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Which Firms Benefit from Corporate QE during the COVID-19 Crisis?

The Case of the ECB's Pandemic Emergency Purchase Program

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Abstract

Using an event study methodology, this paper examines how European firms have been affected by the announcement of the European Central Bank's Pandemic Emergency Purchase Program (PEPP). Firms with an investment grade rating benefit relatively more, as evidenced by higher share prices and lower credit default swap spreads, which reflects that the European Central Bank is restricted to purchasing investment grade corporate debt securities. The gains to shareholders relative to the total gains of shareholders and debtholders are negatively related to firm leverage, consistent with the existence of debt overhang. Firms that are more heavily impacted by the pandemic benefit relatively little from the PEPP, which could reflect that the business models of some of these firms heavily damaged by the pandemic. Monetary policy in the form of the PEPP and national fiscal responses to the pandemic are shown to be complements in the sense that a strong pre-PEPP fiscal response enhances the potential for the program to have a positive effect on equity and debt valuations.

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Which Firms Benefit from Corporate QE during the COVID-19 Crisis? The Case of the ECB's Pandemic Emergency Purchase Program

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1. Introduction

The COVID-19 pandemic has caused a sharp reduction of economic activity, which negatively affected the revenues, liquidity and potentially solvency of many firms. In response to this crisis, the European Central Bank announced the Pandemic Emergency Purchase Program (PEPP) on March 18, 2020. The PEPP earmarks €750 billion for the purchase of government and private debt securities until the end of 2020 without a preset allocation rule.[1] PEPP-eligible private debt instruments are investment-grade, issued by non-bank corporations located in the euro zone, and dominated in euros.[2] The combined monetary and fiscal policy response to the COVID-19 crisis around the world, including corporate QE, appears to have led to a quick overall recovery of equity prices.

This paper uses an event study methodology to investigate which European firms benefited more from the PEPP as evidenced by a more positive share price response and a greater decline in the CDS spread, signaling lower expected credit losses on a firm's debts. We find a more positive abnormal stock return for investment-grade firms, consistent with the PEPP targeting investment-grade debt securities. At the same time, the CDS spread of investment-grade firms declined relatively more after the PEPP announcement, suggesting improved expectations of solvency for such firms.

The benefits of the PEPP, however, extend beyond strictly PEPP-eligible firms. In particular, European firms with a non-investment grade rating also experienced a more positive abnormal stock (relative to firms without a credit rating) as evidence of a spillover of the PEPP to credit

[1] The Federal Reserve announced the establishment of two new facilities to acquire corporate bonds in the primary and secondary market on March 23, 2020. These are the Primary Market Corporate Credit Facility (PMCCF) and the Secondary Market Corporate Credit Facility (SMCCF).

[2] In addition, remaining maturity has to be at least 6 months in the case of bonds, and at least 28 days for commercial paper.

markets that are not directly affected, although the stock price response for non-investment grade firms is weaker than for investment-grade firms. In addition, the finding that investment grade firms experienced relatively large excess stock returns holds up if we restrict the sample to European firms that are not incorporated or headquartered in a euro area country, indicating spillovers of the PEPP to non-euro European countries.

While on average both shareholders and debtholders gain from the PEPP announcement, the division of the overall gains between shareholders and debtholders is found to reflect the pre-announcement financial strength of the firm. In particular, firms that are closer to bankruptcy, as proxied by a higher leverage ratio and a higher book-to-market value of equity, experience relatively smaller gains for shareholders and relatively bigger gains for debtholders. Specifically, the abnormal stock return is negatively related to the book-to-market ratio, while the CDS spread change is negatively related to both the leverage and book-to-market ratios.

To make the gains to shareholders and debtholders more directly comparable, we also consider the change in the market value of equity, and the change in the market value of debt as implicit in the CDS change using the approach of Veronesi and Zingales (2010). Using these additional valuation variables, we find similar results. In particular, the share of shareholder gains in total shareholder and debtholder gains is negatively related to both the leverage and book-to-market ratios. The relatively smaller gains for shareholders of more leveraged firms following the PEPP announcement is consistent with the existence of debt overhang in the case of highly leveraged firms.

We also examine whether the PEPP announcement affected firms differently depending on whether they are highly affected by the COVID-19 pandemic. We find that firms in highly affected industries benefit relatively little from the PEPP, as indicated by a relatively lower

abnormal stock return and a relatively smaller decline in the CDS spread. These results could reflect that highly affected firms have restricted access to credit markets even after the PEPP announcement, and hence can benefit relatively less from the generally lower borrower costs wrought by the PEPP. Alternatively, the business models of highly affected firms could be more permanently impaired, which suggests that there are fewer profitable investment opportunities for these firms that need to be financed regardless of the PEPP.

Finally, we consider how the impact of the PEPP announcement on equity and debt valuations depends on the strength of pre-PEPP national fiscal responses to the pandemic. Firms generally benefit from pandemic-related fiscal measures, either directly as in the case of, say, wage subsidies, or indirectly to the extent that fiscal measures serve to avert a deep recession with a concomitant fall in demand for the firm's output. Thus, fiscal measures should move firms farther away from insolvency, which potentially influences how the PEPP affects firms. We find that firms that are investment grade and rely relatively more on bond finance experience higher abnormal stock returns, especially if located in countries with stronger fiscal responses. At the same time, the CDS spread declines more with a firm's dependence on bond finance if it is located in a country with a stronger fiscal response to the pandemic. These results suggest that the monetary and fiscal policy responses to the pandemic are complements in the sense that a strong pre-PEPP fiscal response enhances the potential for the PEPP to positively affect equity and debt valuations.

To our knowledge, this paper is the first to consider how corporate QE affects individual-firm share prices. In addition, by also considering CDS spreads, we can shed light on how the differential gains to shareholders and debtholders from corporate QE depend on firm characteristics and in particular on leverage. Our finding that a larger share of the total gains

accrues to debtholders in the case of highly leveraged firms is analogous to the classical modeling by Myers (1977), which shows that a larger share of the gains of additional investment accrues to debtholders in case of highly leveraged firms. The implied debt overhang can give rise to underinvestment (see also Hennessy, 2004, and Diamond and He, 2014). Debt overhang was blamed for a slow recovery from the previous financial crisis, as it caused many firms to display weak subsequent investment (see Kalemli-Ozcan, Laeven, and Moreno, 2020, for empirical evidence of a debt overhang effect on corporate investment for the European case). Monetary policy in the form of the PEPP, by providing relatively larger valuation gains to the debtholders of highly indebted firms, can be expected to ameliorate underinvestment incentives at these firms.

