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"Has the ECB's Monetary Policy Prompted Companies to Invest or Pay Dividends?"

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Abstract

This paper focuses on how the European Central Bank's (ECB) monetary policies influenced non-financial firms. The paper's two main contributions are, first, to shed light on non-financial firms' decisions on leverage, and how the ECB's conventional and unconventional policies may have affected them. Second, the paper also examines how these policies influenced non-financial firms' decisions on capital allocation – primarily capital spending and shareholder distribution (for example, dividends and shares repurchases). Towards this end, we use an exhaustive and unique dataset comprised of income statements and balance sheets of leading non-financial firms that operate in the European Economic and Monetary Union (EMU). The main results suggest that ECB's monetary policies have encouraged firms to raise their debt burden especially after the global recession of 2008. Finally, the ECB's policies, mainly after 2011, seem to have also stimulated non-financial firms to allocate more resources towards not only capital spending but also shareholder distribution

JEL classification: E52, E58, G31, G32.

Keywords: ECB's monetary policy, capital structure, leverage, quantitative easing, capital expenditure, dividend's policy, shareholder yield.

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1. Introduction

In recent years, one of the main problems faced by developed countries has been the combination of slowing economic growth and lack of inflation in an environment of zero lower bound on interest rates. Summers (2013) brought back the term Secular Stagnation – first coined by Hansen (1939) – to describe the economic environment in the United States (US) since the 2008-2009 Global Financial Recession. This term implies that central banks cannot slash interest rates enough to boost investment and consumption. Indeed, the situation where a central bank is hitting the zero-lower bound is known "liquidity trap" and has fostered vast literature where the effectivity of different fiscal and monetary policies (central bank's extraordinary monetary measures, among them) to boost economic activity has been examined. See, for example, Krugman (1998), Krugman and Eggertsson (2012), Orphanides (2004), Bernanke and Reinhart (2004), and Koo (2011, 2013), to name a few.

On the other side of the Atlantic, the European Economic and Monetary Union (EMU) countries –who, unlike the US, are not part of a fiscal union, but only of a monetary one – faced a similar plight. So, the responsibility of the European Central Bank (ECB) to stimulate the euro area economy has been higher than that of the Federal Reserve and has therefore been translated into a full bunch of different conventional and unconventional monetary policies. Summing up, in 2011-2012, after the worst years of the European sovereign debt crisis, the ECB tried to boost liquidity in financial markets by introducing the Securities Markets Program (SMP) – first announced in May 2010 – whose objective was to inject funds into specific market segments that were suffering from insufficient liquidity and depth[1]. The SMP, unlike a quantitative easing program, only injected funds to small and somewhat fewer liquid markets that engulfed with high-risk premium. On July 26, 2012, Mario Draghi (who entered office as President of the ECB on November 2011), promised to do "whatever it takes" to preserve the Euro with the aim to rekindle economic growth in the EMU (Draghi, 2012). Since then, the ECB has introduced several conventional and unconventional stimulating monetary policy measures. Some of these policies include slashing interest rates (including cutting its cash rate to zero and the deposit rate to -0.4% by March 2016), implementing both the longer-term refinancing operations (LTRO) and targeted longer-term refinancing operations (TLTRO), and introducing quantitative easing programs or QE. The main QE programs introduced include the public sector purchase program (PSPP), the asset-backed securities purchase program (ABSPP), a covered bond purchase program (CBPP3), and the corporate sector purchase program (CSPP). As of January 2018, the PSPP was the most massive program among all the assets purchase programs the ECB has implemented with over 1.9 trillion euros in holdings, and it accounts for

[1] This program included buying sovereign bonds from five distressed EMU countries: Italy, Ireland, Spain, Portugal, and Greece. In November 2011, the ECB also launched the CBPP 2, which extended CBPP1, aiming to purchase additional covered bonds. After the arrival of Draghi, however, these programs were phased out – the SMP purchases ended in February 2012 and as under the CBPP ended in October 2012.

over 82% of the total asset purchase programs. Table 1 summarizes the most significant announcements regarding the conventional and unconventional monetary policies implemented by the ECB during the recent period.

[Insert Table 1 here]

In this context, this paper aims to examine whether ECB's conventional and unconventional monetary policies in times of crisis influenced non-financial firms' decisions. Specifically, the paper focuses on three critical issues: Leverage, investments and shareholders distribution (which comprises primely of dividends and shares buybacks). The contribution of this paper to the existing literature is twofold. First, it examines how ECB monetary policies in times of crisis have affected non-financial firms' decisions on leverage. Second, it analyzes how those policies have influenced non-financial firms' decisions on capital allocation – primarily capital spending and shareholder distribution (for example, dividends and shares repurchase). To the best of our knowledge, this is the first paper to take such a deep dive into the study of the effects of the ECB's policies on non-financial firms. To that end, we use an exhaustive and unique dataset comprised of income statements and balance sheets of leading non-financial firms that operate in EMU countries.

The main results suggest that the ECB's conventional and unconventional policies encouraged firms to raise their debt burden especially after the global recession of 2008. Moreover, the ECB's monetary policies – mainly after 2011 in the wake of the European economic crisis and as the ECB shifted its monetary policy as Mario Draghi entered office – seem to have also stimulated non-financial firms to allocate more resources towards not only capital spending but also shareholders distribution.

The rest of the paper is organized as follows. Section 2 includes a literature review of the effects of the ECB's monetary policies on non-financial firms. Section 3 presents the analytical framework. Section 4 describes the data used in the paper. Section 5 explains the econometric methodology while Section 6 reports the empirical results. Finally, Section 7 presents the concluding remarks and suggests some possible policy implications.

2. The ECB's monetary policies' effects on non-financial firms

An extensive literature has studied the impact of ECB's policies since 2011 from different perspectives and using different methodologies; however, only a few papers have focused on its effects on non-financial corporations despite its crucial role in the economy[2]. Lenza *et al.* (2010) and Giannone *et al*. (2012a and 2012b) focus on the impact of the ECB's monetary policy on macroeconomic variables by applying VAR methods. Peersman (2011) and Gambacorta *et al.* (2014) examine the relations between

[2] According to Eurostat, non-financial firms account for nearly 58% of the total gross added value in the Euro Area and 55% of Euro Area's gross fixed capital formation (2002-2017 average).

the ECB's balance sheet and macroeconomic conditions. They estimate a panel of eight advanced economies and show that a surprise rise in a central bank's balance sheet – mostly via QE programs – would raise liquidity (supply side), mainly in countries where central banks are already hitting the zero-lower bound and under the prevailing conditions following the global economic crisis of 2008. Cycon and Koetter's (2015) research suggests that the ECB's unconventional monetary policy reduces refinancing costs. Although it does not lower loan rates; the ECB's policy does mitigate the rise in loan prices because of higher credit demand.

Besides this extensive literature, only a few papers attempted at showing the link between non-financial corporations' investments in the EMU and the ECB's monetary policy. Kanga and Levieuge (2017) assess the effects of the different ECB's unconventional monetary policies on the cost of credit of non-financial firms in each EMU country. Daetz *et al.* (2016) focus, albeit not exclusively, on the impact of the ECB's LTROs on non-financial firms' cash holdings and concluded that the ECB's measures were most beneficial to corporations from peripheral countries. Darracq-Paries and De Santis (2015), who look at the effects of the 3-year long-term refinancing operations (LTROs) by considering them as a credit supply shock, show that LTROs have helped to elevate the growth rate of real GDP and to raise the prospects of loan provisions for non-financial firms. Arce et al. (2018) show that the ECB's CSPP appear to encourage Spanish firms to issue more bonds and use these funds to increase real investment. Finally, according to Ferrando *et al.* (2015) small and medium enterprises – that are more reliant on local bank credit – are more harshly impacted by the euro area's credit crisis than large companies that were able to seek funding aboard. This result is more evident in the stressed countries (Spain, Italy Greece Portugal, and Ireland) than in the rest of the EMU countries.

On the whole, the existing literature that has already focused on the effects of ECB's unconventional monetary policy on non-financial corporations is not only scarce but has not focused on how the different types of policy measures affected companies' decisions on capital structure and capital allocation. This paper will try to fill this gap in the literature.

3. Analytical framework

In order to better analyze how the ECB's monetary policy affected non-financial firms, in this Section, we first review the literature on the optimal choice of the firm's capital structure in order to examine whether those models might shed some light on the relationship between interest rates and companies' leverage. Then, we examine more deeply how interest rates could influence a firm's decision to allocate its capital between investments and profits distribution – via dividends and buybacks, or a combination of the two.

3.1. Capital structure

One of the first studies on the optimal choice of the firm's capital structure is the seminal paper by Modigliani and Miller (1958) who propose the "leverage theorem". The theorem states that, in a context of asymmetric information between companies and investors, a firm determines its leverage ratio based on the capital cost and access to finance. However, since then a couple of other alternative theories was proposed by other authors later [Myers (1984), Kraus and Litzenberger (1973) or Merton (1974), to name a few]. Myers (1984) frame a company's choice under the "pecking order" theory which points out that firms prefer internal funds such as retained earnings to external financing, and debt to equity. Kraus and Litzenberger (1973) offer a competing view (the "trade-off" theory); this view assumes every company achieves an optimal capital structure (a "debt target") at any point in time and trade off tax advantages from debt against refinancing risk. Other authors consider market conditions – including interest rates – as a variable that might influence companies' decision on their capital structure. Merton (1974), for example, examine from a theoretical perspective how changes in macroeconomic conditions influence companies on matters such as debt, while Barry *et al*. (2008) examine this subject albeit empirically. Based on their research, in general, lower interest rates should allow companies to increase their leverage as they reduce their borrowing costs.

