Autocorrelation may be due to, for example, the absence of independent variables or the selection of an incorrect function form. Statistical tests such as Breusch-Godfrey Lagrange Multiplier test and Durbin-Watson are the most frequently used tests for detecting the possible autocorrelation. (Hill et al. 2018). However, this study uses the Woolridge test, which tests autocorrelation as its null hypothesis that there is no autocorrelation. The test seeks to explain residuals by the lags of the residuals. If the null hypothesis remains valid, the observations don't depend statistically significantly on previous observations. (Wooldridge 2010)

Multicollinearity means a strong linear relationship between independent variables. If multicollinearity occurs in the model, the effect of the independent variables on the dependent variable is blurred, and the effect of the individual independent variables cannot be properly detected. The easiest way to detect multicollinearity is a simple correlation matrix of independent variables. If the correlation between the independent variables is greater than 0.8, multicollinearity can be assumed in the model. (Hill et al. 2018) A correlation matrix is used in this study to detect the potential autocorrelation.

3.2.2 Panel data model selection

Once the background assumptions have been reviewed and the data modified, the choice of analysis method must be made. As mentioned earlier, the model will be chosen from ordinary least squares (OLS), fixed effect, or random effect models. The logic in choosing the model goes from trying to detect whether the model has fixed or random effects. If both

are found, the random effects model is used, if no endogeneity is observed in the model. If endogeneity is observed, the fixed effect model should be used, as the fixed effect model is robust for it. Random effect model is preferred over fixed effects model because it considers random variations between units and can be used to draw conclusions for a wider population. The fixed effects model cannot be used directly to draw conclusions for a larger population based on a subset analysis of the population, but the random effects model can be used. However, this requires model to be exogenous. In this study, the subject of the study is a subset of the CSPP from a larger CSPP population, so the model of random effects would be best. If no fixed and random effects are found at all, or if random effects cannot be used due to endogeneity, standard OLS may be used. OLS is thus the last option of the models, as it is not a separate specific model for panel data analysis.(Hill et al. 2018)

Fixed effects can be tested with the fixed effects F-test, also called the Chow F-test. The test uses the F-test to see if the model has individual time-invariant effects compared to the pooled OLS model. The null hypothesis is, that there are no observable fixed effects in the model. (Baltagi 2008) The existence of random effects can be investigated using the Breusch-Pagan Lagrange Multiplier (LM) test. The test tests the variance of individual effects as its null hypothesis that the variance of individual effects is zero. If the null hypothesis is rejected, the variance between units is not constant and random effects are found. If the variance is not constant, it also means that heteroskedasticity is found in the model. (Baltagi 2008)

If neither test detects the presence of fixed- or random effects, pooled OLS can be used as a method of analysis. If, in turn, both effects are found, the final model is decided by the Hausman test. Hausman test reveals whether the model is endogenous. Endogenous means that the error terms in the model correlates with some of the independent variables. Endogeneity can be caused for example because of omitted variables or simultaneity. Omitted variables means that the model is lacking some important independent variables, which should be in the vector of independent variables explaining the dependent one. Simultaneity in turn means that the dependent variable y and independent variable x are determined in equilibrium so that either x causes changes in y or y causes changes in x, so they are determined simultaneously. (Roberts & Whited 2013) The Hausman test compares fixed- and random effect models coefficients with each other, and the null hypothesis is that

there are no differences between these coefficients. The test is based on an evaluation of the correlations between the residual and independent variables. If the individual effects and the independent variables are correlated, the fixed effects model provides an unbiased estimator, if not, the GLS estimator used in random effects model is an efficient estimator. (Hansen 2009)

4. Results

The fourth paragraph reviews the results for each of the three research questions. For each research question, descriptive statistics and figures are first examined to visually observe the case and thus to provide a better overview of the phenomena. This facilitates the interpretation of the research results themselves later. Then, in the second step, statistical tests are performed on the background assumptions of the research method, and any corrections are made to use the method. In the last step, tests and their interpretations are performed.

4.1 The results of the first research question

This subsection seeks to answer the previously identified first research question, whether the companies targeted by the CSPP increase their leverage ratio.

4.1.1 First research question descriptive analysis

As can be seen from the table 4, there are more than 2000 observations for the whole period over ten years. Of these findings, 958 are on the CSPP era, the time when the ECB has pursued its purchasing policy. The rest of the observations are from before this time. However, there are also some companies and their bonds that the ECB was not yet targeted on its purchase program at the beginning of the CSPP. The companies may not have had any bonds issued at the beginning of the period, but as soon as they have been issued, the central bank has purchased them. There are 169 of these observations in the dataset, which is shown in the table 4. Table 4 shows bond ratio descriptive statistics in different time periods.

Table 4. Bond ratio descriptive statistics

Bond ratio descriptives	Observations	Average	Median	Standard deviation	Min	Max	Skewness	Kurtosis
Total	2185	0,63	0,59	0,48	0,00	5,54	2,79	19,38
Targeted on CSPP	776	0,68	0,63	0,37	0,00	2,51	1,17	2,82
Not targeted on whole perio	1409	0,59	0,57	0,53	0,00	5,54	3,12	20,46
Not targeted on CSPP perioc	169	0,53	0,47	0,44	0,00	1,68	0,42	-0,88

As can be seen from the table, the average bond ratio over the entire ten-year review period is 0.63. This means that more than 60 percent of the company's total debt is market-based bonds. The remaining less than 40 percent is long- and short-term other debt. The median is slightly lower than the average, indicating that the average is raised by much higher bond ratio for some companies than others. As can be seen from the ratio maximum of 5.54, the market value of a company's bonds is observed to be over five times the amount of total debt on the company's balance sheet. These companies have issued bonds whose market values have grown strongly over the years. This is likely due to a sharp decline in key market interest rates in the 2010s, which has raised the value of bonds issued before the rate cuts. For these reasons, the number of bond ratio may be greater than 1. As can also be seen, the standard deviation is 0.48. On average, the bond ratio therefore deviates almost twice from the average in one direction or another. The bond ratio therefore varies greatly between companies and within companies.

However, the most important consideration in the descriptive statistics is the observation on the research question itself. Companies that are targeted under the CSPP, have on average, a slightly higher bond ratio than companies that are not yet targeted by the program. In the table, the row "Not targeted on whole period" refers to the whole ten-year period from January 2010 to December 2020 and the row "Not targeted on the period" refers to the period from second quarter in 2016 to December 2020 which is the period ECB have conducted purchases. Figure 2 shows the evolution of the average ratio over time for all companies.