This paper contributes to a literature that examines the impact of monetary policy on equity prices.[3] Most of this literature predates QE and hence examines changes in conventional monetary policy. Using an event study methodology, Thorbecke (1997) finds a significantly negative relation between policy-related changes in the federal funds rate and the return on the DJIA stock index. Bernanke and Kuttner (2005) similarly find a positive response of the overall stock market to unexpected federal funds rate changes relative to Federal funds futures. Ehrmann and Fratzscher (2004) consider how the share prices of individual firms react to surprise monetary policy changes on FOMC meeting days, finding that firms with low cash flow-to-income ratios, small size, high price-earnings ratios and high Tobin's q are affected significantly more by monetary policy changes.[4] The observed heterogeneity in the share price response to monetary policy is attributed to how monetary policy changes differentially affect firms' access

[3] Rigabon and Sack (2003) document that monetary policy reacts to the stock market as well, with the Fed being more likely to tighten monetary policy after a fall in the stock market.
[4] Cieslak, Morse and Vissing-Jorgensen (2019) find evidence that communication by the FED about monetary policy between FOMC meetings also affects equity returns.

to credit given informational asymmetries. Using a VAR methodology, Maio (2013) similarly finds a heterogeneous stock market response to monetary policy as based on variables such as size and the market-to-book ratio. In this paper, we consider how the reaction of equity prices to corporate QE in the form of the PEPP differentially depends on firms' financing and exposure to the COVID-19 pandemic, controlling for firm characteristics that have been found to affect the share price response to monetary policy in previous research.

Studies that examine the financial market effects of unconventional monetary policy changes primarily focus on bond markets. Krishnamurthy and Vissing-Jorgensen (2011), for instance, find that the announcement of QE1 in the United States significantly reduced yields on US Treasury debt, US agency debt and on MBS. Additional studies, surveyed by Kuttner (2018), similarly find that QE announcements in the United States significantly reduced yields in the US bond market. Analogously, Dell'Ariccia, Rabanal and Sandri (2018) survey studies on the impact of QE in the euro area, Japan and the United Kingdom, also documenting reductions in bond yields following QE announcements.[5] In a recent paper, Hartley and Rebucci (2020) find that 24 COVID-19 QE announcements by 21 global central banks caused a one-day reduction in the yield on 10-year government bonds of -0.14% on average.

The ECB first purchased corporate bonds as part of its Corporate Sector Purchase Program (CSPP) that was announced in March 2016, with eligibility criteria similar to the PEPP.[6] Several papers have examined the effects of the CSPP on euro zone credit markets. Todorov (2020) finds that bond yields dropped on average by 30 basis points after the CSPP announcement, while bid-ask spreads narrowed as evidence of improved liquidity. In addition, firms issued 25% more in

[5] Arrata, Nguen, Rahmouni-Rousseau and Vari (2020) find that the ECB's purchasing of public bonds in the euro zone has made these assets relatively scarce, causing a decline in the repo rate involving these bonds.
[6] Under the CSPP the ECB could only purchase corporate bonds to the exclusion of commercial paper.

QE-eligible debt after the CSPP announcement compared to other types of debt. Gross-Rueschkamp, Steffen, and Streitz (2019) study the transmission channel of CSPP to firms' capital structures via the banking sector. Lower bond yields after the CPSS announcement cause firms that can issue eligible debt to substitute additional bond finance for bank finance. This enables previously constrained banks to increase their lending to profitable private firms. Betz and De Santis (2019), Ertan, Kleymenova, and Tuijn (2018), and Arce, Gimeno, and Mayordomo (2017) similarly find evidence of a bank credit reallocation effect of the CSPP towards firms that cannot issue CSPP-eligible debt. Rischen and Theissen (2019) further find that the CSPP has tended to reduce the initial underpricing of newly issued bonds in the euro area bond market. Our paper adds to the literature on the CSPP by examining how a similar program, i.e. the PEPP, affects euro zone equity prices at the time of the COVID-19 crisis.

There are several channels by which QE can affect equity prices. QE can directly affect equity prices through a revaluation of the firms' assets and liabilities triggered by lower interest rates. Furthermore, a firm with higher net worth, and in particular higher asset values, following QE can more easily obtain additional credit (e.g., Bernanke and Gertler, 1989), which could indirectly contribute to a higher share price.[7] QE can further have macroeconomic effects with implications for share prices. To illustrate, Gambetti and Musso (2017) provide evidence that QE in the euro zone has had a significant upward effect on real GPD, which could have had a beneficial effect on share prices. In related papers, Luck and Zimmermann (2020) provide evidence of an employment effect of QE in the United States, while Giambona, Matta, Peydro

[7] Additionally, higher equity prices in the case of banks imply a higher market value of the bank's capital, which can provide for a bank lending channel of monetary policy (e.g., Bernanke and Blinder, 1992).

and Wang (2020) find an investment effect of QE also in the United States, consistent with improved prospects for firms stemming from QE.

This paper's focus on the impact of the PEPP on equity prices and CDS spreads is warranted, as it provides new insights into QE as a monetary tool to improve financial conditions for firms at a time of economic crisis. A main finding is that the PEPP raises share prices and reduces CDS spreads for firms with an investment grade rating, as the ECB is restricted to purchasing investment grade debt. Importantly, however, the benefits of the PEPP are shown to extend towards non-investment grade firms, and firms that are not incorporated or headquartered in the euro area, as evidence of policy spillovers. Going beyond prior papers, this paper examines the division of the gains from the PEPP between shareholders and debtholders, finding that debtholders gain relatively more if the firm is more leveraged, consistent with the existence of debt overhang. The paper has two main findings directly related to the COVID-19 crisis. First, firms that are more heavily impacted by the pandemic benefit relatively little from the PEPP, suggesting that monetary policy has only a limited potential to offset a large negative shock to a firm's earnings capacity. Second, the PEPP is a complement to national fiscal responses to the pandemic in the sense that a strong pre-PEPP fiscal response enhances the potential for the PEPP to raise a firm's equity and debt valuations. In the remainder, section 2 discusses the data and the methodology. Section 3 presents the empirical results, and section 4 concludes.