The theories mentioned above have different implications, not only in the reasons underneath the company's decision to issue more debt but also in the effects that interest rate changes have on that decision. Although there is no consensus on the effect that interest rate changes have on capital structure decisions, our aim in this paper is not to explore the accuracy of those models. However, we aim to use them as a background to build up an econometric framework to examine how those changes may impact firms' leverage decisions.

3.2. Capital spending, dividends, and buybacks

One of the ECB's goals through its extraordinary monetary policies was to boost investment. This goal has a simple underlying logic that investments and interest rates are negatively correlated. This logic is prominent in a simple Keynesian IS-LM model where interest rate and its coefficient of interest sensitivity determine investment:

$$I = \bar{I} + dr$$

In the above equation $d>0$ stands for the coefficient of interest sensitivity and, under normal economic conditions, falling interest rates should lead to higher investments and lift the aggregate demand to a higher equilibrium. This relationship between interest rates and investment has mainly been examined from an empirical perspective in the literature and its evolution in EMU countries from 1999 until the present is in Figure 1. This Figure shows that it is not clear-cut in the euro area since it only suggests a limited relationship between investments and yields (the correlation over the period is not

significant, although the fall in interest rates since 2014 coincided by a steady rise in investment in EMU countries).

[Insert figure 1 here]

Nonetheless, the aim of this paper goes beyond that relationship, since the goal is to analyze not only the effect of interest rates on investments but also on dividends and buybacks. To the best of our knowledge, this is the first paper that examines how companies change their capital allocation among investments, buybacks, and dividends due to changes in interest rates. We present below a simple analytical framework to better understand those relationships and the underlying assumptions behind them.

Let us consider that a company, which already took on a debt obligation, needs to decide how to allocate its resources. Specifically, consider a company that needs to evaluate how much to invest in a particular project – noted as I – versus how much it should allocate towards returning capital to shareholders – in the form of dividends or buyback and noted as V– over a timeframe of two periods:

$$Z_i = \frac{\pi(I)}{1+r} + \rho V \qquad (1)$$

Z_i is the added value to the company's stock price, which the firm aims to maximize. The firm has a budget constraint of:

$$1 = \mathrm{I} + V \qquad (2)$$

This constraint means that the company has to use all its resources towards an investment I in a particular project or paying its shareholders via dividends or buybacks – noted as V – or a combination of both (we are assuming that there are no other alternatives, for example, keeping the capital in cash).

The investment I will yield a return in time one of a profit of $\pi(I)$ – a convex, continuous function of I – (let us assume that the company can allocate any portion it desires towards a particular project). This profit will need to be discounted with $1 + r$. Where r in this equation stands for the company's cost of debt. For simplicity, assume that r stands for the prevailing market interest rates (in other words, the company's risk premium over the market is zero). Conversely, the company can allocate V towards shareholders via dividends or buybacks. This shareholder distribution has a positive and constant return set to ρ. This parameter represents the added value associated from a company repurchasing its stocks back or paying dividends to its investors. Put differently, we consider that profit distribution creates value to its shareholders in the form of a signaling mechanism about the positive prospects of a company's future returns – especially if the company's value is undervalued according to the company's management. This positive correlation could be explained by agency costs, information asymmetries, and market irrationality, as Fairchild (2006) points out. In other words, a

shares buyback could signal to investors a company is doing well, and its stock is undervalued. This signal will justify a specific return for the company, over time, for these profits' distributions[3]. In this vein, the empirical research that has been done on this matter has also shown the positive relationship between buybacks and stock prices [see Wang *et al*. (2008), McNally (1999) and Gup and Nam (2001)]. However, with regards to the relation between dividends and firm valuation (as Black and Scholes (1974) examine in detail), the empirical research is not conclusive. In particular, Denis and Osobov (2008) use an international comparison to show minimal empirical evidence for a signaling effect for dividend-paying companies; while Wood and Frankfurter (2002) and Bernhardt *et al.* (2005) call into question the validity of signaling theories for dividends[4]. In any case, for our model, we consider shares buybacks and their more established positive relation with firm's value to justify a company's decision to allocate capital towards them over investing[5]. In the econometric estimation, however, we use a broader term: "shareholder yield" that includes dividends, buybacks and deleveraging. With these methods, firms can return value to investors as a signaling mechanism.

Given these assumptions, we can solve the firm's maximization problem[6] to know how it distributes its capital in time zero between *V* and *I*, based on prevailing market interest rates. The Lagrangian equation is:

$$\mathcal{L} = \frac{\pi(I)}{1+r} + \rho V + \lambda(\mathrm{I} + V - 1) \qquad (3)$$

The First order condition (FOC) for the investment is:

$$\pi'(I) = -\lambda(1 + r) \qquad (4)$$

While the FOC for the shareholder distribution is:

$$-\rho = \lambda \qquad (5)$$

These two FOCs before accounting for the λ budget constraint leads to:

[3]Dividends tend to be "stickier"; furthermore, even if market conditions are not good, a company will be more incline to maintain its dividend not to alarm investors from a possible selloff of the stock. Conversely, if a company faces a transitory gain then it will be more incline to distribute its windfall through buybacks rather than raise dividend and thus lift expectations about future dividend. That could explain the rise in the prevalence of buybacks as they have become more ubiquitous in recent years mainly, however not solely, in the United States.

[4] Conversely, the research done by Hussainey *et a*l (2011) and Garrett, and Priestley (2002) supported the positive relation between dividends and share prices.

[5] Even when interest rates fall, both investments and shareholders yield could remain subdued due to low productivity and earnings growth – because expected lower growth leads to lower growth in investments. If companies face higher capital costs due to heightening risk in the markets (as measured, in one way, via Weighted Average Cost of Capital, WACC), they may opt out of taking risk even as interest rates continue to decline. Conversely, falling equity pricing tend to prop up dividend yields. Lower equity prices could also lead to repurchasing stocks over investing for some companies. Finally, when it comes to banks, they have been more reluctant to provide loans, in part, because of the new capital restrictions (e.g. Basel III) and for them being more prudent after the financial global crisis of 2008 (this could explain the rise in the variance of the interest rates on loans in recent years).

[6] This maximization problem does not account for the difference between growth companies and value companies. Where the former tends to allocate more towards investments and the latter tends to prioritize shareholder distribution.

$$\frac{\pi'(I)}{(1+r)} = \rho \qquad (6)$$

The solution shows that a company assesses a project based on two parameters: ρ the company's return to shareholders, and r. Therefore, a company divides its resources between investments and shareholders distribution until the discounted marginal return on a given project is equal to the added value a dividend or buyback has on a company's stock price. This is the framework that might help us understand how monetary policy changes could impact non-financial firms' decisions on capital expenditure and shareholder yield[7].

4. Data

We gathered the data directly related to the companies' financials from Bloomberg. We focus on non-financial firms listed in the leading stock exchanges from the four largest economies in the EMU: Germany, France, Spain, and Italy (and fair out as a good representation for the entire EMU because their aggregate GDP accounted for roughly 75% of EMU's GDP in 2017) from 2000 to 2017 [Deutsche Börse (DAX), BME Spanish Exchanges (IBEX35), Borsa Italiana (FTSE MIB), Euronext Paris (CAC40)]. Explicitly, we gather quarterly data from a total of 62 non-financial firms (banks and insurance companies are excluded) that register a market capitalization of 2 trillion euros at the beginning of 2017 (which represents nearly a third of the total market capitalization of non-financial firms in the four leading stock exchanges). Therefore, our analysis focuses on large-cap companies since, although their number is not high, they represent a sizable portion of the market value of publicly traded non-financial firms in the EMU.

For our analysis, we use three main dependent variables: "CapEx-to-sales", "Debt-to-equity" and "Shareholder yield[8]" that capture capital spending, leverage, and capital distribution to shareholders, respectively. Figures 2 and 3 show the high correlation between the first two variables behavior in the 62 companies included in the sample and in the four largest economies in the EMU (Germany, France, Spain and Italy) while a detailed description of them, together with the rest of the variables used in our analysis, is in Appendix A.

[Insert Figures 2 and 3 here]

[7] To examine how these relationships work, we run simulations under different assumptions and investment functions. The results of these simulations suggest under the baseline parameters, as r falls, companies tend to allocate more towards investment over shareholders returns. However, as ρ rises and interest rates fall, the tradeoff between investment and shareholder distribution tends to flatten. In other words, if the added value to shareholder is high enough mainly in low interest rates environment, a further fall in interest rate will not encourage firms to allocate more resources towards investments over shareholder distribution. Conversely, if ρ is low, investment allocation is more likely to crowd out shareholder distribution as interest rates decline.

[8] Because of data restrictions, we use the total amount a company returns to its shareholders by distributing dividends, repurchase shares or paying back debt as a proxy of the "shareholder yield".

To produce a data matrix without missing values, we apply two complementary procedures: the technique of multiple imputation developed by King *et al.* (2001) (which permits the approximation of missing data and allows us to obtain better estimates) and the simultaneous nearest-neighbor predictors proposed by Fernández-Rodríguez *et al*. (1999) (that infers omitted values from patterns detected in other simultaneous time series).

As for the monetary policy independent variables, we use changes to the ECB's assets and the 3-month Euribor interest rate. The ECB's assets are used because they show the different policy measures the ECB has employed over the years concerning changes to its balance sheet. This variable does not distinguish the different policy schemes such as LTRO, TLTRO, PSPP, ABSPP, CBPP3, and CSPP[9]. These programs have different targets, starting points, budgets and some have even winded down in recent years. However, all these policies aim to boost liquidity and reduce borrowing costs. Moreover, since late 2014 the majority of the growth in the ECB's assets is attributed to the PSPP. Appendix B includes further details about their progression. As such, we pick the changes to the ECB assets to show how these conventional and unconventional policies, without distinction, affect companies' decisions. We then use the 3-month Euribor as a proxy of the ECB's direct impact on interest rates. We decided to use this variable rather than the ECB's deposit rate because it has a more direct connection to the interest rates faced by companies (nonetheless, Appendix C shows that they are highly correlated).