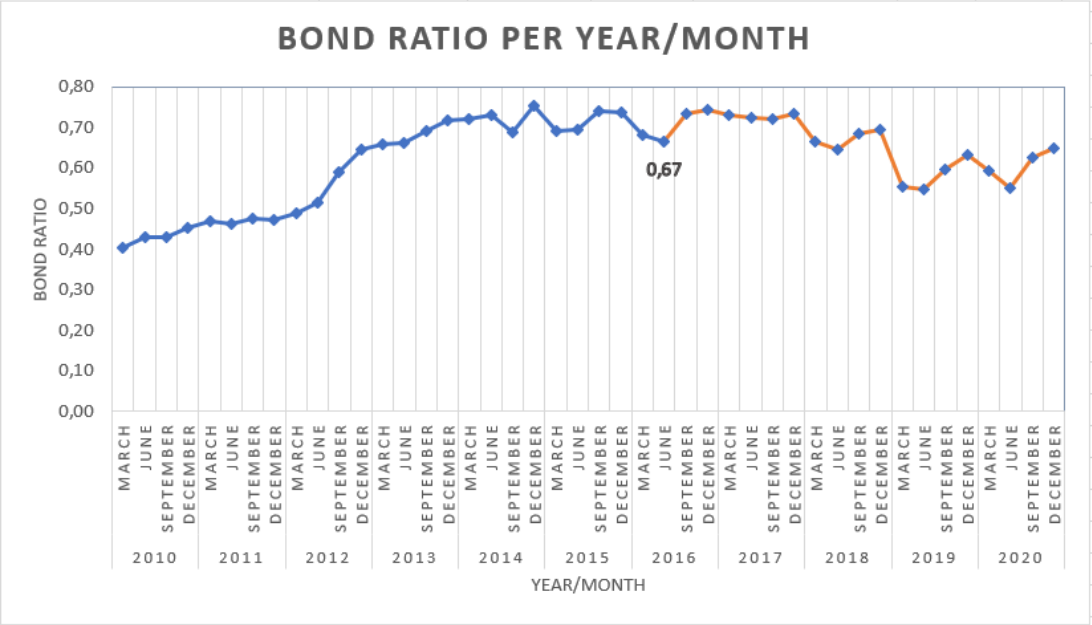

Figure 2. Average bond ratio per year/month

As can be seen, the bond ratio has grown steadily from the beginning of the review period to around the end of 2014. Since then, the ratio has been steady and ranging from circa 0.5 to 0.7 per year. The graph also shows the orange line starting in 2016 second quarter. This line describes the bond ratio during the CSPP period for all companies, regardless of whether the company is targeted by the program or not. The bond ratio at the beginning of the CSPP period was approximately 0.67 which is shown in the figure. Since then, it has fluctuated and gone up and down. In general, the ratio has been lower at the beginning of the year than at the end of the year, and especially in recent years the variation between the beginning and the end of the year has been strong. This is because the companies have issued more bonds annually in the second half of the year than in the first half.

4.1.2 First research question regression analysis

As can be seen from table 5, the kurtosis and skewness of the dependent variable are very high. These indicate that the values of the dependent variable are not normally distributed. This is not directly a problem but exposes it to the fact that the residual terms of the model are also not normally distributed, which in turn is a problem in regression analysis. For this

reason, the values have been changed from their original values to their natural logarithm. This makes the distribution of the data closer to the normal distribution, which is better suited for regression analysis and makes it more reliable. (Hansen 2009) Since no logarithm can be taken from zero, a constant is added to the data so that the minimum logarithm of the data becomes zero. In this case, the logarithm can be taken. Table 5 shows the kurtosis and skewness values.

Table 5. Skewness and kurtosis of bond ratio

	Skewness	Kurtosis
Bond ratio	2,79	19,38
Bond ratio LN	0,46	1,72

In normally distributed data, the skewness is zero and the kurtosis is 3. (Ryan 2007) This is not completely achieved after the transformation to natural logarithm (LN), but still quite close.

Table 6 shows the main tests for selecting panel data model and testing other background assumptions. The first row of the table, F test, indicates whether there are any individual effects in the data, i.e., whether there is anything unique about the companies that affects the dependent variable bond ratio. As can be seen, the null hypothesis is clearly rejected, i.e., individual effects are found. The null hypothesis of the second line Breusch-Pagan LM test for random effects is also clearly rejected. This means that the random variation of individual effects is very strong and doesn't remain constant, so the random effects model is better suited for the regression modelling. This also indicates that the model is heteroskedastic.

Table 6. Tests for panel data model selection and background assumptions

Test	**P-value**
F-test of individual effects	0.00
Breusch-Pagan's LM test for random effects	0.00
Wooldridge's test for autocorrelation	0.00
Hausmans test	0.00

The Hausman test shown in the last row also gets a value of 0. Thus, there are statistically very significant differences in the coefficients of the random- and fixed effect models, so endogeneity is found in the model. Thus, the results of the random effects model cannot be relied, so it was decided to use fixed effects model in the first research question. Since fixed effects were also found, it's not reasonable to use pooled OLS model. The third row in the table also shows pure zero. According to the Woolridge test, residual terms within units correlate very strongly with their previous residual terms. Thus, a strong autocorrelation is observed in the model. Because both the heteroskedasticity and autocorrelation of the residuals are observed in the model, it means that different clusters can be detected in the data, where the error terms within the units are correlated with each other. The units thus form different clusters in the model. If default standard errors were used in the analysis, the coefficients and their significance would be excessively good and less reliable. Because of this, the fixed effect model in the first research question replaces the standard errors with cluster-robust standard errors. (Cameron & Miller 2015) Appendix 1 shows all the Matlab outputs from the tests of table 6.

Table 7 shows the research results of the regression analysis of the first research question. There are 2185 observations, so the analysis covers the entire 10-year period. During the first five years of 2010-2015, no company has been on the target of the CSPP because the program started in 2016. The adjusted R-squared, which tells how much the model explains the variation of the dependent variable, is even negative. The adjusted R-squared is always lower than the regular R-squared and since the standard R-squared is close to zero, the adjusted R-square becomes negative. Thus, the model explains almost no variation in the dependent variable. This itself is not directly a problem, as there is only one independent variable in the model, so with one dummy variable, the R-square remains very low. However, a negative value is by no means a good thing.

Table 7. Results of the first research question

Model	Observations	Adjusted R-squared	P-value
Fixed effects	2185	-0.008	0.063
Variable	Coefficient	Robust standard error	P-value
Constant	0.436	0.007	0.000
CSPP	0.040	0.021	0.063

Constant's coefficient of 0.436 includes the fixed effects of units, in this case companies. In the standard OLS model, it would include the average bond ratio outside the CSPP period, that is, when the independent variable is 0. In the fixed effects model, it also includes individual fixed effects that are adjusted out of the CSPP independent variable. The CSPP coefficient of 0.040 is an increase in the average logarithmic bond ratio when the company is on the target of the CSPP. However, these fixed effects, which appear in the constant coefficient, have been adjusted off from the independent variable coefficient. For this reason, the standard OLS coefficients would appear to be lower for constant and higher for the independent variable CSPP. As the coefficient of the independent variable decreases significantly compared to the coefficient of the independent variable of the OLS model, the P-value rises above the 5 percent risk level, which can be considered as a statistically significant limit. Thus, according to the model, the CSPP period in companies cannot be considered as a statistically significant factor in the growth of the bond ratio, although the bond ratio still increases for companies when they become a target of the CSPP. Appendix 2 shows all the Matlab outputs from the fixed effects model and the individual unit specific fixed effects tests of table 7.

It should be noted that the modelling covered the entire ten-year period. As seen earlier in the figure 2, the bond ratio in companies increases steadily from the beginning of 2010 until around 2014. Thereafter, the average bond ratio fluctuates slightly from year to year, with a slightly declining trend. If, for example, the analysis is reduced to six years, taking the analysis period 2014-2020, the statistical significance of the independent variable will deteriorate much further. Bond ratios have thus been high for companies long before the CSPP acquisition program. It is also worth considering the calculation formula of the ratio itself. Bond volumes are at market values, which have fluctuated slightly from year to year. For example, in 2011-2012 and 2014-2015, the ECB cut its key interest rates more sharply

than in other periods. (Suomen Pankki) Decreases in interest rates can be seen as an increase in the market value of bonds in circulation over time. For example, in 2014-2015, the market values of bonds increased, while in 2017-2018 they remained stable or decreased slightly. On the other hand, in 2010-2011, Euribor interest rates rose, lowering the market values of outstanding bonds, but the bond ratio has still increased in those years. However, the number of issued bonds and the total market values in the era of steadily declining interest rates have been growing rapidly already for some time before the era of the CSPP.

4.2 The results of the second research question

This subsection seeks to answer the previously identified second research question, whether the companies targeted by the CSPP increase their leverage ratio. As noted earlier, in addition to the effect of the CSPP, this section examines the effect of variables identified in traditional capital structure theories on company leverage ratios. The section thus studies capital structures more broadly from a broader perspective than in the case of the first research question.