2. Data and methodology

2.1 Data

We obtain data on publicly traded firms headquartered in Europe from Thomson Reuters. We exclude financial firms, utilities and not-for-profit and governmental firms (firms with primary

SIC codes between 6000 and 6999, 4900 and 4949, and 8000 and above). We select firms for which price information on common shares is available, but discard firms with illiquid shares that display zero daily stock returns more than trading 90 days in the year before January 24, 2020 when the first coronavirus case was reported in Europe. We also exclude firms with a share price that dropped to zero during this one-year window. Furthermore, we only retain ultimate parent firms (by abandoning firms with a name that differs from the ultimate parent company name), and firms for which we can obtain accounting data.

A first dependent variable is abnormal return, which is the excess stock return on March 19, 2020 when European financial markets could first react to the PEPP announcement made the prior evening (see Table A1 in the Appendix for variable definitions and data sources). Abnormal return is calculated as the difference between the actual stock return and the predicted stock return, derived from an estimated relation between the firm's stock return and the return on the euro denominated MSCI World Index during the year from January 24, 2019 to January 23, 2020 (this is the year prior to the discovery of the first COVID-19 infection in Europe on January 24, 2020).[8] The mean abnormal return was 0.56% for 2011 European firms from 32 countries (see Table 1; see Table A2 in the Appendix for the number of firms per country). This positive abnormal return followed a week of negative average abnormal returns for European firms (see Figure 1), perhaps in part driven by market disappointments over the absence of a PEPP-like intervention by the ECB before. On March 19, 2020, the average absolute stock return was 1.7% (see Figure 2), given a positive return on the MSCI World Index of 0.04% on that day.

As an additional dependent variable, we consider the change in a firm's CDS spread on March 19, 2020. The CDS spread is the cost of ensuring against default, and hence a lower CDS

[8] To deal with outliers and data inconsistencies we drop the bottom and top one percentiles of all returns in the estimation window.

spread suggests lower expected credit losses for debt security holders. We consider CDS spreads for five-year contracts written on senior bonds.[9] We drop illiquid CDS contracts, for which the quoted CDS spread was the same as on the day before for more than 90 days in the year beginning on January 24, 2019. If available, we select euro denominated contracts, and otherwise we take dollar or Swiss franc denominated contracts (106 of the 111 CDS contracts in our sample are euro denominated). The mean CDS spread decreased by 4.5 basis points on March 19.

Higher share prices and lower CDS spreads provide prima facie evidence that the PEPP had beneficial effects in the face of the COVID-19 shock which jeopardized corporate liquidity and solvency. In particular, higher share prices could in part reflect a greater borrowing capacity, either because asset prices improved or because future borrowing costs declined. At the same time, a lower CDS spread hints at a lower probability of bankruptcy for the firm, which entails lower expected bankruptcy costs for the firm itself and for its various stakeholders. In addition, a lower CDS spread suggests that the firm faces a stronger incentive to invest, as there is less potential for additional investment to primarily increase the valuation of debt on account of a debt overhang problem.

Arguably, monetary policy at a time of crisis is especially effective if it reduces expectations of bankruptcy and debt overhang, rather than if it mainly creates additional shareholder wealth. Thus, it is interesting to consider to what extent and for what firms the PEPP reduced the CDS spread rather than engendered an abnormal return for shareholders. To be able to compare CDS and share price changes more directly, we examine the changes in the values of the firm's overall equity and of its overall debt as implied by the observed share price and CDS

[9] In addition, we select CDS spreads with an MM14 restructuring clause (Modified-Modified Restructuring for data referencing the 2014 ISDA Definitions).

changes, both scaled by the book value of assets at the end of 2019. In particular, dMVE/Book assets is the change in the market value of equity on March 19, 2020 (calculated as the change in the share price times the number of shares outstanding), divided by the book value of assets at the end of 2019. The mean of dMVE/Book assets is 2.94% for a sample of 2211 observations.

Analogously, dMVD/Book assets is the estimated change in the value of the firm's overall debt implicit in the CDS change on March 19, 2020, divided by the book value of assets at the end of 2019. We follow the methodology of Veronesi and Zingales (2010) to calculate the change in the value of debt as the change in the cost of insuring the debt against default implicit in the CDS spread change. At any moment, the cost of ensuring the firm's debt against default in the CDS market is given by

$$I = \sum_{t=0}^{T} \frac{CDS(t)}{10000} D(t)Q(t)Z(t), \quad (1)$$

where CDS(t) is the cost of ensuring debt in year t, D(t) is the amount of debt that will not have matured by year t, Q(t) is the probability of not defaulting up to year t, Z(t) is the t-year risk-free discount factor, and T is the maximum maturity of debt. The CDS spread in (1) is divided by 10000, as the CDS spread is normally expressed in basis points. The change in the market value of debt at the time of the PEPP announcement is then given by:

$$\Delta E = -\left[\sum_{t=0}^{T} \frac{CDS_1(t)}{10000} D(t)Q_1(t)Z(t) - \sum_{t=0}^{T} \frac{CDS_0(t)}{10000} D(t)Q_0(t)Z(t)\right], \quad (2)$$

where the subscripts 0 and 1 denote CDS(t) and Q(t) observed before and after the PEPP announcement, respectively. To implement equation 2, we assume a constant, risk free rate of 2% so that $Z(t) = \exp(-0.02t)$. Also, we assume a constant instantaneous probability of default and we set the debt recovery rate at 0.6 so that $Q(t) = e^{-t\frac{CDS(t)}{10000(1-\delta)}}$ (see Veronesi and Zingales, 2010, Appendix A). Furthermore, we take the remaining maturity of all the firm's debt to be 3

years (close the average mean remaining maturity of bonds and loans of 2.31 and 4.27 years for the firms in our sample, calculated from Capital IQ data), and we assume that firms repay the outstanding debts in equal annual payments, i.e. they repay a third of their debts each year. Using these assumptions, we calculate the mean dMVD/Book assets to be 5.95 basis points for a sample of 111 firms.

We also consider the increase in the market value of equity relative to the sum of the increases in the market values of equity and debt, i.e. dMVE/(dMVE + dMVD) in case both dMVE and dMVD are positive, which is the case for 66 firms. The mean of dMVE/(dMVE + dMVD) is 0.879, i.e. on average 87.9% of the total valuation gains accrue to shareholders. Alternatively, we compute dMVE/(dMVE + dMVD) conditional on the sum of dMVE and dMVD being positive, yielding 84 observations with a mean of 0.812.