Finally, we also take into account that two substantial economic events occured during our sample period: (1) the global economic recession of 2008 and (2) the peak of the European debt crisis in 2011-2012, that not only could have played a substantial role in swaying European companies' decisions but might have also determined the ECB's monetary policy (another important event occurred in late 2011 – the entrance of Mario Draghi to the ECB as president that has changed the direction of the ECB's monetary policy). Based on the above, we decided to split the sample into two points in time to capture these major events: 2008Q1 (we set this quarter as a tipping point in time for the global economic recession), and 2011Q3 (we decided to set 2011Q3 to examine not only whether the European debt crisis may have had an impact on the results but also if Mario Draghi's ECB leadership had affected them). In total we have five different time frames that we have examined: The first covers the period 2000Q2-2008Q1; the second spans from 2008Q2 to 2017Q4; the third ranges from 2000Q2 to 2011Q3; the fourth spans between 2011Q4 and 2017Q4; and the last one covers the entire period from 2000Q2 to 2017Q4.

5. Econometric Estimation

[9] A breakdown of the different QE programs is offered in Table B1.

Based on the theoretical framework laid out in Section 4 we estimate the econometric models to examine the role of monetary policy in determining firms' capital spending, leverage and shareholder payouts. Our panel data analysis relies on Blundell and Roulet (2013) who looked at 4,000 global companies and examined the impact of low interest rates – which directly resulted from the monetary policies of central banks including the Federal Reserve, the ECB and Bank of Japan in recent years– on their investments. They conclude that, since capital spending depends on the cost of equity and uncertainty, low interest rates and tax benefits incentivizes long-term investment (because debt finance is cheap, companies have an incentive to borrow and carry out buybacks –also known as de-equitation–)[10]

5.1. Leverage

Two of the most widely models used in the literature to analyze the way a company decides on its capital structure are the tradeoff model of Kraus and Litzenberger (1973) and the pecking order model of Myers (1984). The former model looks at a company's aim to raise its debt load until it reaches a specific debt ratio target, whilst according to the latter model, a company will first exhaust its internal funds (available cash) before raising funds from debt and equity. However, these two models neither analyze the relationship between interest rates and the company's decisions on debt as described in Section 3.1, nor examine the role of macroeconomic or monetary policy factors (such as QE programs) on the capital structure of firms. Therefore, following Kühnhausen and Stiber (2014)[11], in our model, we incorporate external variables that could influence a company's decision on its debt-to-equity ratio ($L_{i,t}$ is the dependent variable in the model which measures the company's debt burden or leverage):

$$L_{i,t} = \alpha_{i,t} + \beta_1 * X_{i,t-1} + \beta_2 * Y_{t-1} + \beta_3 * Z_{t-1} + \varepsilon_{i,t} \quad (7)$$

As equation 7 shows, our model includes three prime independent variables. The first (*X* vector) corresponds to microeconomic variables that are attributed to each company – they are also realted to tradeoff and pecking order models–. The second (*Y* vector) comprises macroeconomic variables that may proxy the changes in the economy. Finally, the third (*Z* vector) includes variables which are directly or indirectly related to ECB's monetary policy and proxy supply-side developments[12].

For our purposes, the monetary policy variables (*Z* vector) are the most important ones. They include the ECB's asset levels – a proxy to the ECB's asset purchase programs

[10] The issue of leveraged buybacks in sovereign debt has been examined by Baglioni (2015), however the process of leveraged buybacks of non-financial firms in times of QE programs is less researched.

[11] Their model is based on Rajan and Zingales (1995) and include five macroeconomic factors: GDP per capita, the growth rate of GDP (in constant local currency), inflation rate, interest rate, and tax rate.

[12] All independent variables, except WACC, lag the dependent variable by one period.

and loans– and changes in 3-month Euribor interest rate. Since the ECB added more funds to the economy and brought down interest rates to encourage companies to take on more loans, we should expect a negative correlation between companies' leverage and interest rates and a positive correlation with the changes in the ECB' assets. Regarding the microeconomic variables (*X* vector), three variables are included in the model: profitability (EBITDA-to-sales), growth in profits (growth in earnings per share or EPS) and WACC. We include the variables profitability and growth in profits as they play an important role in determining the leverage of a company as described by both Myers (1984) and Kraus and Litzenberger (1973)[13] while the cost of capital (estimated by the Weighted Average Cost of Capital (WACC)) is a critical variable in this kind of models and a negative relationship between it and the leverage ratio should be expected. Finally, as regards the macroeconomic variables (*Y* vector), we have included the inflation rate in the EMU because, since inflation depreciates the debt value in real terms, we should expect a positive relationship between inflation and leverage.

5.2 Capital spending and shareholder's yield

To analyze the relationship between ECB's monetary policy and the developments of capital spending and shareholder yields we have adjusted the Blundell and Roulet's (2013) model who conducted a panel data analysis and estimated two regressions (one for capital spending per sales and another for dividends and buybacks per sales). Therefore, we have also estimated two equations (an investment equation (8) and a shareholder yield equation (9)), but have adjusted their model by including variables that show how monetary policy affects capital expenditure and dividends/buybacks:

$$C_{i,t} = \alpha_{i,t} + \beta_1 * i_{t-1} + \beta_2 * ECB_{t-1} + \beta_3 * S_{t-1} + \beta_4 * P_{t-1} + \beta_5 * E_{i,t-1} + \beta_6 * k_{i,t-1} + \varepsilon_{i,t} \quad (8)$$

$$y_{i,t} = \gamma_{i,t} + \beta_7 * i_{t-1} + \beta_8 * ECB_{t-1} + \beta_9 * E_{i,t-1} + \beta_{10} * k_{i,t-1} + \vartheta_{i,t} \quad (9)$$

In equation (8), the dependent variable is the company's capital spending divided by sales ($C_{i,t}$). The regression also includes the two main ECB policy variables –the cost of debt (i_{t-1} which is proxied by 3-months Euribor rate) and the changes in the ECB's assets (ECB_{t-1}) – plus another four independent variables: the cost of capital ($k_{i,t-1}$, measured by the WACC), changes in profits ($E_{i,t-1}$ proxied by EBITDA-to-Sales), the inflation rate in the EMU (P_{t-1}), and the spread between long-term and short-term yields (S_{t-1})[14].

By including the last two variables, we aim to test changes to the economy and market expectations that are directly linked to the ECB's policies all awhile still including variables related to the ones Blundell and Roulet use in their analysis. In particular, inflation serves as a proxy for changes in demand and monetary policy. Nonetheless, the

[13] The empirical evidence is also divided: Fama and French (2002) show that companies with higher profits tend to be less leveraged – putting the pecking order model right on this issue; Wald (1999) reaches a similar conclusion. On the other hand, Frank and Goyal (2008) show the opposite.

[14] The spread between 10-years weighted average of sovereign bond yields of all EMU countries and 3-month Euribor rate.

relationship between inflation and capital spending is not clear. On the one hand, higher inflationary pressures may lead the real returns (see Fama and Gibbons, 1982) on projects to be less profitable[15], but on the other, a rise in the rate of inflation might also indicate higher economic activity. With regards the spread between long- and short-term rates, it is used as a proxy of economic conditions. According to Baumeister and Benati (2010), the compression of long-term bond spread may even impact GDP and inflation. Furthermore, this compression tends to indicate a fall in the term premium. The decline in the term premium could be due to lower expectations of either sudden inflation eruptions or future lower interest rates because of slower economic activity in the future. In other words, a contracting spread, or the flatting of the yield curve, may correspond with companies reducing capital spending as economic activity deteriorates. Therefore, we would expect a positive relationship between capital expenditure and bond yield spread.

As stated before, our model includes an investment equation (8) and a shareholder yield equation (9) where the variables that may affect the shareholder yield ($y_{i,t}$) are explored. Likewise equation (8), equation (9) also includes the two main ECB policy variables – the cost of debt (i_{t-1}) and the changes in the ECB's assets (ECB_{t-1}) – plus another two independent variables: the cost of capital ($k_{i,t-1}$ measuread by WACC) and changes in profits ($E_{i,t-1}$ proxied now by earnings per sale or EPS of each company). A positive relationship is expected for the former variable (if the cost of retaining a euro to invest relative to the cost of bonds rises, a company is better off repurchasing its shares – and reducing its relative rising cost of capital). Finally, regarding the latter variable, although Blundell and Roulet (2013) use earnings yield in their model, we decided to use changes in EPS because it isolates the changes in a company's fundamentals by not including the variations in its underlying stock price (which could shift based on changes to liquidity in the markets, supply and demand changes and more). As for the expected relationship, even though there is no consensus in the literature[16], we still expect rising earnings leading to higher returns to investors.

6. Empirical results

In this section, we first discuss the results from the panel data analysis applied to the leverage, the investment and the shareholder yield regressions. Concretely, we consider two basic panel regression methods: the fixed-effects (FE) method and the random effects (RE) model[17]. To determine the empirical relevance of each of the potential methods for our panel data, we test FE versus RE. We do so by using the Hausman test statistic to analyze the non-correlation between the unobserved effect and the regressors.

[15] Although Rappaport and Taggart (1982) alluded that companies might not include inflation in their decision process when evaluating a project.

[16] According to French and Fama (2002), more profitable firms tend to have higher dividend payments. Eije and Megginson (2008) looked into European companies and showed that rising earnings didn't raise the chances of increases in cash payoffs to investors. Even Miller and Modigliani (1961) point out that rising profits do not necessarily lead to a rise in dividend payment – it will depend on other factors such as the payout ratio.

[17] Estimations were also performed by the Arellano-Bond GMM approach, rendering similar quantitative results.