4.2.1 Second research question descriptive analysis

Table 8 describes the leverage ratios. The key figures and their presentation are the same as in table 4. The number of observations is the same as for the first research question. Throughout the ten-year period under review, the average leverage is 1.11. Thus, companies have used more debt than equity as a source of financing. However, the median is less than one. This is because the vast majority of companies have a leverage ratio below one, but there are also many companies where the ratio rises well above one, thus raising the average as well. The average distribution is also above one, i.e., the ratio is distributed very widely around the mean.

Table 8. Leverage ratio descriptive statistics

Leverage ratio descriptives	Observations	Average	Median	Standard deviation	Min	Max
Total	2185	1,11	0,84	1,07	-2,87	7,11
Targeted on CSPP	776	1,21	1,02	1,01	-2,87	4,48
Not targeted on on whole period	1409	1,06	0,76	1,10	-1,49	7,11
Not targeted on CSPP period	169	0,81	0,73	0,62	-1,38	4,84

The minimum leverage ratio goes to the negative side. This is because one of the companies has negative equity. The main consideration in the descriptive statistics is that the leverage ratio is higher for companies that are subject to the CSPP purchasing program. This is very clear by looking both the mean and the median figures. There is a particularly big difference between targeted and non-targeted companies in the CSPP era. It can therefore be concluded from the figures that, although the average leverage figure is more than one, most companies use more equity than debt as a source of financing.

Figure 3 shows the average leverage ratios between the different industries. The utility industry is by far the most leveraged. The median and the average are also very close, and there are five companies in the sample under that industry, so the observation can be considered relevant. Leverage ratios are also high in the telecommunications sector. The leverage ratios are lowest in the healthcare- and technology sectors. However, there is only one healthcare company in the sample, as shown in table 1. For this reason, no major conclusions can be drawn from it.

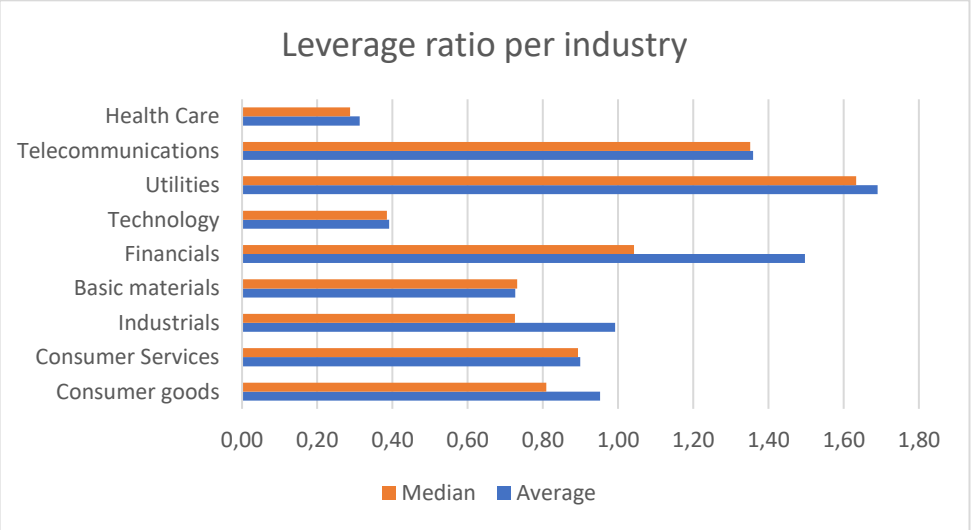

Figure 3. Average leverage ratio per industry

Figure 4 shows the average leverage ratio of all companies from the beginning of the reference period from 2010. The figure follows the same logic as figure 2, i.e., the orange line represents the leverage ratio during the CSPP period and the blue line the period before that. The average leverage ratio has been 1.11 CSPP at the beginning of the period.

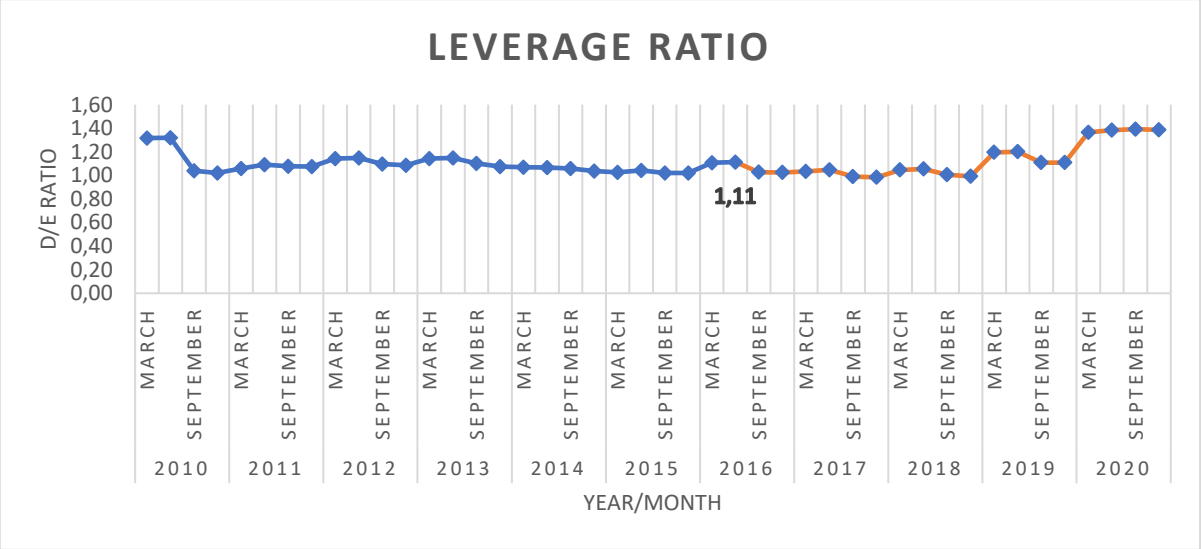

Figure 4. Average leverage ratio per year/month

As can be seen from the figure 4, the degree of the leverage at the beginning of the CSPP period has remained relatively constant and has not changed much since then. Fluctuations between years have been moderate. Only from 2019 onwards, and especially in 2020, the ratio has been clearly higher than before. The level of 2020 can be explained, for example, by the COVID pandemic, where debt levels have risen sharply.

Table 9 shows the descriptive statistics for the independent variables included in the analysis based on traditional capital structure theories. The table shows the key figures for each independent variable for the whole 10-year period. Profitability, calculated on the basis of return on investment, is at a good level on average. The median also gets quite close to the average, but is lower, as the data shows very high profitability numbers rather than low numbers for few companies. This can be seen from the maximum number which is very high in the data, and the minimum is not nearly as low on the same scale. Risk was previously defined as the standard deviation of a company's entire time series of returns. Return in this

analysis means earnings before interests and taxes. The figures in the table are in thousands of euros, so the average standard deviation of returns is about 276 million euros.

Table 9. Independent variable descriptive statistics

Independent variable descriptives	Average	Median	Standard deviation	Min	Max	Skewness	Kurtosis
Company profitability (ROI)	8,19	6,63	18,13	-29,26	358,42	14,62	264,09
Company risk (Standard deviation)	275 684	117 133	366 770	6 598	1 643 756	2,33	5,16
Company size (Total assets)	52 230 311	24 656 300	116 655 652	1 574 043	904 029 000	5,49	32,36
Company size (Total assets LN)	16,94	17,02	1,18	14,27	20,62	0,40	0,44
Company growth (P/B)	1,82	1,69	1,42	-9,22	8,30	-1,54	12,71

The size of the company is also naturally also in the thousands of euros and is defined as total assets. The average company size is thus 52.2 billion euros, and the average of the figure relative to the median is greatly increased by company AXA SA, one of the world's largest insurance companies, with total assets of almost 1 billion euros in 2016. The descriptive figures also include the natural logarithm of the total assets that will be used in the statistical tests instead of the original total assets. The last row in the table is the growth of the company, measured by the market value of the company in relation to the balance sheet value (P/B). As the growth rate is well above one, it can be concluded that, on average, companies are expected to grow strongly in the future. Companies are therefore expected to be able to generate significantly higher cash flows in the future than in the past. The negative P/B figure is due to Edenred company’s negative equity.