We relate the various dependent variables reflecting share price and CDS spread changes to a range of independent variables that capture (i) the likely relative impact of the PEPP on the firm as indicated by the firm's credit rating and reliance on bond finance, (ii) other firm characteristics that potentially proxy for credit constraints and debt overhang that could be alleviated by the PEPP, (iii) whether a firm belongs to an industry that is highly affected by COVID-19, and, finally, (iv) the strength of pertinent national fiscal policy measures to counter the pandemic that potentially affect the implications of monetary policy for the firm.

The PEPP is restricted to purchasing corporate debt securities that are investment grade, which suggests that corporate issuers with an investment grade rating are more directly affected by the PEPP. To test this, we construct the Investment grade dummy variable, which signals that the firm had a long term issuer credit rating of at least BBB-/Baa3 issued by either Moody's, S&P or Fitch on March 17, 2020. We use both domestic and foreign currency credit ratings to

create this variable. Analogously, the Non-investment grade dummy variable refers to firms that had an issuer rating below BBB-/Baa3 on March 17, 2020. In our sample, 9.9% of firms had an investment grade rating, while 4.6% of had a non-investment grade rating. The remaining firms had no issuer rating.

Firms that rely more heavily on bond finance are potentially more strongly affected by the PEPP, as the PEPP is restricted to purchasing marketable debt securities. To represent a firm's bond issuance, Bonds/assets is calculated as the ratio of the sum of the principal amounts of all outstanding bonds as of the most recent reporting date in 2019 available in S&P's Capital IQ (most commonly, end of Q2 or Q4 in 2019) divided by total assets. Bonds are defined to include commercial paper and notes. Assets for the same reporting date as bonds are obtained from Compustat. We matched data from Capital IQ and Compustat with data from Eikon based on ISIN security numbers. In our sample, firms finance on average 5.75% of assets using bonds.

The implications of monetary policy for a firm depend, among other things, on whether it serves to alleviate credit constraints and debt overhang. Some firms no doubt already were subject to credit constraints and debt overhang before the COVID-19 crisis, while the occurrence of this crisis can only have aggravated these problems for many firms, even if to different extents. To proxy for potential pre-existing credit constraints and debt overhang, we consider a range of firm-level variables similarly to Ehrmann and Fratzscher (2004) and Maio (2014), measured as of the end of 2019 and thus predating the COVID-19 crisis.

Among these, Leverage is the ratio of liabilities to assets. Highly leveraged firms potentially experience greater credit constraints and debt overhang that could be alleviated by the PEPP. The sample mean of Leverage in our sample is 53.1%. Log assets is the natural logarithm of total assets, and it proxies for firm size. Larger firms may be less credit constraint. ROA is net

income before extraordinary items divided by assets, with a mean of -2.91%. More profitable firms are less likely to experience credit constraints and debt overhang. Book-to-market is the book value of equity divided by the market value of equity with a mean of 0.650. Firms with a higher book-to-market could face fewer credit constraints if a high book-to-market reflects lower growth opportunities and investment needs, but it could alternatively signal debt overhang resulting from depressed asset valuation.

In some specifications, we include several additional variables that potentially are indicative of credit constraints. Among these, Cash-to-price ratio is the cash-flow per share divided by the share price with a mean of 0.083, and Earnings to-price is net income per share divided by the share price with a mean of -0.0259. Firms with a lower cash flow or net income per share relative to the share price could be more subject to credit constraints. Cash/assets is cash balances divided by assets with a mean of 0.157. A greater cash/assets ratio could be a sign of lower credit constraints as the firm can fund itself for a while, but alternatively it could signal greater credit constraints as firms could accumulate greater cash balances exactly because they know that they are credit constraint (Almeida, Campello, and Weisbach, 2004). Finally, redeployability is a measure of asset redeployability based on Kim and Kung (2017), computed as the value-weighted average of asset-level redeployability indices across a firm's business segments using market capitalizations in each industry-year as weights. Firms with more redeployable assets are less likely to experience credit constraints. The alleviation of credit constraints and debt overhang by the PEPP could result in higher share prices and lower CDS spreads. In addition, relatively smaller gains for shareholders compared to debtholders could be a sign of debt overhang.

The COVID-19 crisis has differentially impacted the earning power of firms, and as a corollary any worsening of credit constraints and debt overhang that they may experience. This implies that firms that are highly affected by the pandemic could see their share prices, CDS spreads and other derived valuation variables differentially affected by the PEPP. A priori, it is uncertain whether, say, the share prices of highly affected firms should rise or fall relatively more on account of the PEPP. On the one hand, highly affected firms could be essentially insolvent and headed for bankruptcy anyway, in which case monetary policy would be impotent to improve the firm's prospects and hence raise its share price. On the other hand, highly affected firms that are not certain to go bankrupt could see their credit constraints go down relatively more, giving rise to a relatively large share price increase. We capture a firm's exposure to COVID-19 by the Affected industry dummy, which indicates the following industries that were particularly affected by the pandemic according to the OECD (2020): Entertainment; Construction materials; Automobiles and trucks; Aircraft; Shipbuilding, railroad equipment; Personal services; Business services; Transportation; Wholesale; Retail; Restaurants, hotels, motels. This list of industries is also used by Fahlenbrach et al. (2020) in their study of the share price reactions of US firms to news of the US fiscal policy response to the pandemic on March 24, 2020.[10]

Firms are not only helped by monetary policy in the form of the PEPP, but also by fiscal policies at the national level. Firms located in countries with strong fiscal responses to the COVID-19 crisis arguably were already less distressed at the time the PEPP was announced. This suggests that the PEPP has more potential to raise the share price, and less potential to

[10] These authors analyze how the share price reactions of all firms and separately of highly affected firms to the COVID-19 shock and the subsequent fiscal policy news depend on measures of financial flexibility, showing that firms with less financial flexibility experience worse stock returns until March 23 and benefit more from the news on March 24.

lower the CDS spread, of firms located in countries with stronger pre-PEPP fiscal responses to the COVID-19 crisis. To test this, we include the Fiscal response/GDP variable, which is the total amount of pandemic-related economic stimulus spending in a firm's country of residence announced up to March 17, 2020 divided by the country's GDP. Fiscal response/GDP has a mean of 0.044. These data are obtained from Hale et al. (2020).