This test indicates that the fixed effects estimators are more appropriate for all the timeframes in the leverage and the investment regression. However, in the shareholder yield model, the Hausman test shows that the best method (FE or RE) to be used changes depending on the subsample. Subsequently, we also present the results corresponding to a cross-country and a cross-sector analysis for the whole period (it has also been estimated using panel data techniques and in each case the Hausman test has been used to select the best methodology – FE or RE) in order to examine whether companies from different countries or industrial sectors have different reactions to ECB's policies.

6.1 Panel unit root tests

A dependent stationary variable cannot be explained using non-stationary variables since the statistical properties of the former (mean, variance, autocorrelation, et cetera) remain constant over time while the statistical properties of the latter change over time. Therefore, to assess the statistical characteristics of our variables, we perform a variety of unit roots tests in panel datasets. In particular, we use the Levin–Lin–Chu (2002), Harris–Tzavalis (1999), Breitung (2000), Im–Pesaran–Shin (2003), and Fisher-type (Choi 2001) tests. The results from these tests (which are shown in Appendix D) decisively reject the null hypothesis of a unit-root for all the variables except for the ECB assets. Therefore, while the rest are found to be stationary in levels, the latter can be treated as the first-difference stationary. So, in the different empirical estimations it will be transformed into a stationary variable by differencing it.

6.2 Leverage: Empirical results

The results regarding the main drivers of the leverage ratio are presented in Table 2.

[Insert Table 2 here]

These results indicate that interest rates and changes to the ECB's balance sheet have a positive impact on companies' leverage. For the entire period (column 5), a one percentage point fall in 3-months Euribor tends to lift the debt-to-equity ratio, on average, by 3.46 percentage points. Moreover, for every 1 trillion euros the ECB adds to its balance sheet, via the various LTRO and QE programs, companies are likely to raise their debt ratio, on average, by 0.17 percentage point. A closer examination of the results also reveals that the ECB's policies have a stronger marginal effect on companies' debt-to-equity ratio after 2011Q3 (column 2) and 2008Q1 (column 4). Specifically, the 3-months Euribor coefficients in column 4 (-3.968) and column 2 (-2.495) are much lower than the coefficients in column 3 (-0.655) and column 1 (-1.174). As for changes in the ECB's assets, the coefficients are much higher in column 4 and 2 compared to column 1 and 3. The inflation rate, which is another variable that is indirectly affected by monetary policy, also presents positive and significant coefficients across the different time frames. Finally, the overall regressions' fit is

satisfactory as measured by the R^2 values. They range from 66.7% to 83.3% for the various time frames.

6.3 Capital spending: Empirical results

The results corresponding to the investment equation are presented in Table 3. It can be observed that ECB's policies (both changes in interest rates and balance sheet assets) have a significant and stimulating impact on a company's capital spending across the different time frames. In particular, from 2001 to 2017 (column 5) for every 1 trillion euros buildup in the ECB's assets, the capital-spending-to-sales ratio rises, on average, by 2.98 percentage points. As for interest rates, a decline of one percentage point in the 3-months Euribor tends to raise the CapEx-to-sales ratio, on average, by 1.5 percentage points.

[Insert Table 3 here]

A comparison of the different sub-periods reveals that the ECB's policies related to its interest rates have a stronger marginal impact after 2011Q3. Specifically, based on the results in column 2, for every one percentage point decline in the 3-months Euribor, the CapEx-to-sales ratio tends to rise, on average, by 4.19 percentage points. Conversely, before 2011Q4 this coefficient is only 1.68 – indicating changes to the 3-months Euribor have a much smaller impact on the CapEx-to-sales ratio before Mario Draghi entered office. The same, however, cannot be said after 2008Q2 (column 4), where the 3-months Euribor coefficient is only -0.57. This result may indicate that the financial crisis may have played a role in diminishing the correlation between interest rates and capital spending. In other words, perhaps during 2008-2011 – between the global recession and the European debt crisis (and before Mario Draghi tenure) – interest rates may have had a weaker impact on capital spending than before or after this period. These results also correspond to the relationship we have framed in Section 3.2. That is to say, falling interest rates tend to encourage companies to allocate more capital towards investments. Regarding the ECB's asset purchase programs, they seem to have positively affected companies' capital spending; however, the coefficients are not vastly different across the various time frames. This finding suggests that the ECB's policies do not have a marginally stronger impact on companies' capital spending decisions after 2011Q3 or after 2008Q2. Lastly, across the different time frames, the values of R^2 range between 59.9% and 80.3%. These results indicate our econometric model may identify sensible and interpretable relationships among the economic variables in this research.

6.4 Shareholder yield: Empirical results

Table 4 presents the results of the panel data analysis for the shareholder yields model.

[Insert Table 4 here]

The results indicate that changes in the ECB's policies have a stimulating and significant impact on companies' shareholder yield across the different time samples. In particular, from 2011 to 2017, for every 1 trillion euros the ECB adds to its balance sheet, shareholder yield rises, on average, by 1.33 percentage point (column 5). Moreover, for every one percentage point decline in the 3-months Euribor, shareholder yield increases, on average, by 0.912 percentage point. We also find that after 2011Q3 (column 2) the ECB's policies – mainly related to changes in interest rates (3-months Euribor) – seem to have a stronger marginal impact on shareholder yield compared to before. The results of the regressions are significant according to the F-tests and the R^2 values throughout the different time frames. The R^2 values range from 59.1% to 73.5%. Finally, these results also suggest, as indicated in Section 3.2, that lower interest rates do not crowd out dividends or buybacks in favor of investments. This finding implies that the added value for companies for returning capital to shareholders may have been high enough to encourage them to allocate more funds not only to investments but also to shareholder distribution.

6.5 A Cross-Country Analysis

In order to analyze how companies from different countries react to ECB's policies, we have also conducted a cross-country analysis. To this end, we have separated the companies in our sample according to their country of origin (based on where their head offices are located): Germany, France, Italy, and Spain. The results of the panel data analysis for the entire period (2000-2017) are presented in Appendix E. These results show that, for the debt-to-equity ratio (Table E1), the coefficients for the ECB assets are positive and significant across the different countries. However, the ECB's balance sheet variable appears to have the strongest stimulating effect on German companies: For every 1 trillion euros the ECB adds to its balance sheet, a German company's debt-to-equity ratio rises, on average, by 4.7 percentage points. Conversely, Italian companies have the lowest coefficient of 1.51. Moreover, the 3-months Euribor coefficients are all negative and significant. However, Spanish and French companies have the lowest coefficients at -9.8 and -8.3, respectively. German companies recorded the highest 3-months Euribor coefficient. This result suggests that Spanish and French companies are more sensitive to changes in interest rates than German companies are. Regarding the CapEx-to-sales ratio regressions (Table E2), German companies are the least sensitive to changes in the ECB assets or interest rates while Spanish and French companies are the most sensitive to the ECB's policies. Finally, as for shareholder yields (Table E3), Italian companies are the least sensitive to changes in the ECB's assets – the coefficient is only 0.267; while the coefficient of Spanish companies is the highest in the sample at 3.06. Conversely, Spanish companies are the least sensitive to changes in interest rates – with a coefficient of -0.452; while the coefficient of Italian companies is the lowest at -1.437. These findings indicate that both Italian and Spanish companies are more sensitive to only one (and different) form of the ECB's policies compared to companies from other countries.

6.6 A Cross-Industry analysis

Finally, we have also conducted a cross-sector analysis in order to examine whether the ECB's policies have affected differently according to the economic sector. So, we break down the sample into 12 industrial sectors[18]. The results from the panel data regressions for the entire sample (2000-2017) are presented in Appendix F. These results for all three models indicate that the ECB's policies – both changes to interest rates and balance sheet – have a stimulating effect across the different industrial sectors, as was the case in previous analyses. Specifically, in the leverage model (Table F1), the Communications sector has the highest ECB assets coefficient at 9.3. Moreover, the lowest 3-months Euribor coefficients are for Information Technology, Industrial, and Communications at -11.927, -11.927, -11.187, respectively. Regarding the investment model (Table F2), Basic Materials have the highest coefficient for changes in the ECB assets at 2.78, while the Technology & Telecommunications sector has the lowest 3-months Euribor coefficient at -2.224. Finally, the results for the shareholder yield model (table F3) show that for the changes in the ECB's assets, the Consumer Cyclical's coefficient is the highest at 4.95; the lowest 3-months Euribor coefficient is for Utilities.

7. Concluding remarks

In this paper, we have examined whether the ECB's monetary policies have encouraged non-financial firms to raise their debt burden, invest more and boost their shareholder distribution. The main results indicate that the answer to all three is yes. However, the results also show that these policies seem to have a stronger marginal impact on these companies' decisions not only after the global recession of 2008 but also after late 2011 – as the Euro debt crisis was unfolding and Mario Draghi entered office, and dramatically changed the ECB's policies. We also find that French and Spanish companies appear more sensitive to changes in the ECB's policies on issues of investments and leverage. This finding might have policy implications: The ECB's main asset purchase program (PSPP) allocates its funds based on a country's size (GDP) rather than its need. The results suggest that the ECB's policies could boost investments of non-financial firms more efficiently if the ECB were to allocate more funds to countries, such as France and Spain, where companies react more strongly to its policies. Finally, one of the main goals the ECB set out to do via its stimulative monetary policies was to encourage companies to invest in the economy, which should lead to higher economic growth. As in every empirical analysis, the results must be regarded with caution, since they are based on a set of countries and companies over a certain period and a given econometric methodology. Nonetheless, we show that while the ECB's policies seem to have done so, the policies may have also encouraged companies to use the low interest rate environment to distribute capital to their

[18] The list of industries is: Basic Materials, Communications, Consumer Discretionary, Consumer Cyclical, Consumer Non-Cyclical, Energy, Industrial, Information Technology, Materials, Technology & Telecommunications, and Utilities

shareholders. Even though share buybacks and dividends could play a role in boosting economic activity[19], their stimulative impact on the economy is indirect and unclear.