It is also important to visually understand the dependencies between independent and dependent variables. This may facilitate the interpretation of statistical results at a later stage. The first scatter plot (figure 5) shows the relationship between profitability, i.e., the first independent variable, and the degree of leverage. The dependent variable leverage ratio as the vertical Y variable and profitability as the horizontal X variable.

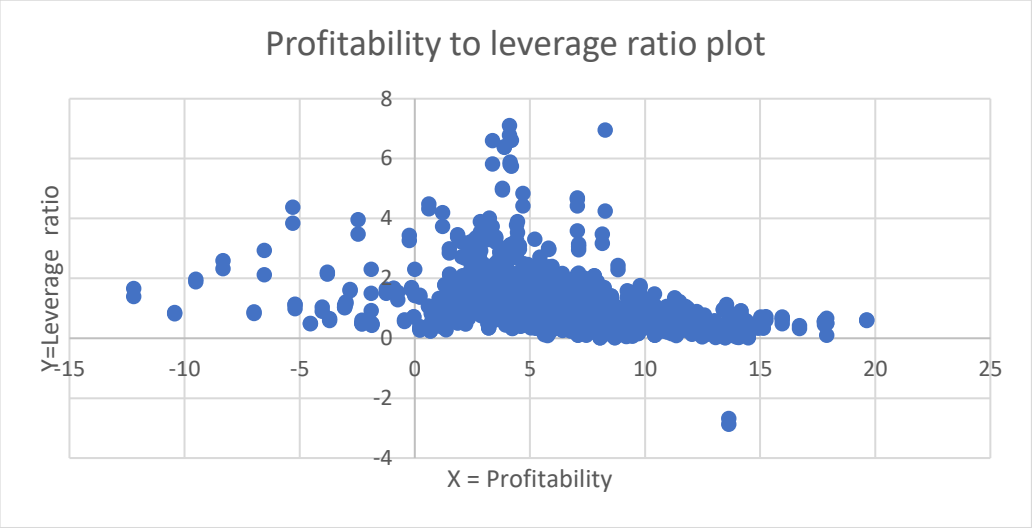

Figure 5. Profitability to leverage ratio scatter plot

Fairly clear linear relationship can be observed from the plot. As profitability increases, i.e., the return on invested capital, the leverage ratio decreases. When the ROI remains well below five, the debt ratio can be seen to increase, but especially after that, as profitability increases to higher figures, the leverage ratio will also decrease accordingly. This would therefore be a conclusion largely in line with pecking order theory.

The second plot (figure 6) describes the relationship between corporate risk and leverage ratios. However, it is much more difficult to draw any conclusions from this figure than with the first independent variable.

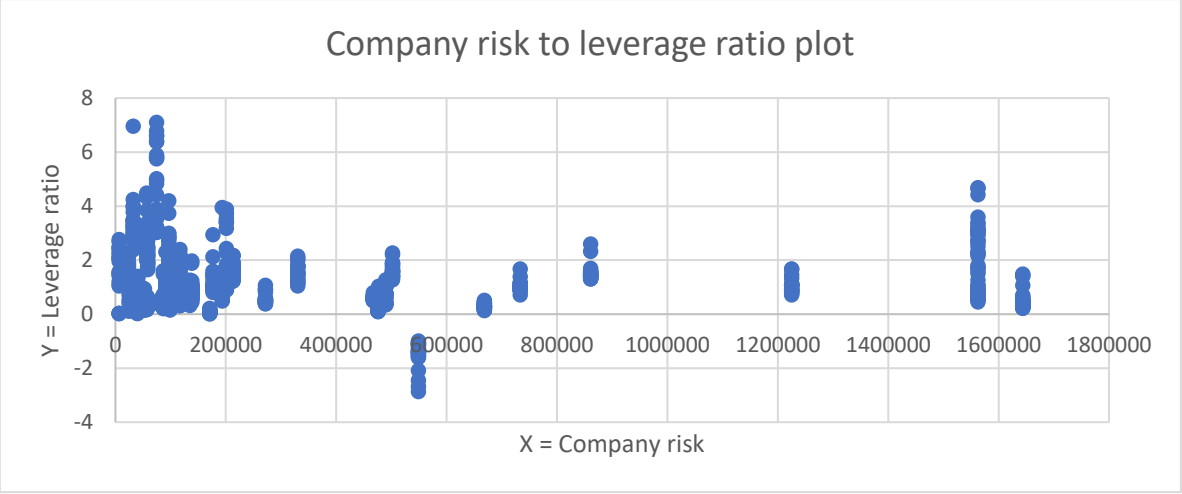

Figure 6. Risk to leverage ratio scatter plot

The standard deviation in the data varies somewhat, and "outliers," i.e., values well above the mean, are found some. Even these very different levels of risk don't visually seem to change the leverage ratio. It is therefore difficult to make visually significant observations for this variable.

The third variable in the review is the size of the company. The X axis in the figure 7 is this time the natural logarithm of the total assets. As with company risk, detecting a linear relationship from a plot is very difficult. Company sizes vary a lot, but the leverage ratio doesn't seem to move logically in one direction or another as the company size increases or decreases. Leverage ratios thus seem to vary randomly regardless of company size.

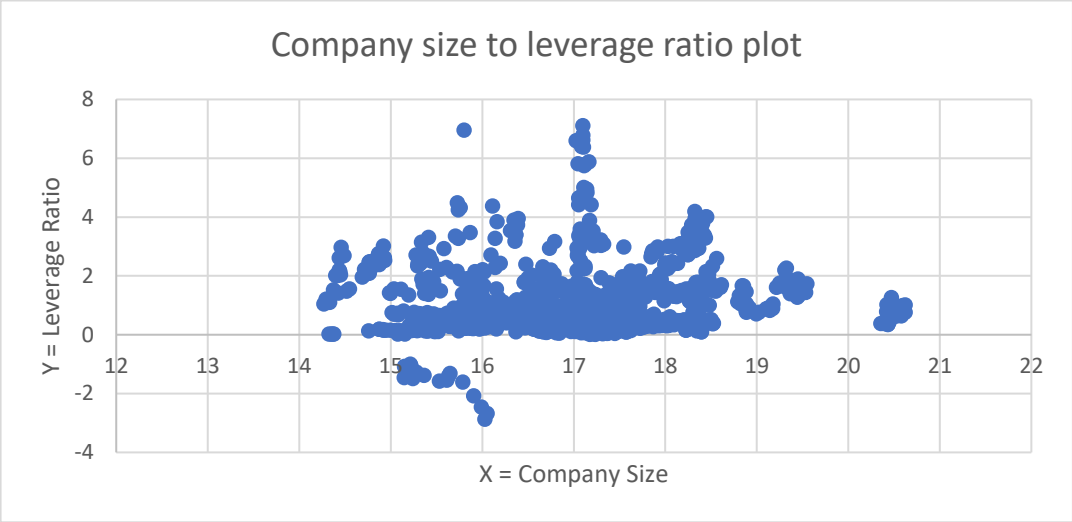

Figure 7. Company size to leverage ratio scatter plot

The figure 8 shows the external relationship between company growth and leverage. As with profitability, a similar effect can be observed for this variable. The higher the growth expectations a company has, the lower its leverage ratio. Especially when the growth ratio rises above two, the leverage ratio henceforth decreases as the company's growth expectations become higher.