2.2 Methodology

Using an event study methodology, we estimate specifications of the following general form:

$$P_{ijk} = \beta_1 F_{ijk} + \beta_2 X_{ijk} + \beta_3 Affected\ industry_j + \beta_4 F_{ijk} * Fiscal\ response/GDP_k + \alpha_k + \epsilon_{ijk} \quad (3)$$

where P_{ijk} is a valuation change variable, such as the excess stock return or the change in the CDS premium, for firm *i* in industry *j* and country *k* on the event day of March 19, 2020. F_{ijk} is a set of firm financing variables (Investment grade, Non-investment grade, and Bonds/assets) that reasonably imply greater benefits for a firm from the PEPP. Thus, the estimated coefficients β_1 are expected to be positive and negative, if P_{ijk} stands for the excess stock return and the change in the CDS premium, respectively. X_{ijk} is a set of additional firm-level variables (at a minimum, Leverage, Log of assets, ROA, and Book-to-market) that potentially affect the benefits of the PEPP for the firm. $Affected\ industry_j$ indicates whether a firm is in an industry that is affected relatively strongly by the COVID-19 crisis. A priori, is it not clear whether firms in more affected industries stand to gain more or less from the PEPP. Hence, the estimated coefficient β_3 could be of either sign in, say, an excess stock return regression. $F_{ijk} * Fiscal\ response/GDP_k$ is a set of interactions of firm-level financing variables and the fiscal response variable for country *k*. A strong fiscal response could enlarge the scope for a firm to

benefit from the PEPP, which would be consistent with the estimated coefficients β_4 being positive in an excess stock return regression, and negative in a CDS premium change regression. The specification further includes a set of country fixed effects α_k to control for any country-level news on the event day, such as on the national development of the pandemic, that could affect the valuation variables. The un-interacted fiscal response variable is subsumed in these country fixed effects. The errors are clustered at the country level to accommodate any commonality at this level.

3. Empirical results

This section presents empirical evidence on the impact of monetary policy in the form of the PEPP on European firms by examining equity and debt market reactions to the PEPP announcement. The analysis takes into account that European firms were different before the COVID-19 crisis, and also were affected differently by this crisis. To make the former distinction, we first present 'baseline' results taking into account variables that potentially explain the financial market response to a corporate bond-buying program such as the PEPP, and in particular the firm's credit rating and extent of bond finance, but excluding variables related to the COVID-19 crisis. Subsequently, we additionally include information on which industries were affected most by COVID-19 and on the strength of countries' fiscal responses to the pandemic.

Table 2 shows regressions of the abnormal stock return on March 19, 2020 (when the stock market could first react to the PEPP announcement made in the evening of the previous day) for the full sample of European firms. In regression 1, the issuer-level Investment grade dummy is estimated with a coefficient of 0.0206 that is significant at 1%, suggesting that firms

that can issue investment grade debt benefited relatively more from the PEPP announcement. ROA is estimated with a negative and significant coefficient, as less profitable firms potentially gain more from the PEPP due to a relaxation of financial constraints. Regression 2 additionally includes the Non-investment grade dummy. In this regression, the Investment grade and Non-investment grade dummy variables receive coefficients of 0.0232 and 0.0137 that are significant at 1% and 10%, respectively. Thus, the PEPP benefits firms with a non-investment grade rating as well (relative to firms without a credit rating), although less strongly than firms with an investment-grade rating. Instead of these dummy variables, regression 3 includes the Bonds/assets to reflect the extent to which a firm relies on bond finance, which is estimated to be insignificant. In this regression, Book-to-market is negative and significant, perhaps because firms with a high Book-to-market are closer to bankruptcy so that accommodative monetary policy has less potential to benefit shareholders rather than debtholders. Regression 4 includes the financing variables included in regressions 2 and 3 as well as the interaction Bonds/assets * Investment grade. In this regression, Investment grade is estimated to be positive and significant in regression 2. In addition, Bonds/assets is negative and significant, and Bonds/assets * Investment grade is positive and significant. This suggests that firms with an investment grade rating benefit more from the PEPP, if they rely relatively more on bond finance.

Starting from regressions 1-4, regressions 5-8 include several additional independent variables that proxy for financing constraints that are potentially alleviated by the PEPP (the additional variables are Cash-to-price, Earnings-to-price, Cash/assets and Redeployability). In these regressions, Cash/assets receives positive and significant coefficients, as high cash balances could reflect financial constraints that are mitigated by the PEPP. In these regressions, the estimated effects of the financing related variables are largely unchanged. Overall, the results

of Table 2 provide evidence of greater abnormal returns for bond-issuing firms, and especially firms with an investment grade rating, which makes sense as the PEPP targets investment-grade debt instruments.

Firms incorporated in the euro area are potentially PEPP eligible and hence could be directly affected by PEPP purchases, while other European firms could see their access to finance and credit terms affected more indirectly through PEPP spillovers in bond markets. To estimate the effects of potential PEPP eligibility and alternatively PEPP spillovers on excess returns, we next split the overall sample of European firms into firms incorporated and not incorporated in a euro area country. In addition, we also consider a sample split into firms that are headquartered and not headquartered in a euro area country, with potentially different PEPP effects as firms that are headquartered in a euro area country are more likely to borrow in the euro area capital market that is more directly affected by PEPP purchases.

We first consider excess returns for firms that are either incorporated or headquartered in the euro area. Specifically, regressions 1-4 of Panel A of Table 3 provide estimates of regressions 1-4 of Table 2 for the sample of firms that are incorporated in a euro area country, while regressions 5-8 of this panel provide analogous estimates for firms that are headquartered in the euro area.[11] The investment grade dummy is estimated to be positive but insignificant in regressions 1 and 2, unlike in regressions 1-2 of Table 2. The interaction of Bonds/assets with Investment grade in regression 4, however, is positive and significant as in the corresponding regression in Table 2, providing some evidence that investors discriminate among euro area incorporated firms on the basis of the investment grade criterion for PEPP eligibility. For the sample of euro area headquartered firms, the investment grade dummy is positive and significant

[11] There are 911 and 921 firms that are identified as incorporated and headquartered in the euro area, respectively, of which 900 are incorporated as well as headquartered in this area.

in regressions 5 and 6, while the interaction Bonds/assets * Investment grade is positive and significant in regression 8. Taken together, the evidence of Panel A suggests that investors more clearly discriminate between investment grade firms and other firms among euro area headquartered firms compared to euro area incorporated firms. This could reflect that euro area headquartered firms as a group are in a better position to benefit from the effect of the PEPP on bond markets given their substantive nexus to the euro area, or alternatively that investors act on better known information about a firm's country of headquarter location than its country of incorporation.