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[19] The excess capital shareholders receive could be used to reallocate funds to firms that require capital for investment. Shareholders could use the funds to increase their spending, which, in turn, could also boost economic activity. Nonetheless, not all shareholders live in the EMU so that the spending could be done abroad. Also, shareholders could decide to invest in companies outside the EMU. These points only show that it is unclear how shareholder distribution could affect the economy.

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Appendix A: Description of variables and data sources

Variable	Description	Source
EBITDA-to-revenue	EBITDA-to-revenue of a company	Bloomberg
WACC	Weighted Average Cost of capital of a company	Bloomberg
Spread between 10 year and 3 months Euribor	Gap between weighted average yield of a 10-year of EMU governments note and 3-months libor in euros	Eurostat and Fred
ECB total assets	Total assets on the ECB's balance sheet (in trillions of euros)	FRED
3-months Euribor rate	Weighted average rate of a 3-months libor in euros	FRED
10-year EU government bond	Weighted average yield of a 10-year of EMU governments note	Eurostat
Total Debt	The total long term and short term of a company as recorded on its balance sheet	Bloomberg
EPS growth	Quarter-on-quarter rate of growth of earnings per share	Eurostat
Inflation	Year-on-year rate of growth of Harmonized Index of Consumer Price in EMU (HICP)	Eurostat
Debt-to-equity	Non-Financial Corporate debt to equity ratio	Bloomberg
Shareholder yield	Returns to investors per share – including buybacks, dividends and deleverage per company	Bloomberg
CapEx-to-sales	Capital spending per revenue of a company	Bloomberg

Appendix B: The ECB's Assets and Quantitative Easing

Figure B1: The ECB assets and non-QE assets (millions of euros); Ratio of QE to total ECB assets (right axis)

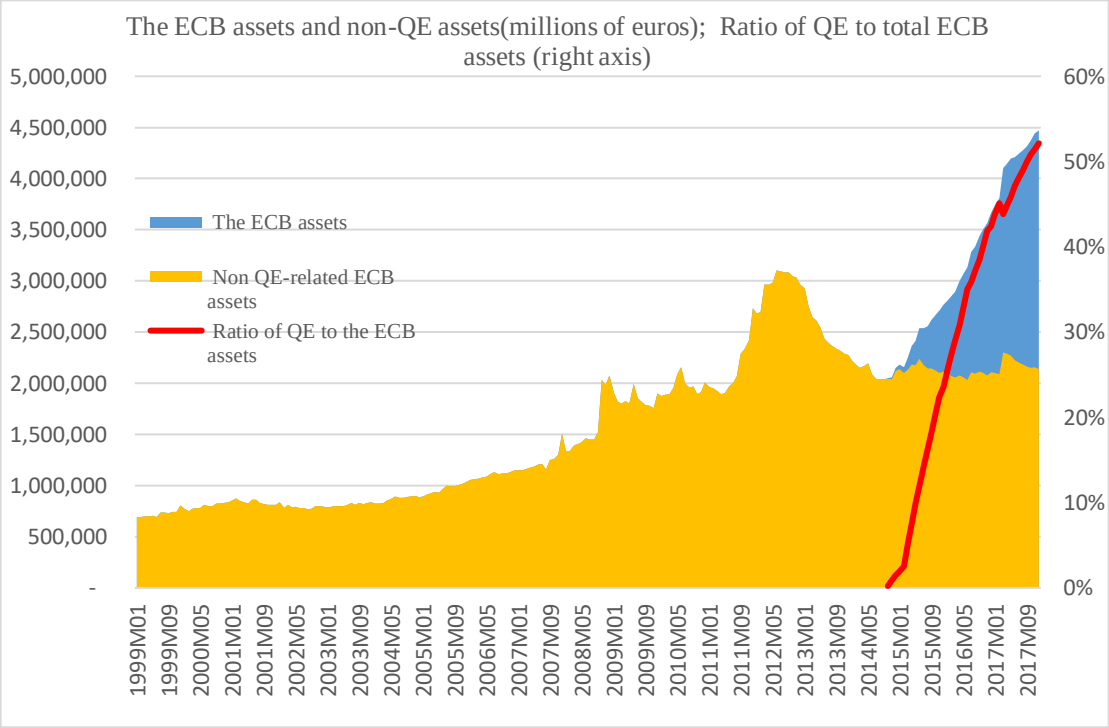


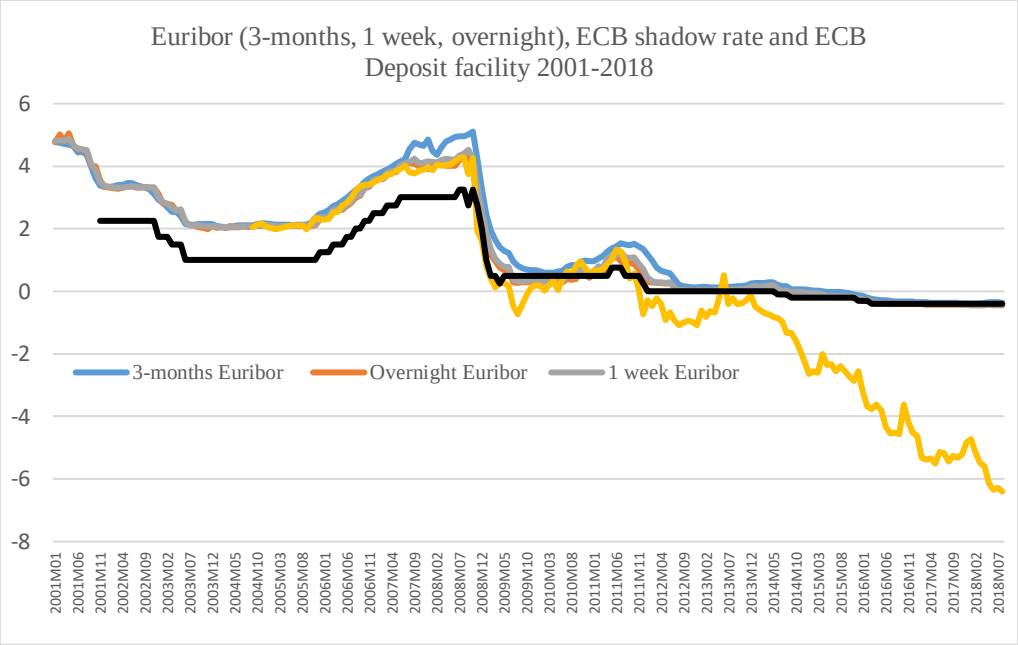
Table B1: List of the ECB's QE programs

The ECB assets and various QE programs, as of Dec 2017 (millions of euros)		Percent of total	Gain since Oct 2014*
The ECB assets	4,471,689	100%	2,038,235
CBPP3	243,752	5%	243,752
ABSPP	25,014	1%	25,014
CSPP	131,593	3%	131,593
PSPP	1,931,239	43%	1,931,239

Note: The total gain in the ECB assets is less than the total gain in the QE programs listed above. The reason is that some programs have winded down over the years such as the LTRO and reduced the ECB assets.

Appendix C: Euribor, EU Yields and The ECB's Interest Rates

Figure C1: Euribor (3-months, 1 week, overnight), ECB shadow rate and ECB Deposit facility 2001-2018



Source of data: FRED, Jing Cynthia Wu's website for shadow rate and the ECB's website

Table C1: Linear correlations of different internet rates and std. deviations

Correlations 2001-2018	3-months Euribor	Overnight Euribor	1-week Euribor	Shadow rate	Deposit facility
Overnight Euribor	0.751				
1-week Euribor	0.863	0.927			
Shadow rate	0.452	0.410	0.470		
Deposit facility	0.697	0.653	0.717	0.403	
Std. Dev.	1.599	1.533	1.548	2.912	1.090

Appendix D: Tests for unit root

Variable	LLC	HT	Breitung	IPS	Fisher(ADF)	Fisher(PP)
WACC	-8.3439***	0.8428***	-11.1838***	-2.6407***	277.7692***	277.7692***
Shareholder yield	-16.4426***	0.7345***	-7.4528***	-3.5964***	702.5072***	702.5072***
Debt-to-equity	-15.8260***	0.8539***	-6.6381***	-6.4830***	308.5653***	308.5653***
CapEx-to-Sales	-17.9772***	0.8315***	-14.0383***	-9.2027***	1264.7517***	1264.7517***
EPS	-22.4463***	0.5271***	-13.8662***	-8.5641***	1271.6925***	1271.6925***
EBITDA-to-sales	-18.0776***	0.5109***	-18.2389***	-11.0369***	1484.3477***	1484.3477***
Spread 10y-3mo yield	-7.1622***	0.9175***	-11.7074***	-9.9545***	387.7816***	121.0040***
3 mo Euribor	-9.5504***	0.0000***	-46.0420***	-4.6214***	171.7552***	134.8042***
Inflation	-11.6715***	0.8943***	-14.6981***	-1.9569***	446.9590***	250.2261***
ECB assets	21.8598	1.0339	24.4366	20.0003	0.2100	0.2100
D(ECB assets)	63.7046	0.0280***	-40.3748***	-24.4600***	4434.0483***	4434.0483***

LLC denotes the Levin-Lin-Chu unit-root with Ho: Panels contain unit roots and Ha: Panels are stationary
HT represents the Harris-Tzavalis unit-root test with Ho: Panels contain unit roots and Ha: Panels are stationary

Breitung is the Breitung unit-root test with Ho: Panels contain unit roots and Ha: Panels are stationary

IPS denotes the Im-Pesaran-Shin unit-root test with Ho: All panels contain unit roots and Ha: Some panels are stationary
Fisher(ADF) represents the Fisher-type unit-root test based on augmented Dickey-Fuller tests with Ho: All panels contain unit roots and Ha: At least one panel is stationary
Fisher(PP) is the Fisher-type unit-root test based on Phillips-Perron tests with Ho: All panels contain unit roots and Ha: At least one panel is stationary

*, **, *** indicate statistical significance at the 10, 5% and 1% levels, respectively.