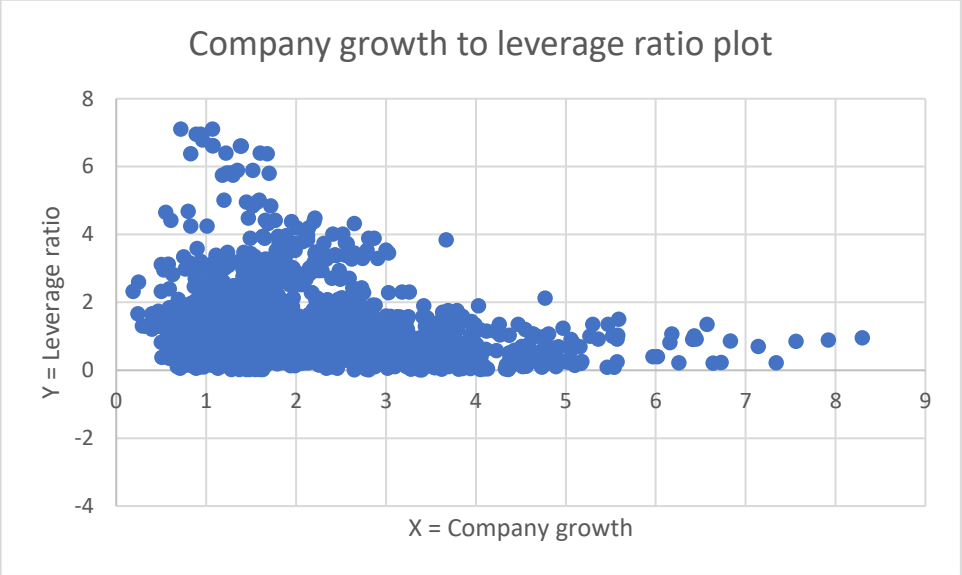

Figure 8. Company growth to leverage ratio scatter plot

This observation that as growth expectations increases, the leverage ratio decreases, is more in line with trade-off theory, in contrast to the observation with profitability, which seems to follow the pecking order theory. Thus, according to the graphs, a profitable but also growing company uses equity rather than debt as a source of financing.

4.2.2 Second research question regression analysis

As is the first research question, the variables addressed in the second research question are not normally distributed. This was perceptible when very high maximum values and differences in median and mean values for some variables were observed in the analysis of the descriptive statistics. However, direct data transformations don't positively affect some of the extremely skewed and kurtosis independent variables of the original data. For this reason, the company Edenred, which produces a lot of outliers in terms of both profitability and growth variables, was first removed from the data. This changed alone dramatically lowers skewness and kurtosis values, although still not fully normalized. Logarithm or other data changes didn't further improve the profitability or growth variables, so they were left as is in the model. The skewness and kurtosis of the third independent variable, company size, and the dependent variable, leverage ratio, improved significantly after the logarithmic change, so for these, this change was made in the model. The fourth variable, risk, in turn,

was completely removed from the analysis at this stage. The variable makes the regression model singular or poorly scalable which can affect to the reliability of the entire model and make the results unreliable. In addition, the variable gives very poor results, so deleting it is not seen as a problem. Appendix 3 shows the skewness and kurtosis of the original values and the logarithm (LN) ones.

Unlike the first research question, the second research question has four independent variables instead of just one. This makes the regression model multivariate from univariate. In this case, multicollinearity must be included in the background assumptions. The independent variables must therefore not be strongly correlated with each other. Table 10 shows a matrix of correlations between variables according to the Pearson correlation test.

Table 10. Correlation matrix of independent variables

Variable	*CSPP*	*Total assets (LN)*	*P/B*	*ROI*
CSPP	1,00			
Company size (Total assets LN)	0,18	1,00		
Company growth (P/B)	0,04	-0,14	1,00	
Company profitability (ROI)	-0,18	-0,12	0,27	1,00

According to the table, none of the variables correlates nearly as much as the multicollinearity assumes as maximum. The profitability variable ROI and the growth variable P/B correlate almost 30% in the same direction, but this doesn't cause problems or measures any further. Thus, these variables can well be used together as independent variables.

Table 11 shows the main tests for selecting panel data model and testing other background assumptions. The Matlab outputs can be found in appendix 4.

Table 11. Tests for panel data model selection and background assumptions

Test	**P-value**
F-test of individual effects	0.00
Breusch-Pagan's LM test for random effects	0.00
Wooldridge's test for autocorrelation	0.00
Hausmans test	0.00

As can be seen from the table 11, the results are identical to the results of the first research question. Thus, the null hypotheses at the 5 percent risk level are clearly rejected. This means that the model of fixed effects is used again, as it is observed that both fixed- and random effects are detected, but due to the endogenous observed in the model, the model of random effects cannot be used. Table 12 shows the research results of the fixed effects model.

Table 12. Results of the second research question

Model	Observations	Adjusted R- squared	P-value
Fixed effects	2143	0.108	0.007
Variable	Coefficient	Robust standard error	P-value
Constant	-5.630	3.172	0.082
CSPP	0.062	0.073	0.397
Company profitability (ROI)	-0.013	0.007	0.072
Company size (Total assets LN)	0.306	0.188	0.111
Company growth (P/B)	0.160	0.070	0.031

There are fewer observations in the model (2143) than in the first research question. This is due to the deletion of the Edenred company from the data. According to adjusted R-squared, this time the model explains about 11 percent of the variation in the dependent variable leverage ratio. This is a much higher proportion than for the first research question, due to the model of more than one independent variable. In comparison, however, the R-squared remains at a rather low level, given the existence of several in previous studies found statistically significant independent variables. However, the model as a whole is statistically significant at a p-value of 0.007.

Of the independent variables in this study, the most important, i.e., CSPP, has an increasing effect on the degree of leverage. This is logical and easy to understand by looking at the leverage averages before and after the CSPP period in the table 5. Debt to equity has thus increased in those companies that have ended up under the CSPP purchase program. However, the debt ratio has not increased statistically significantly, and the p-value is thus 0.397. Thus, the changes in the capital structures of companies have by no means been significant. Of the other independent variables, profitability also behaves as expected, decreasing the leverage rate of companies as profitability improves. This is also very close to statistical significance at a p-value of 0.072. The size of the company has an increasing effect on the leverage ratio. However, this is also not a statistically significant finding, but still more significant than CSPP. The only statistically significant variable at five percent risk level for this research question is growth. What makes this observation special, however, is that the coefficient of the growth variable is opposite to that of the OLS model, as well as to the observation made in the previously visually descriptive analysis. As observed in figure 8, it seemed easy to draw a descending linear line between growth and leverage ratio, i.e., a stronger growth means lower relative leverage. The model of fixed effects, in turn, gives the opposite observation, and yet is statistically significant. According to it, the leverage ratio in companies increases significantly with growth. This, phenomena, is called the Simpson's effect. The Simpson's effect occurs when the correlation between two variables becomes reversed when considering a third variable that correlates with both variables. (Pearl 2011) In this context, it means that the company, i.e., the unit of the fixed effects model, correlates with both the leverage ratio and the growth. The standard OLS model is not able to model this correlation, precisely because it doesn't consider these company- or unit-specific fixed effects. In this case, therefore, there are also fixed effects on the variability of the categorical company variable which correlates with growth. Thus, generally a higher growth ratio between companies means a higher leverage ratio, but within companies, higher growth leads to a lower leverage ratio. The leverage ratio decreases with higher growth in companies and doesn't grow as the OLS model and graph suggest. The Matlab outputs from the fixed effects model results can be found in appendix 5.