Panel B of Table 3 provides the results of analogous excess return regressions for the groups of non-euro area incorporated and non-euro area headquartered firms. The investment grade dummy is positive and significant in regressions 1, 2 and 4 for the sample of non-euro area incorporated firms, and also in regressions 5, 6 and 8 for the sample of non-euro area headquartered firms. These results provide strong evidence of PEPP spillovers to European firms that are either not incorporated or not headquartered in a euro area country. In fact, the evidence of Table 3 suggests that investors discriminate more strongly among firms that are investment grade vs other firms among groups of firms that are not directly targeted by the PEPP, i.e. firms that are either not incorporated or headquartered in the euro area. Conceivably, this reflects investors' surprise that the ECB announced the PEPP, which has an obvious potential for spillover effects via capital markets, instead of other possible monetary policy measures that would have had less potential for spillovers to firms with a weaker link to the euro area.

We can also estimate excess return regressions at the country level to determine any PEPP effects in individual euro area and non-euro area countries. Specifically, Table 4 reports the results of estimating regressions 1 and 2 of Table 2 for firms that are either incorporated or

headquartered in the United Kingdom, which is a main non-euro area country with a well-developed bond market (reported standard errors are robust to heteroskedasticity). The investment grade dummy is positive and significant in columns 1 and 2 for UK incorporated firms, while it is positive in columns 3 and 4 (and significant in column 4) for firms that are headquartered in the United Kingdom, indicating strong evidence of PEPP spillovers to UK firms.

More broadly, we estimated regression 1 of Table 2 for countries with more than 25 incorporated firms, and alternatively more than 25 headquartered firms. This yields a significant positive effect of the investment grade dummy on the excess returns of firms incorporated in Belgium (euro area country) and the United Kingdom (non-euro area country), and insignificant effects for firms incorporated in other countries. In addition, there is a significant positive effect of the investment grade dummy on the excess returns of firms headquartered in Belgium and Greece (euro area countries) and the Russian Federation (non-euro area country), and insignificant effects for firms that are headquartered in other countries.[12] Thus, there is evidence of PEPP effects on excess stock returns in individual euro as well as non-euro area countries.

Table 5 presents regressions of the change in the CDS spread that are analogous to Table 2. These regressions are based on a much smaller sample of observations (for instance, 111 observations in regression 1), compared to the excess returns regressions of Table 2. In regression 1, the Investment grade dummy is estimated to be negative and significant, suggesting lower expected credit losses on securities issued by investment-grade firms after the PEPP announcement, consistent with increased demand for such securities by the ECB through the

[12] These results except those for the United Kingdom are not reported.

PEPP. In this regression, the estimated coefficient for Leverage is negative and significant. This could reflect that highly leveraged firms are closer to bankruptcy, so that the potential for monetary policy in the form of the PEPP to reduce expected credit losses is greater. Book-to-market is also estimated to be negative and significant, which could similarly reflect that firms with a high Book-to-market are closer to bankruptcy and subject to a debt overhang, which entails that accommodative monetary policy is relatively potent in reducing expected credit losses rather than in raising share prices (consistent with regressions 3-4 and 7-8 in Table 2). In regression 2, the Non-investment grade dummy is insignificant, while in regression 3 Bonds/assets is insignificant. In regression 4, all the financing related variables turn out to be insignificant. In regressions 5-8, Cash/assets is positive and significant, perhaps because bond investors see a smaller potential for the PEPP to reduce expected credit losses for firms with high cash/assets ratios, as they think that firms with large cash balances can use this cash to pay off debts. Otherwise, regressions 5-8 are very similar to regressions 1-4.

Overall, Table 5 shows evidence that investment grade firms see expected credit losses on their debts decline relatively more on account of the PEPP, as the PEPP increases demand for such securities. In addition, firms that are closer to bankruptcy and thus are likely to suffer more from debt overhang, as indicated by higher leverage and book-to-market values, are shown to experience relatively larger declines in CDS spreads, suggesting larger reductions in expected credit losses for bond investors.

Analogously to Table 3, we estimated CDS premium change regressions separately for firms that are or are not incorporated or headquartered in the euro area. The results, as shown in Table A3 in the Appendix, provide some limited evidence of a relatively large decline in the CDS spread of investment grade firms that are incorporated or headquartered in the euro area (in

regressions 1 and 5 of Panel A) or alternatively not incorporated in the euro area (in regression 4 of Panel B), based on rather small samples of firms.[13]

On average, both shareholders and debtholders benefit from the PEPP as indicated by the negative average abnormal return and the negative average CDS change. To make the gains that accrue to shareholders and debtholders comparable, we next examine how the PEPP has affected the valuations of equity and debt separately and relatively to each other, as indicated by dMVE/Book assets, dMVD/Book assets and two versions of dMVE/(dMVE + dMVD), conditional on whether dMVE and dMVD are both or in the aggregate positive. Table 6 shows the results of regressions of the four pertinent variables on the same set of variables as in regression 1 of Table 2 plus the firm's market Beta which is the coefficient of a regression of the daily log stock return on the daily log return of the MSCI World Index for the period from January 24, 2019 to January 23, 2020. In regressions 1 and 2, the Investment grade dummy is estimated with positive and significant coefficients of 0.0219 and 0.00121, indicating that both shareholders and debtholders of investment grade firms benefit relatively more from the PEPP announcement (consistent with the results of Tables 2 and 5). In regressions 3 and 4, the estimated coefficients are negative at -0.146 and -0.213 and significant, suggesting that for investment grade firms, a relatively smaller share of the total gains accrues to shareholders.