Appendix E: Tests by countries

Table E1: Results of panel analysis for the debt-to-equity equation by countries

OLS Estimates of the Effect of the ECB's policies on Leverage Dependent variable: Debt-to-sales	All sample **(1)**	France **(2)**	Germany **(3)**	Italy **(4)**	Spain **(5)**
D(ECB Assets (t-1))	**0.171*** **	**2.19** **	**4.73** **	**1.51*** **	**2.25** **
3 Mo Yld (t-1)	**-3.459*** **	**-8.301** **	**-0.693** **	**-2.223** **	**-9.809** **
EPS (t-1)	**-2.437*** **	**-1.626*** **	**-3.849*** **	**-0.056** **	**-0.931** **
WACC	**-8.214*** **	**-11.689*** **	**-4.460** **	**-9.854** **	**-1.543** **
EBITDA to Revenue (t-1)	**0.159*** **	**0.454*** **	**0.058*** **	**0.682** **	**0.8535** **
EU inflation (t-1)	**4.300*** **	**5.529*** **	**0.763*** **	**4.744** **	**3.218** **
Constant	**154.77*** **	**189.12*** **	**121.22** **	**196.21** **	**89.41** **
Statistics					
R-squared (overall)	75.50%	74.65%	71.32%	73.91%	72.19%
F-statistic	**53.40*** **	**47.31*** **	**18.97*** **	**8.00*** **	**18.87*** **
Total Obs.	3160	1944	1224	934	360
Cross sections	62	27	17	13	5
Hausman Test (Chi-Sq Stat.)	**36.01*** **	**10.52** **	**22.42**	**5.12**	**98.75*** **
RE/FE	**FE**	**FE**	**FE**	**RE**	**FE**

This table reports the results of estimating an equation for a balanced panel of 62 publicly traded non-financial firms over the period 2001.Q2- 2017.Q4.

*, **, *** indicate statistical significance at the 10, 5% and 1% levels, respectively.

Table E2: Results of panel analysis for the capital expenditures equation for countries

OLS Estimates of the Effect of the ECB's policies on investments Dependent variable: CapEx-to-sales	All sample **(1)**	France **(2)**	Germany **(3)**	Italy **(4)**	Spain **(5)**
D(ECB Assets (t-1))	**2.98****	**6.96*****	**0.282*****	**0.309*****	**3.25*****
3 Mo Yld (t-1)	**-1.501****	**-2.211*****	**-0.212****	**-0.636****	**-2.712*****
EU inflation (t-1)	**-0.997*****	**-1.766*****	**-0.001****	**-0.271****	**-2.067****
EBITDA-to revenue (t-1)	**0.125****	**0.614****	**0.072****	**0.132*****	**0.125****
Spread 10 Year Y and 3 mo Libor (t-1)	**0.623*****	**1.115****	**0.220*****	**0.421*****	**2.036****
WACC (t-1)	**-0.268*****	**-1.104*****	**-0.368*****	**-0.492****	**-2.568****
Constant	**15.65****	**32.06****	**8.92****	**4.26****	**14.58****
Statistics					
R-squared (overall)	72.00%	71.94%	72.35%	73.84%	71.46%
F-statistic	**5.61*****	**6.94*****	**7.31*****	**12.26*****	**8.53*****
Total Obs.	4462	1944	1224	934	360
Cross sections	62	27	17	13	5
Hausman Test (Chi-Sq Stat.)	**63.30*****	**118.76*****	**0.97**	**12.44****	**108.35*****
RE/FE	**FE**	**FE**	**RE**	**FE**	**FE**

This table reports the results of estimating an equation for a balanced panel of 62 publicly traded non-financial firms over the period 2001.Q2- 2017.Q4.

*, **, *** indicate statistical significance at the 10, 5% and 1% levels, respectively.

Table E3: Results of panel analysis for the shareholder yield equation for countries

OLS Estimates of the Effect of the ECB's policies on dividends and buybacks Dependent variable: Shareholder yield	All sample **(1)**	France **(2)**	Germany **(3)**	Italy **(4)**	Spain **(5)**
D(ECB Assets (t-1))	**1.33*** **	**1.64*** **	**1.14*** **	**0.267*** **	**3.06** **
3 Mo Yld (t-1)	**-0.912*** **	**-0.832*** **	**-0.822** **	**-1.437** **	**-0.452*** **
EPS (t-1)	**0.108** **	**0.013** **	**0.358** **	**0.088** **	**0.211** **
WACC (t-1)	**0.437** **	**0.176** **	**0.618** **	**0.498** **	**0.630** **
Constant	**-0.706** **	**2.020** **	**-3.467** **	**-0.152** **	**-4.139** **
Statistics					
R-squared (overall)	73.50%	74.15%	73.29%	71.83%	71.34%
F-statistic	**103,52** **	**14.65*** **	**7.64*** **	**10.80*** **	**5.21*** **
Total Obs.	4463	1944	1224	934	360
Cross sections	62	27	17	13	5
Hausman Test (Chi-Sq Stat.)	**1.93**	**1.95**	**2.05**	**1.12**	**0.82**
RE/FE	**RE**	**RE**	**RE**	**RE**	**RE**

This table reports the results of estimating an equation for a balanced panel of 62 publicly traded non-financial firms over the period 2001.Q2- 2017.Q4.

*, **, *** indicate statistical significance at the 10, 5% and 1% levels, respectively.

Appendix F: Tests by industries

Table F1: Sectorial results of panel analysis for the debt-to-equity equation

OLS Estimates of the Effect of the ECB's policies on Leverage Dependent variable: Debt-to-sales	All industries **(1)**	Basic Materials **(2)**	Communications **(3)**	Consumer Discretionary **(4)**	Consumer Cyclical **(5)**	Consumer Non-Cyclical **(6)**	Energy **(7)**	Industrial **(8)**	Information Technology **(9)**	Materials **(10)**	Technology & Telecommunications **(11)**	Utilities **(12)**
D(ECB Assets (t-1))	**0.1711*** **	**6.47** **	**9.30** **	**3.90*** **	**8.51*** **	**2.71*** **	**6.61*** **	**0.455** **	**0.455** **	**5.50*** **	**0.547** **	**3.37** **
3 Mo Yld (t-1)	**-3.459*** **	**-1.442** **	**-11.187** **	**-4.144** **	**-9.948** **	**-1.794*** **	**-9.448** **	**-11.927** **	**-11.927** **	**-1.126** **	**-2.919** **	**-6.441** **
EPS (t-1)	**-2.437*** **	**-11.807*** **	**-1.807*** **	**-13.276** **	**-1.061** **	**-0.968** **	**-1.732** **	**-1.192** **	**-1.192** **	**-9.382** **	**-2.134** **	**-0.706** **
WACC	**-8.214*** **	**-7.557** **	**-24.751** **	**-0.821** **	**-10.857** **	**-2.128** **	**-0.885** **	**-2.873** **	**-2.873** **	**-1.266** **	**-1.007** **	**-3.296*** **
EBITDA to Revenue (t-1)	**0.159*** **	**0.680*** **	**0.305** **	**0.573** **	**0.868** **	**0.968** **	**1.733** **	**1.062** **	**1.062** **	**0.135** **	**0.115** **	**0.033** **
EU inflation (t-1)	**4.300*** **	**4.839*** **	**3.129*** **	**0.965** **	**2.718** **	**1.794*** **	**1.532** **	**2.541*** **	**2.541*** **	**1.912** **	**2.176** **	**2.785*** **
Constant	**154.77*** **	**74.11*** **	**157.99** **	**83.90** **	**207.87** **	**87.70** **	**58.72** **	**274.05** **	**274.05** **	**36.76** **	**38.96** **	**94.03** **
Statistics												
R-squared (overall)	75.50%	74.32%	71.32%	70.87%	71.73%	72.46%	73.14%	74.73%	74.73%	72.75%	72.75%	71.34%
F-statistic	**53.40*** **	**5.98*** **	**23.17*** **	**8.72*** **	**36.73*** **	**7.87*** **	**43.54*** **	**26.66*** **	**26.66*** **	**6.99*** **	**5.67*** **	**21.37*** **
Total Obs.	3160	144	360	288	864	576	360	720	720	144	214	214
Cross sections	62	2	5	4	12	8	5	10	10	2	3	3
Hausman Test (Chi-Sq Stat.)	**36.01*** **	**13.33*** **	**0.75**	**30.98*** **	**73.11*** **	**20.55*** **	**0.91**	**23.45*** **	**0.19**	**0.31**	**53.85*** **	**34.89*** **
RE/FE	**FE**	**FE**	**RE**	**FE**	**FE**	**FE**	**RE**	**FE**	**RE**	**RE**	**FE**	**FE**

This table reports the results of estimating an equation for a balanced panel of 62 publicly traded non-financial firms over the period 2001.Q2- 2017.Q4.

*, **, *** indicate statistical significance at the 10, 5% and 1% levels, respectively.