An important consideration is the confirmation of the traditional capital structure theory pecking order theory. The effects of the variables are exactly what the theory suggests, i.e., growth and company size increase the leverage ratio, while profitability decreases it. The

impact of the CSPP purchase program is also expected. The loose monetary policy and the subsequent quantitative easing have increased the amount of debt in the economy but also in the balance sheets of companies relative to equity. However, only the growth rate has a statistically significant effect on the debt ratio.

4.3 The results of the third research question

This subsection seeks to answer the previously identified third research question, whether the companies targeted by the CSPP increase their investments volumes. The aim is therefore to find out whether the amount of investment increases statistically significantly with additional funding, or whether the funding is channeled more to other purposes, such as operations, cash growth or dividend distribution. However, a more detailed analysis is not made of exactly where the money from the CSPP bonds has been spent but focuses on the amount of investment.

4.3.1 Third research question descriptive analysis

Figure 9 shows the average investments (capital expenditure) in fixed assets each year. The orange bars represent the CSPP period. The average annual investments for the entire 10-year period have been approximately 379 million. As can be seen from the figure, the annual average investments is at a higher level each year except in 2017 during the CSPP period than the full ten-year average. Especially in 2020, investment has been well above average.

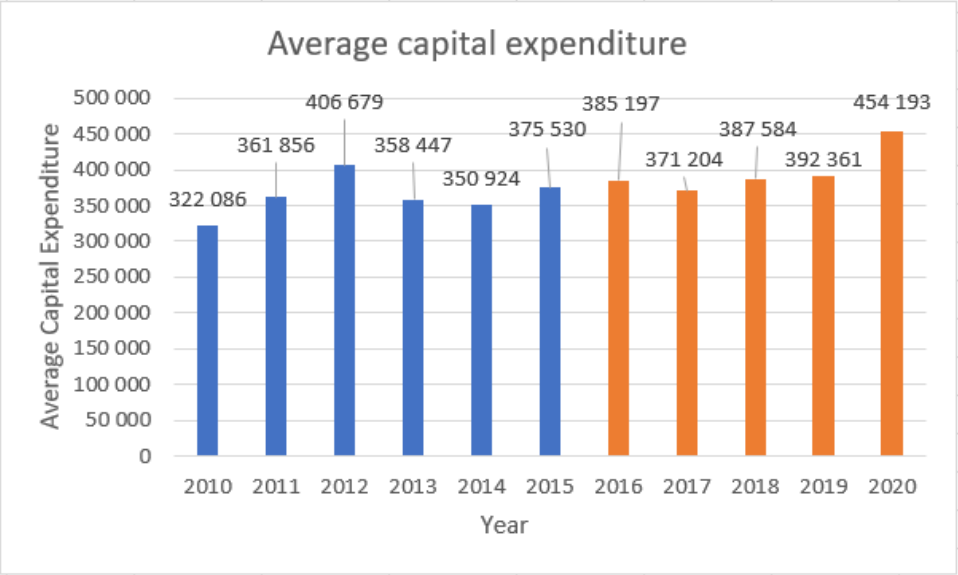

Figure 9. Average capital expenditure per year

What makes it interesting is that, as with the second research question, the figure for the last year in 2020 is much higher. This is also true for 2019, but not as strongly. Thus, the increase in the amount of debt has grown the balance sheets of companies, increased the leverage ratio and also increased the amount of investment in the economy. Thus, in line with the ECBs goals, money has also flowed into the economy in the form of investments, among other uses.

4.3.2 Third research question regression analysis

As with the first and second research question, the dependent variable investments addressed in the third research question is not normally distributed. However, direct data transformations don't positively affect the normality of the dependent variable. Nor can the modification of the as the deletion of outliers be performed in a sensible or justifiable manner. The observations of the dependent variable are very widely distributed around the mean in both directions, so deleting data from just one or two companies won't help the problem. For these reasons, the observations of the variable are left as is for analysis.

Table 13 shows the main tests for selecting panel data model and testing other background assumptions.

Table 13. Tests for panel data model selection and background assumptions

Test	**P-value**
F-test of individual effects	0.00
Breusch-Pagan's LM test for random effects	0.00
Wooldridge's test for autocorrelation	0.00
Hausmans test	0.84

As can be seen from the table 13, the results are identical to the results of the first and second research questions for the first three tests. The null hypotheses at the 5 percent risk level are clearly rejected. However, the Hausman tests null hypothesis is clearly accepted at 5 percent risk level. This means, that endogeneity is not found in the model, so this time random effects model can and will be used. More detailed Matlab outputs can be found in appendix 6. Table 14 shows the research results of the random effects model.

Table 14. Results of the third research question

Model	Observations	Adjusted R- squared	P-value
Random effects	2185	-42.586	0.265
Variable	Coefficient	Robust standard error	P-value
Constant	351 294	81 500	0.000
CSPP	55 806	50 039	0.265

There are 2185 observations, so the analysis covers the entire 10-year period as it was for the first research question. The adjusted R-squared is strongly negative. It means that residual sum of squares is very close to the total sum of squares, which means the explanation towards response is very low or negligible. Thus, the model explains almost no variation in the dependent variable. This is also seen in the p-value 0.265 of the model, which is not even close to the 5 percent risk level. Efforts were made to improve the model by introducing additional variables that were used in the second research question, but there was no significant improvement. Thus, it was decided to keep only the CSPP independent variable in the model. Constant coefficient of 351 294 includes the random effects of units. In the standard OLS model, it would include the average capital expenditure outside the CSPP

period, that is, when the independent variable is 0. In the random effects model, it also includes the random effects that are adjusted out of the CSPP independent variable. The CSPP coefficient of 55 805 (€55.8M) is an average increase in the capital expenditure of companies when the company is the target of the CSPP. However, the random effects, which appear in the constant coefficient, have been adjusted off from the independent variable coefficient. As mentioned earlier, the model doesn't produce statistically significant results. The CSPP period has an increasing effect on company fixed investment, but not statistically significantly. Nor will the result change significantly even if the analysis period changes. Appendix 7 shows the random effects Matlab outputs.

5. Conclusion

The aim of this thesis was to study the effects of the European Central Bank's (ECB) Corporate Sector Purchase Programme (CSPP) on the operation of companies. The purpose was first to understand how this purchase program has affected companies 'capital structure decisions. After this, the aim was to understand how this program has affected the investments made by companies. The study combined macroeconomics and traditional corporate finance. Thus, explanatory factors were sought for the capital structure decisions, both from the internal factors of the companies and from the macroeconomic environment. The CSPP naturally represented this macroeconomic component. This was the ultimate social purpose of the study. The effects of monetary policy on corporate financing and investment decisions have been studied less than traditional capital structure theories. Even fewer studies can be found where these research items are combined.

The capital structure part of the study was divided into the first two research questions. The first research question sought to understand whether the CSPP program had a significant impact on bond ratio growth. It was assumed that the companies would significantly increase their market debt, i.e., the amount of bonds on their balance sheets, after the ECB had included the companies in the CSPP program. This assumption was made because few previous studies had found a significant connection between CSPP and bond ratio. The second research question sought an answer to whether the CSPP program had a significant impact on company leverage ratio. This was chosen as the subject of the study, as it could logically be assumed that the amount of additional debt generated by the ECB on the corporate market would also increase the relative share of debt in company capital structures. However, based on previous studies, it was assumed that no significant relationship could be found. Exceptionally, for this research question, significant variables according to traditional capital structure theories such as profitability, growth, and size of the companies were included. The last third research question examined the relationship between CSPP and investment. The answer was sought as to whether the additional money generated by the ECB for the corporate market was channeled into investments made by companies, which accelerates economic growth. However, the assumption was that it won't affect to investments based on previous research.