The leverage and book-to-market variables are both negative and significant in regression 1, positive and significant in regression 2, and negative and significant in regression 3. Thus, firms that appear to be closer to bankruptcy and putatively suffer more from debt overhang (with

[13] In robustness checks, we estimated Tables 2 and 4 for alternative event windows, for instance computing the excess stock return and the CDS premium change during the three-day window of March 18-20. In these robustness checks, we continue to find that investment grade firms experienced relatively large excess stock returns. The finding that the CDS premium for such firms declined relatively much, however, is not robust to changing the event window. In another robustness check, we dropped firms with an ROA of less than -0.5, yielding very similar results for Table 2 and unchanged results for Table 5.

higher leverage or book-to market) experience smaller shareholder gains, larger debtholder gains, and correspondingly smaller shareholder gains relative to total shareholder and debtholder gains. ROA is negative and significant in regression 1, indicating smaller shareholder gains for more profitable firms, but ROA is insignificant in regressions 2 and 3. Beta is positive and significant in regression 1, suggesting that shareholders of riskier firms gain relatively more from the PEPP, while Beta is insignificant in regressions 2 and 3.

Next, we consider whether the PEPP announcement affected firms differently depending on whether they are in industries that have been highly affected by the COVID-19 crisis. The PEPP lowers prospective borrowing costs for firms, but there are several reasons to expect that highly affected firms are less able to take advantage of the generally lower borrowing costs. First, highly affected firms could be closer to insolvency and thus unable to access credit markets even after the PEPP announcement. Second, the business models of highly affected firms may be permanently impaired, which suggests that there are fewer profitable investment opportunities for these firms that need to be financed. Third, the relatively large decline in the value of the assets of highly affected firms implies that these firms could have become subject to debt overhang, which reduces the incentives of these firms to invest as a substantial share of the benefits of additional investment would accrue to debtholders. For these reasons, the absolute gains of the PEPP announcement for shareholders as well as debtholders could be relatively small for highly affected firms.[14] In relative terms, debtholders of highly affected firms are expected to gain relatively more on account of the more severe debt overhang.

[14] Going the other way, however, lower prospective borrowing costs could make a costly bankruptcy less likely, especially in the case of highly affected firms. This stands to benefit both shareholders and debtholders ex ante, i.e. before a bankruptcy occurs, through lower borrowing costs, although bankruptcy costs only accrue to debtholders ex post, i.e. once a bankruptcy occurs.

Table 7 shows the results of regressions of equity and debt valuation variables that include the Affected industry variable as a proxy for how strongly a firm has been affected by the pandemic. Specifically, regression 1 includes the Affected industry variable in the abnormal return regression 1 of Table 2, yielding a negative and significant coefficient for this variable. This result is consistent with relatively smaller gains for shareholders of highly affected firms on account of the PEPP. Analogously, regression 2 includes the Affected industry variable in the CDS change regression 1 of Table 5. This yields a positive and significant coefficient of 2.438 for the Affected industry variable, suggesting that also debtholders of highly affected firms gain relatively less from the PEPP announcement. Next, we include Affected industry in the regressions of dMVE/Book assets, dMVD/Book assets and the two versions of dMVE/(dMVE + dMVD) of Table 6, with the results reported as regressions 3-6 in Table 7. The coefficients are negative and significant in regressions 3 and 4, consistent with smaller gains for both shareholders and debtholders of highly affected firms. Affected industry receives negative coefficients in regressions 5 and 6 consistent with a relatively small share of the total gains accruing to shareholders in the case of highly affected firms, but these coefficients are insignificant.

Finally, we consider how the impact of the PEPP announcement on equity and debt valuations depends on the strength of national fiscal responses to the pandemic as summarized by the Fiscal response/GDP variable. Firms tend to benefit from fiscal measures, either directly as in the case of, say, wage subsidies, or indirectly to the extent that fiscal measures serve to avert a deep recession with a concomitant fall in demand for the firm's output. Thus, fiscal measures tend to move firms farther away from insolvency, which has implications for how the PEPP can be expected to affect firms. Firms that are farther away from insolvency can more

easily access credit markets to take advantage of lower borrowing costs, which suggests a stronger impact of the PEPP on equity and debt valuations in countries with stronger fiscal measures. Similarly, firms in countries with strong fiscal measures may have a greater incentive to invest, both on account of a shallower recession and less debt overhang, which also increases the potential for the PEPP to increase equity and debt valuations.[15]

Table 8 provides empirical evidence on the interaction effect of the PEPP and pandemic-related fiscal policies on the abnormal stock return and the CDS change. In particular, to examine the impact of this interaction on abnormal returns, we include interactions of Fiscal policy/GDP with pertinent financing variables in regressions 1-4 of Table 2, with the results reported as regressions 1-4 of Table 8. Thus, regression 1 includes the interaction Fiscal policy/GDP * Investment grade, which is estimated to be positive and significant, indicating a greater abnormal return following the PEPP announcement for investment-grade firms in countries with stronger fiscal measures. Similarly, Fiscal policy/GDP * Investment grade and Fiscal policy/GDP * Non-investment grade are both estimated to be positive and significant in regression 2. In regression 3, Fiscal response/GDP * Bonds/assets is positive and significant, indicating that more heavily bond-financed firms gain more from the PEPP if located in countries with stronger fiscal measures. The interaction Fiscal response/GDP * Bonds/assets * Investment grade has a positive and significant coefficient in regression 4, hinting at greater benefits of the PEPP for investment-grade firms that are more heavily bond-financed and located in countries that took more extensive fiscal measures.

Analogously, we include interactions of Fiscal policy/GDP with pertinent finance variables in the CDS change regressions 1-4 of Table 5, with the results reported as regressions

[15] To the contrary, strong fiscal measures could reduce the potential for the PEPP to lower the probability of costly bankruptcy, which suggests that equity and debt valuations could be affected less positively.

5-8 in Table 8. In regression 7, the interaction Fiscal policy/GDP * Bonds/assets is negative and significant, indicating that debtholders benefit more from the PEPP if firms are more dependent on bond finance. In regressions 5 and 7-8, the interactions of Fiscal response/GDP with included financing variables are insignificant. Overall, Table 8 provides evidence of a positive effect of the interaction of monetary policy in the form of the PEPP and fiscal policies on equity and debt valuations, as prior fiscal measures are shown to enhance the positive effect of the PEPP announcement.

4. Conclusion

The PEPP is a key element of the European policy response to the COVID-19 pandemic. The PEPP enables the ECB to spend an additional €750 billion to purchase debt securities including corporate bonds. By increasing demand for corporate bonds, the ECB makes it easier for corporations to issue additional bonds, thereby improving firms' chances of surviving the pandemic.