Table F2: Sectorial results of panel analysis for the capital expenditures equation

OLS Estimates of the Effect of the ECB's policies on investments Dependent variable: CapEx-to-sales	All industries **(1)**	Basic Materials **(2)**	Communications **(3)**	Consumer Discretionary **(4)**	Consumer Cyclical **(5)**	Consumer Non-Cyclical **(6)**	Energy **(7)**	Industrial **(8)**	Information Technology **(9)**	Materials **(10)**	Technology & Telecommunications **(11)**	Utilities **(12)**
D(ECB Assets (t-1))	**2.98****	**2.78*****	**0.297*****	**2.68*****	**0.122*****	**0.455*****	**2.64*****	**0.224*****	**1.80*****	**0.234****	**1.87*****	**0.323*****
3 Mo Yld (t-1)	**-1.501****	**-0.439****	**-0.327****	**-0.636****	**-0.354****	**-0.128****	**-1.867*****	**-0.232*****	**-1.489****	**-0.605*****	**-2.224****	**-0.571****
EU inflation (t-1)	**-0.997*****	**-0.042*****	**-0.092****	**-0.990****	**-0.649****	**-0.094****	**-1.657****	**-0.017*****	**-1.021****	**-0.948****	**-0.168****	**-0.211****
EBITDA-to revenue (t-1)	**0.125****	**0.039****	**0.036****	**0.033*****	**0.237****	**0.048*****	**0.370****	**0.018****	**0.303****	**0.073****	**0.313*****	**0.233****
Spread 10 Year Y and 3 mo Libor (t-1)	**0.623*****	**0.474*****	**0.525*****	**0.515****	**1.595*****	**0.287****	**0.555****	**0.118*****	**1.088****	**2.206****	**0.965****	**0.176****
WACC (t-1)	**-0.268*****	**-0.102*****	**-0.210*****	**-1.257*****	**-0.251****	**-0.184*****	**-1.838*****	**-0.056****	**-0.126****	**-1.199****	**-0.141****	**-0.203****
Constant	**15.65****	**11.83****	**9.05****	**-6.25****	**12.04****	**7.17****	**-7.28****	**4.39****	**3.48****	**25.14****	**-5.76****	**9.36****
Statistics												
R-squared (overall)	72.00%	73.12%	72.53%	73.84%	72.56%	72.31%	72.87%	71.93%	70.36%	71.82%	71.30%	71.23%
F-statistic	**5.61*****	**4.53*****	**3.77*****	**4.57*****	**3.99*****	**8.21*****	**9.01*****	**10.18*****	**13.24*****	**9.20*****	**8.60*****	**5.56*****
Total Obs.	4462	144	360	288	864	576	360	720	144	214	214	360
Cross sections	62	2	5	4	12	8	6	10	2	3	3	5
Hausman Test (Chi-Sq Stat.)	**63.30*****	**79.90*****	**7.99****	**12.44****	**2,28**	**0.49**	**0.08**	**1.69**	**1.15**	**24.58*****	**12.24*****	**2.11**
RE/FE	**FE**	**FE**	**FE**	**FE**	**RE**	**RE**	**RE**	**RE**	**RE**	**FE**	**FE**	**RE**

This table reports the results of estimating an equation for a balanced panel of 62 publicly traded non-financial firms over the period 2001.Q2- 2017.Q4.

*, **, *** indicate statistical significance at the 10, 5% and 1% levels, respectively.

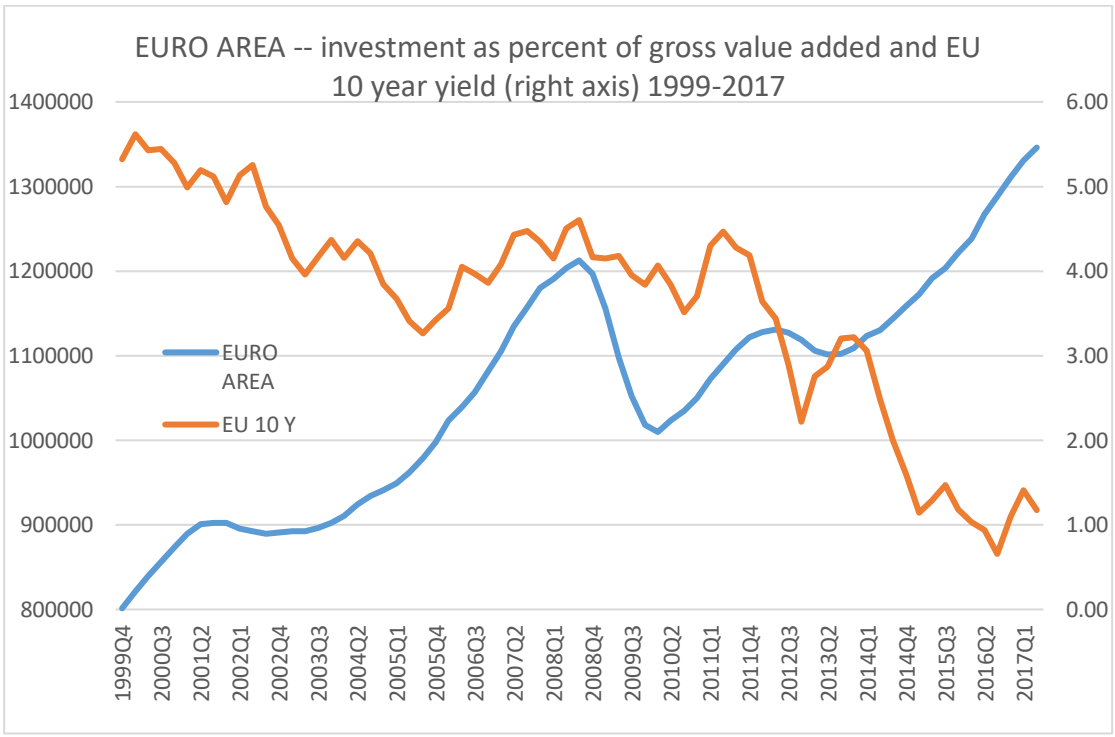
Table F3: Sectorial results of panel analysis for the shareholder yield equation

OLS Estimates of the ffect of the ECB's olicies on dividends nd buybacks Dependent variable: hareholder yield	All industries (1)	Basic Materials (2)	Communications (3)	Consumer Discretionary (4)	Consumer Cyclical (5)	Consumer Non-Cyclical (6)	Energy (7)	Industrial (8)	Information Technology (9)	Materials (10)	Technology & Telecommunications (11)	Utilities (12)
D(ECB Assets (t-1))	**1.33*** **	**0.515*** **	**0.417*** **	**4.95*** **	**1.09** **	**0.164*** **	**0.103*** **	**0.161*** **	**3.55*** **	**2.84*** **	**2.12*** **	**0.353*** **
Mo Yld (t-1)	**-0.912*** **	**-0.471** **	**-1.746** **	**-0.267** **	**-0.120** **	**-0.250** **	**-1.433** **	**-1.385** **	**-0.263*** **	**-1.312*** **	**-1.005*** **	**-2.871*** **
PS (t-1)	**0.108** **	**1.800** **	**1.983*** **	**2.180** **	**0.324** **	**0.139** **	**0.225** **	**0.350** **	**0.467** **	**1.312*** **	**0.736*** **	**0.184** **
VACC (t-1)	**0.437** **	**0.748** **	**0.645** **	**0.165*** **	**0.722*** **	**0.309** **	**1.563*** **	**0.422*** **	**0.496*** **	**1.777** **	**0.156** **	**0.451** **
Constant	**-0.706** **	**-0.234** **	**3.693** **	**3.946** **	**-5.850** **	**-1.218** **	**-11.963** **	**-1.939** **	**-3.529** **	**-10.412** **	**3.492** **	**7.497** **
					Statistics							
R-squared (overall)	73.50%	72.80%	73.40%	72.43%	72.62%	72.80%	73.10%	74.20%	72.50%	73.20%	74.60%	72,25%
F-statistic	**103,52** **	**11.11*** **	**9.77*** **	**7.55*** **	**4.15*** **	**5.44*** **	**5.59*** **	**7.81*** **	**3.67** **	**4.64*** **	**3.42*** **	**9.94*** **
Total Obs.	4463	144	360	288	864	576	360	720	144	214	214	36'
Cross sections	62	2	5	4	12	8	5	10	2	3	3	5
Hausman Test (Chi-Sq Stat.)	**1.93**	**1.58**	**0.20**	**0.48**	**0.56**	**3.3**	**18.45*** **	**9.29*** **	**1.66**	**16.81*** **	**1.88**	**0.86**
RE/FE	**RE**	**RE**	**RE**	**RE**	**RE**	**RE**	**FE**	**FE**	**RE**	**FE**	**RE**	**RE**

This table reports the results of estimating an equation for a balanced panel of 62 publicly traded non-financial firms over the period 2001.Q2- 2017.Q4.

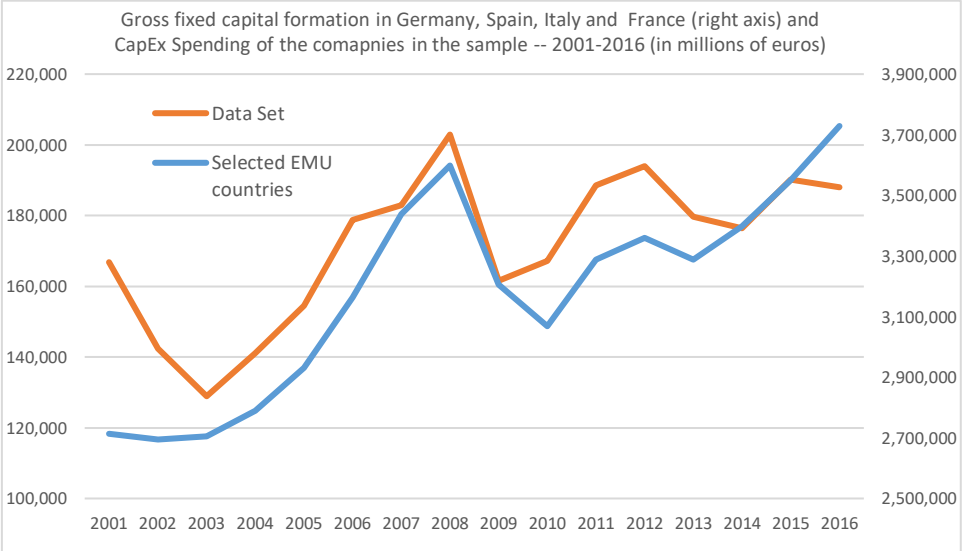
*, **, *** indicate statistical significance at the 10, 5% and 1% levels, respectively.