The thesis started with a theoretical review, first dealing with monetary policy in general and its quantitative easing programs, such as the CSPP. In addition, traditional capital structure theories were discussed at the theoretical level. Theories were also illustrated on a practical level by presenting previous studies and their results. The research material and methodology were then discussed. The research material was based on 51 companies over a ten-year period (2010-2020) that had been CSPP targeted by the Banque de France. Regression analysis of either fixed effects, random effects, or ordinary least squares (OLS) model was chosen as the method depending on their suitability.

The results of the study were interesting. In the first research question, the CSPP had an effect on the company bond ratio, but not statistically significant. The amount of market-based debt has clearly increased in the balance sheets in relation to the total amount of debt if the entire ten-year period is the subject of the study. However, the bond ratio has clearly increased already a few years before 2016, when the CSPP began. It is therefore unclear what the real impact of the purchase program has been. In addition, the market values of bonds used in the study and their fluctuations obscure the understanding of companies 'correct financing decisions. For the first research question, it can be concluded that large companies have moved towards market-based debt financing over the last decade. However, the conclusion must be limited to the companies targeted by the Banque de France, since the fixed effects model used for the first research question doesn't allow the conclusions to be extended to a larger population.

The model formed for the second research question was statistically significant with an explanatory level of about 11 percent. As with the first research question, the CSPP had an increasing but not statistically significant effect on the dependent variable leverage ratio. The variable company size also had the same relationship. Higher profitability, in turn, had a declining but not statistically significant effect on leverage. Profitability reduces the need for debt in companies. The only statistically significant variable in the second study question was growth. For the growth variable, very strong company-specific effects were observed that were not observed of the descriptive graph or of the standard OLS regression. This meant that, in general, the higher growth rate between companies meant a lower leverage ratio. Within companies, however, the situation was the opposite, meaning that growth needed

more debt and increased leverage. Most interestingly, the effects of all internal variables were in line with pecking order theory. The results of the last research question were very similar to those of the first two. The CSPP thus had a positive but statistically insignificant relationship with the dependent variable, in this case investments.

The general conclusion for all research questions is the growth of the dependent variable as the decade progresses. Market-based debt to total debt, total debt to equity and investments have all increased in the 2010s. However, it's more difficult to understand the direct effect of CSPP on these variables. For example, the bond ratio has been high for a few years before the CSPP, and leverage and investments haven't grown very rapidly since the start of the CSPP. It's also interesting to note that there has been a sharp increase in all the dependent variables, especially in 2020, when the ECB strongly boosted the quantitative easing due to the COVID pandemic. It would be so interesting to see the figures for these variables in 2021-2022 to see if the trend has been permanent. Inflation has also risen sharply since 2020. For example, at the end of 2020, annual euro area inflation was negative, while at the end of 2021 it was around 5 percent. (Eurostat 2022) This speaks to the fact that money has indeed finally started circulating after a long period of quantitative easing. It would therefore be interesting to see how this would be reflected in the dependent variables. An in-depth study of company spending would also be an interesting topic for further research. Where is the capital of loose monetary policy really channeled? Whether, for example, investments, dividend distributions, or corporate cash has increased, or all of these, are good questions.

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Appendices

Appendix 1. Matlab output of panel data model selection and background assumptions

```
F test of individual effects

H0: All mu_i = 0
F(50,2133) = 87.707123
p-value = 0.0000

Breusch-Pagan's LM test for random effects

Baltagi and Li (1990) version of the Breusch and Pagan (1980) test
H0: sigma2_mu = 0
  LM = 20153.872451 ~ Chi2(1)
p-value = 0.0000

Wooldridge's test for serial correlation

H0: Corr(res_{T-1}, res_T) = rho. No serial correlation
rho = -1/(T-1) = -0.023256
F(1,50) = 592.960637
p-value = 0.0000

Hausman's test of specification

------------------------------------------------------------------------
        Varname |          A:RE          B:FE    Coef. Diff    S.E. Diff
------------------------------------------------------------------------
           CSPP |      0.040407      0.039991      0.000416      0.000078
------------------------------------------------------------------------
A is consistent under H0 and H1 (A = RE)
B is consistent under H0        (B = FE)
H0: coef(A) - coef(B)  = 0
H1: coef(A) - coef(B) != 0
      H = 28.775260 ~ Chi2(1)
p-value = 0.0000
```

Appendix 2. Matlab output of the results of first research question

Panel: Fixed effects (within) (FE)

N = 2185 n = 51 T = 8,...,42.84,...,44 (Unbalaced panel)
R-squared = 0.01534 Adj R-squared = -0.00821
Wald F(1, 50) = 3.616980 p-value = 0.0630
RSS = 47.347098 ESS = 543.065499 TSS = 590.412597
Standard errors robust to heteroskedasticity adjusted for 51 clusters

Bond ratio	Coefficient	Rob.Std.Err	t-stat	p-value
CSPP	0.039991	0.021028	1.9018	0.063 *

Individual Effects
Standard errors robust to heteroskedasticity adjusted for 51 clusters

id	ieffect	Rob.Std.Err	t-stat	p-value
1	0.663872	0.146705	4.5252	0.000 ***
2	0.556777	0.146983	3.7881	0.000 ***
3	0.662358	0.146814	4.5115	0.000 ***
4	0.120073	0.146780	0.8181	0.417
5	0.621575	0.146954	4.2297	0.000 ***
6	0.436617	0.146765	2.9749	0.005 ***
7	0.523665	0.146983	3.5628	0.001 ***
8	0.538388	0.146983	3.6629	0.001 ***
9	0.640967	0.146927	4.3625	0.000 ***
10	0.506941	0.146901	3.4509	0.001 ***
11	0.247656	0.146927	1.6856	0.098 *
12	0.446832	0.146983	3.0400	0.004 ***
13	0.059362	0.146721	0.4046	0.688
14	0.550690	0.150424	3.6609	0.001 ***
15	0.417019	0.146983	2.8372	0.007 ***
16	0.264769	0.146954	1.8017	0.078 *
17	0.732092	0.202916	3.6079	0.001 ***
18	0.367698	0.146983	2.5016	0.016 **
19	0.836875	0.146983	5.6937	0.000 ***
20	0.464292	0.146983	3.1588	0.003 ***
21	0.589020	0.146705	4.0150	0.000 ***
22	0.278759	0.146983	1.8965	0.064 *
23	0.487817	0.146983	3.3189	0.002 ***
24	0.486627	0.146983	3.3108	0.002 ***
25	0.409665	0.146983	2.7872	0.007 ***

26	0.465878	0.146901	3.1714	0.003 ***
27	0.014188	0.146705	0.0967	0.923
28	0.331617	0.146983	2.2562	0.028 **
29	0.485501	0.146983	3.3031	0.002 ***
30	0.443418	0.146983	3.0168	0.004 ***
31	0.307370	0.146983	2.0912	0.042 **
32	0.979206	0.146927	6.6646	0.000 ***
33	0.100214	0.146983	0.6818	0.499
34	0.241911	0.146702	1.6490	0.105
35	0.291583	0.146927	1.9845	0.053 *
36	0.784812	0.146983	5.3395	0.000 ***
37	0.554899	0.146983	3.7753	0.000 ***
38	0.138451	0.146983	0.9420	0.351
39	0.413204	0.146983	2.8112	0.007 ***
40	0.410835	0.146954	2.7957	0.007 ***
41	0.068596	0.146714	0.4675	0.642
42	0.451101	0.146983	3.0691	0.003 ***
43	0.122896	0.146709	0.8377	0.406
44	0.573257	0.146983	3.9002	0.000 ***
45	0.528725	0.146983	3.5972	0.001 ***
46	0.534353	0.146983	3.6355	0.001 ***
47	0.516366	0.146983	3.5131	0.001 ***
48	0.107201	0.146954	0.7295	0.469
49	0.800085	0.146983	5.4434	0.000 ***
50	0.399269	0.146983	2.7164	0.009 ***
51	0.266556	0.344136	0.7746	0.442