Figure 1: Euro Area investment and 10- year EU yield, quarterly data, 1999-2017



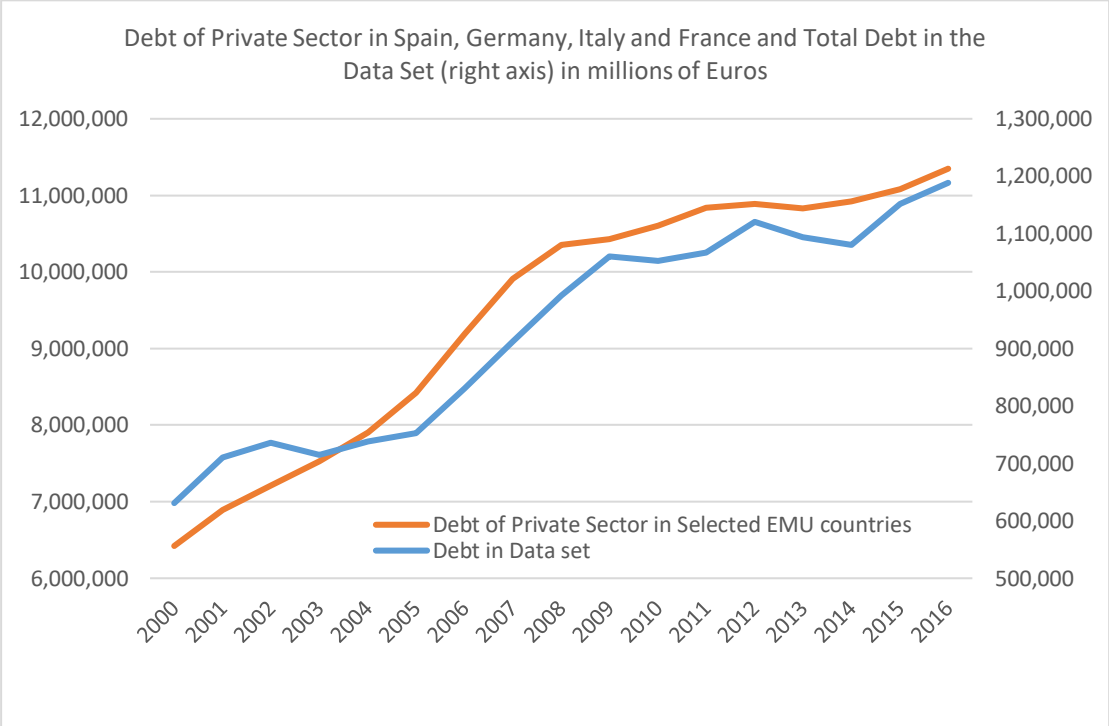
Source: Eurostat and European central bank data warehouse

Figure 2: Capital formation in selected EMU countries and capital spending of firms in the sample, 2001-2016



Source: Bloomberg and author's calculations and Eurostat

Figure 3: Private debt in selected EMU countries and total debt of firms in the sample, 2001-2016



Source: Bloomberg and author's calculations and Eurostat

Table 1: List of the ECB's major monetary policy changes since Mario Draghi entered office

List of the ECB's major monetary policy changes since Mario Draghi entered office	
Date	Policy
3 Nov. 2011	Cut deposit rates by 25 bp to 0.5%;
8 Dec. 2011	Cut deposit rates by 25 bp to 0.25%;
5 Jul. 2012	Cut deposit rates by 25 bp to 0%;
2 May 2013	Cut main refinancing operations (MRO) rates by 25 bp to 0.5%;
7 Nov. 2013	Cut main refinancing operations (MRO) rates by 25 bp to 0.25%;
5 Jun. 2014	First introduced the Targeted longer-term refinancing operations programme
5 Jun. 2014	Cut deposit rates by 10 bp to -0.1%;
4 Sep. 2014	Cut deposit rates by 10 bp to -0.2%;
15 Oct. 2014	First introduced the covered bond purchase programme
19 Nov. 2014	First introduced the asset-backed securities purchase programme
4 Mar. 2015	First introduced the public sector purchase programme
3 Dec. 2015	Cut deposit rates by 10 bp to -0.3%;
10 Mar. 2016	First introduced the corporate sector purchase programme
10 Mar. 2016	Cut deposit rates by 10 bp to -0.4%;

Source: The ECB's website

Table 2: Results of panel analysis for Debt-to-equity

OLS Estimates of the Effect of the ECB's policies on Leverage Dependent variable: Debt-to-equity					
	2001Q2-2011Q3	**2011Q4-2017Q4**	**2001Q2-2008Q1**	**2008Q2-2017Q4**	**2001Q2-2017Q4**
	(1)	**(2)**	**(3)**	**(4)**	**(5)**
D(ECB Assets (t-1))	**1.22****	**8.56*****	**1.25****	**65.4****	**0.1711*****
3 Mo Yld (t-1)	**-1.174*****	**-2.495****	**-0.655*****	**-3.968*****	**-3.459*****
EPS (t-1)	**-2.129*****	**-1.213*****	**-1.872*****	**-2.804*****	**-2.437*****
WACC	**-7.547*****	**-4.396*****	**-6.506****	**-3.802*****	**-8.214*****
EBITDA to Revenue (t-1)	**0.028*****	**0.058*****	**0.120****	**0.542*****	**0.159*****
EU inflation (t-1)	**0.947*****	**1.768*****	**7.034****	**1.086*****	**4.300*****
Constant	**162.11*****	**130.81*****	**149.38*****	**130.88*****	**154.77*****
Statistics					
R-squared (overall)	81.4%	82.7%	83.3%	66.7%	75.5%
F-statistic	**49.28*****	**22.54*****	**51.50*****	**54.71*****	**53.40*****
Total Obs.	3160	1240	2044	2480	4462
Cross sections	62	62	62	62	62
Hausman Test (Chi-Sq Stat.)	**34.91*****	**47.35*****	**32.12*****	**79.21*****	**36.01*****
RE/FE	**FE**	**FE**	**FE**	**FE**	**FE**

These tables show the results of estimating an equation for a balanced panel of 62 publicly traded non-financial firms. *, **, *** indicate statistical significance at the 10, 5% and 1% levels, respectively.

Table 3: Results of panel analysis for CapEx-to-Sales

OLS Estimates of the Effect of the ECB's policies on investments Dependent variable: CapEx-to-sales					
	2001Q2-2011Q3	**2011Q4-2017Q4**	**2001Q2-2008Q1**	**2008Q2-2017Q4**	**2001Q2-2017Q4**
	(1)	**(2)**	**(3)**	**(4)**	**(5)**
D(ECB Assets (t-1))	**2.98****	**1.63****	**2.76****	**1.38****	**2.98****
3 Mo Yld (t-1)	**-1.679****	**-4.189****	**-2.176****	**-0.570****	**-1.501****
EU inflation (t-1)	**-1.159****	**-1.305*****	**-7.045****	**-0.294*****	**-0.997*****
EBITDA-to revenue (t-1)	**0.027****	**0.084*****	**0.029****	**0.036*****	**0.125****
Spread 10 Year Y and 3 mo Libor (t-1)	**0.216****	**0.011****	**1.290****	**0.44794*****	**0.623*****
WACC (t-1)	**-0.4131*****	**-0.0845*****	**-1.022*****	**-0.0125****	**-0.268*****
Constant	**12.72****	**7.10****	**62.26*****	**-33.43*****	**15.65****
Statistics					
R-squared (overall)	67.5%	59.9%	80.3%	79.1%	72.0%
F-statistic	**2.88****	**2.71****	**12.24*****	**11.26*****	**5.61*****
Total Obs.	3160	2040	1150	2480	4462
Cross sections	62	62	64	62	62
Hausman Test (Chi-Sq Stat.)	**26.32*****	**7.09****	**15.28*****	**74.73***	**63.30*****
RE/FE	**FE**	**FE**	**FE**	**FE**	**FE**

These tables show the results of estimating an equation for a balanced panel of 62-64 publicly traded non-financial companies. *, **, *** indicate statistical significance at the 10, 5% and 1% levels, respectively.

Table 4: Results of panel analysis for Shareholder Yield

OLS Estimates of the Effect of the ECB's policies on dividends and buybacks Dependent variable: Shareholder yield					
	2000Q2-2011Q3	**2011Q4-2017Q4**	**2000Q2-2008Q1**	**2008Q2-2017Q4**	**2001Q2-2017Q4**
	(1)	**(2)**	**(3)**	**(4)**	**(5)**
D(ECB Assets (t-1))	**1.41*** **	**2.40** **	**0.965** **	**2.67*** **	**1.33*** **
3 Mo Yld (t-1)	**-0.839** **	**-2.759*** **	**-0.315** **	**-0.860** **	**-0.912*** **
EPS (t-1)	**0.262** **	**0.485*** **	**0.347** **	**0.095** **	**0.108** **
WACC (t-1)	**0.521** **	**0.856*** **	**0.667*** **	**0.493*** **	**0.437** **
Constant	**-1.533** **	**-4.051*** **	**-4.645** **	**-0.921** **	**-0.706** **
Statistics					
R-squared (overall)	65.1%	62.8%	59.1%	65.2%	73.5%
F statistic	**67.18** **	**22.64*** **	**12.70***	**34.68*** **	**103.52*** **
Total Obs.	3160	1240	2044	2480	4463
Cross sections	62	62	62	62	62
Hausman Test (Chi-Sq Stat.)	4.28	**12.78*** **	**15.43*** **	3.92	1.93
RE/FE	**RE**	**FE**	**FE**	**RE**	**RE**

These tables show the results of estimating an equation for a balanced panel of 62 publicly traded non-financial companies. *, **, *** indicate statistical significance at the 10, 5% and 1% levels, respectively.

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