Appendix 3. Skewness and kurtosis of second research question independent variables

	Skewness	Kurtosis
Leverage ratio	2,29	7,38
Leverage ratio LN	-0,80	2,06

	Skewness	Kurtosis
Total assets	5,44	31,73
Total assets LN	0,38	0,50

	Skewness	Kurtosis
ROI	1,35	20,66
ROI LN	-8,41	127,02

	Skewness	Kurtosis
P/B	1,48	3,35
P/B LN	-0,11	-0,02

Appendix 4. Matlab output of panel data model selection and background assumptions

F test of individual effects

```
H0: All mu_i = 0
F(49,2089) = 97.055037
p-value = 0.0000
```

Hausman's test of specification

Varname	A:FE	B:RE	Coef. Diff	S.E. Diff
CSPP	0.062055	0.084322	-0.022267	0.003968
ROI	-0.012557	-0.013224	0.000666	0.000000
Totalassets LN	0.305798	0.237369	0.068428	0.020251
P/B	0.155544	0.147419	0.008125	0.001933

```
A is consistent under H0 and H1 (A = FE)
B is consistent under H0        (B = RE)
H0: coef(A) - coef(B)  = 0
H1: coef(A) - coef(B) != 0
      H = 892.463995 ~ Chi2(4)
p-value = 0.0000
```

Breusch-Pagan's LM test for random effects

```
Baltagi and Li (1990) version of the Breusch and Pagan (1980) test
H0: sigma2_mu = 0
  LM = 15188.986350 ~ Chi2(1)
p-value = 0.0000
```

Wooldridge's test for serial correlation

```
H0: Corr(res_{T-1}, res_T) = rho. No serial correlation
rho = -1/(T-1) = -0.023256
F(1,49) = 534.335791
p-value = 0.0000
```

Appendix 5. Matlab output of the results of second research question

Panel: Fixed effects (within) (FE)

N = 2143 n = 50 T = 8,...,42.86,...,44 (Unbalaced panel)
R-squared = 0.12972 Adj R-squared = 0.10765
Wald F(4, 49) = 4.015546 p-value = 0.0068
RSS = 435.431531 ESS = 1342.500215 TSS = 1777.931746
Standard errors robust to heteroskedasticity adjusted for 50 clusters

Leverage ratio	Coefficient	Rob.Std.Err	t-stat	p-value
CSPP	0.062055	0.072674	0.8539	0.397
ROI	-0.012557	0.006826	-1.8395	0.072 *
Totalassets LN	0.305798	0.188156	1.6252	0.111
P/B	0.155544	0.069903	2.2252	0.031 **

Individual Effects
Standard errors robust to heteroskedasticity adjusted for 50 clusters

id	ieffect	Rob.Std.Err	t-stat	p-value
1	-5.201045	3.042792	-1.7093	0.094 *
2	-5.133802	3.059526	-1.6780	0.100 *
3	-5.604548	3.186570	-1.7588	0.085 *
4	-4.203502	2.959574	-1.4203	0.162
5	-5.571831	2.987465	-1.8651	0.068 *
6	-5.981684	3.047092	-1.9631	0.055 *
7	-6.803466	3.865740	-1.7599	0.085 *
8	-5.539827	3.284703	-1.6866	0.098 *
9	-6.005302	3.086264	-1.9458	0.057 *
10	-5.167430	3.328473	-1.5525	0.127
11	-4.662575	3.167773	-1.4719	0.147
12	-5.754289	3.271005	-1.7592	0.085 *
13	-6.971064	2.929323	-2.3798	0.021 **
15	-5.595015	3.658966	-1.5291	0.133
16	-3.897020	3.239712	-1.2029	0.235
17	-4.623051	2.981297	-1.5507	0.127
18	-5.932274	3.573057	-1.6603	0.103
19	-4.666086	2.961882	-1.5754	0.122
20	-5.494803	3.114688	-1.7642	0.084 *
21	-5.281368	2.954718	-1.7874	0.080 *
22	-5.676680	2.924993	-1.9407	0.058 *
23	-6.153859	3.195965	-1.9255	0.060 *
24	-4.750647	3.143447	-1.5113	0.137
25	-5.820530	3.251769	-1.7900	0.080 *

25	-5.820530	3.251769	-1.7900	0.080 *
26	-5.721327	2.996056	-1.9096	0.062 *
27	-8.321500	3.264286	-2.5493	0.014 **
28	-6.752080	3.365711	-2.0061	0.050 *
29	-4.890255	2.756713	-1.7739	0.082 *
30	-5.342654	3.458692	-1.5447	0.129
31	-5.772029	3.228251	-1.7880	0.080 *
32	-6.043600	3.182090	-1.8993	0.063 *
33	-5.257548	3.460947	-1.5191	0.135
34	-6.103004	3.238295	-1.8846	0.065 *
35	-5.975593	3.328876	-1.7951	0.079 *
36	-7.011684	3.468528	-2.0215	0.049 **
37	-6.358247	3.289409	-1.9329	0.059 *
38	-6.763346	3.371617	-2.0060	0.050 *
39	-5.456008	3.097116	-1.7616	0.084 *
40	-5.252802	2.925982	-1.7952	0.079 *
41	-4.815541	3.253441	-1.4801	0.145
42	-3.823994	2.832122	-1.3502	0.183
43	-6.593128	3.193902	-2.0643	0.044 **
44	-6.240168	3.292835	-1.8951	0.064 *
45	-5.099262	3.077952	-1.6567	0.104
46	-5.637893	3.297057	-1.7100	0.094 *
47	-4.839010	3.398918	-1.4237	0.161
48	-5.226734	3.306831	-1.5806	0.120
49	-6.174138	3.118243	-1.9800	0.053 *
50	-4.509169	3.367532	-1.3390	0.187
51	-7.030772	3.591516	-1.9576	0.056 *

Appendix 6. Matlab output of panel data model selection and background assumptions

---

F test of individual effects

H0: All mu_i = 0
F(50,2133) = 195.755915
p-value = 0.0000

Hausman's test of specification

Varname	A:FE	B:RE	Coef. Diff	S.E. Diff
CSPP	55723.865548	55805.567085	-81.701537	412.306347

A is consistent under H0 and H1 (A = FE)
B is consistent under H0 (B = RE)
H0: coef(A) - coef(B) = 0
H1: coef(A) - coef(B) != 0
H = 0.039266 ~ Chi2(1)
p-value = 0.8429

Breusch-Pagan's LM test for random effects

Baltagi and Li (1990) version of the Breusch and Pagan (1980) test
H0: sigma2_mu = 0
LM = 31510.008483 ~ Chi2(1)
p-value = 0.0000

Appendix 7. Matlab output of the results of third research question

```
Panel: Random effects (RE)

N = 2185  n = 51  T = 8,...,42.84,...,44 (Unbalaced panel)
R-squared = 0.00216    Adj R-squared = -42.58560
Wald Chi2(1) = 1.243757 p-value = 0.2647
RSS = 200029440226643.281250 ESS = 1209154466954959.250000 TSS = 1409183907181602.500000
Standard errors robust to heteroskedasticity adjusted for 51 clusters

------------------------------------------------------------------------
    Investments |   Coefficient   Rob.Std.Err      z-stat    p-value
------------------------------------------------------------------------
           CSPP |  55805.567085  50039.132782      1.1152    0.265
          CONST | 351293.951815  81499.819767      4.3104    0.000 ***
------------------------------------------------------------------------
sigma_mu = 644889.774185      rho_mu = 0.819391
 sigma_v = 302768.065711     sigma_1 = 646675.549739
   theta = 0.836251,...,0.929399,...,0.929399
------------------------------------------------------------------------
```