Using an event study methodology, this paper finds that investment-grade firms benefit especially from the PEPP as evidenced by higher share prices and lower CDS spreads, which is likely to reflect that the ECB is restricted to purchasing investment-grade debt securities. However, non-investment grade firms benefit from the PEPP as well relative to firms without a credit rating, due to spillovers of anticipated ECB purchases to the non-investment grade bond market. Firms in euro as well as non-euro area countries were positively affected by the PEPP, providing evidence of PEPP spillovers to non-euro area countries.

While on average both shareholders and debtholders gain from the PEPP announcement, the division of the overall gains between shareholders and debtholders is found to reflect the pre-announcement financial strength of the firm. In particular, the share of shareholder gains in total

shareholder and debtholder gains is negatively related to both the leverage and book-to-market ratios. The relatively smaller gains for shareholders of more thinly capitalized firms (indicated by either the leverage ratio or the book-to-market ratio) following the PEPP announcement is consistent with the existence of debt overhang, and a potential effect of monetary policy to ameliorate debt overhang at a time of economic crisis.

We find that firms in highly affected industries benefit relatively less from the PEPP, as indicated by a relatively lower abnormal stock return and a relatively smaller decline in the CDS spread. These results could reflect that highly affected firms have restricted access to credit markets even after the PEPP announcement, and hence can benefit relatively little from the generally lower borrower costs wrought by the PEPP. Alternatively, the business models of highly affected firms could be more permanently impaired, which suggests that there are fewer profitable investment opportunities for these firms that need to be financed.

Finally, we find that the impact of the PEPP on a firm's equity and debt valuations depends on the strength of pre-PEPP national fiscal responses to the pandemic. In particular, firms that are investment grade and rely relatively more on bond finance experience higher abnormal stock returns, especially if located in countries with stronger fiscal responses. At the same time, the CDS spread declines more with a firm's dependence on bond finance if it is located in a country with a stronger fiscal response to the pandemic. These results suggest that the monetary and fiscal policy responses to the pandemic are complements in the sense that a strong pre-PEPP fiscal response enhances the potential for the PEPP to positively affect equity and debt valuations.

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Figure 1: Cumulative abnormal stock returns around the announcement of the PEPP

This graph shows the unweighted average of the cumulative abnormal stock returns of publicly traded European firms, excluding non-financial firms, utilities, not for profit and governmental firms, in a two-week window centered around the time of the PEPP announcement in the evening of March 18, 2020. Only ultimate parent companies are included. Abnormal stock returns are calculated as the difference between the predicted and the actual returns for a stock, using regressions of stock returns on returns of the MSCI World index.

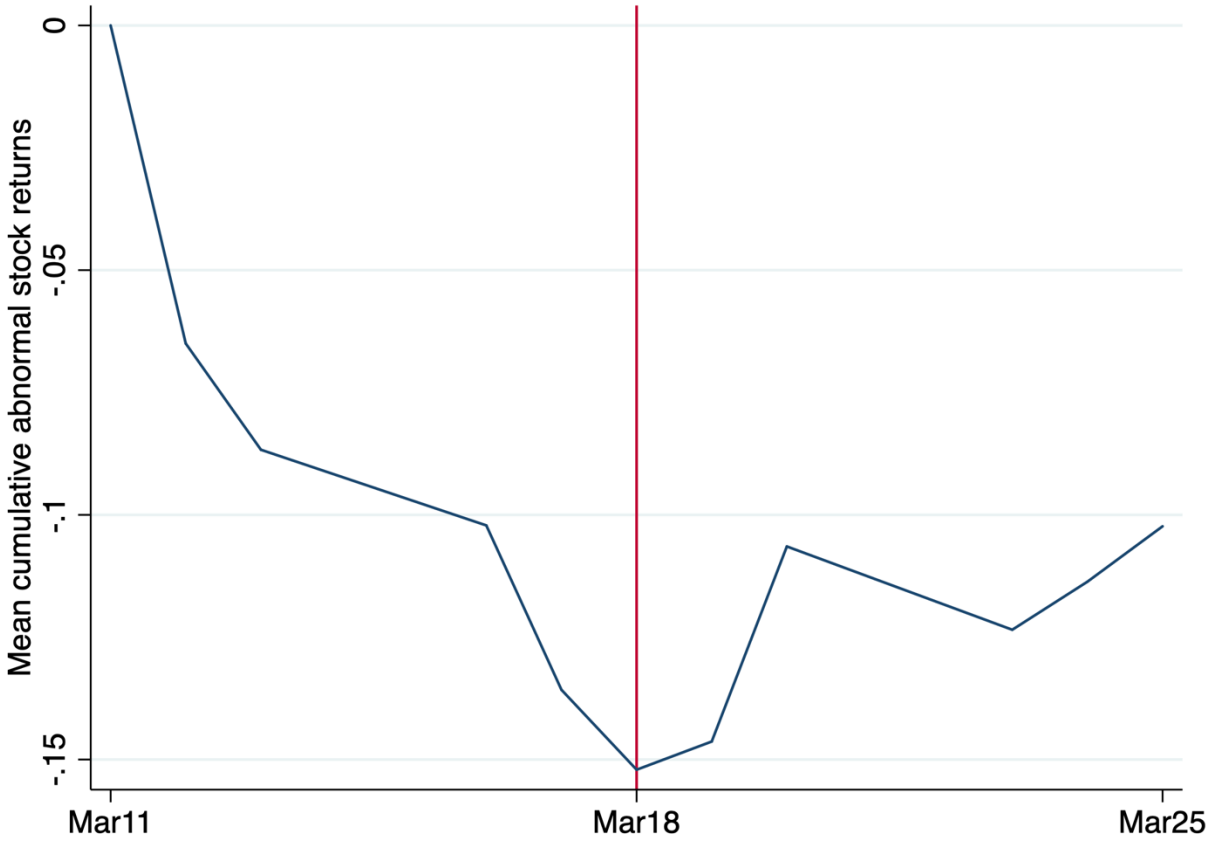

Figure 2: Cumulative stock returns around the announcement of the PEPP

This graph shows the unweighted average of the cumulative stock returns of publicly traded European firms, excluding non-financial firms, utilities, not for profit and governmental firms, in a two-week window centered around the time of the PEPP announcement in the evening of March 18, 2020. Only ultimate parent companies are included.

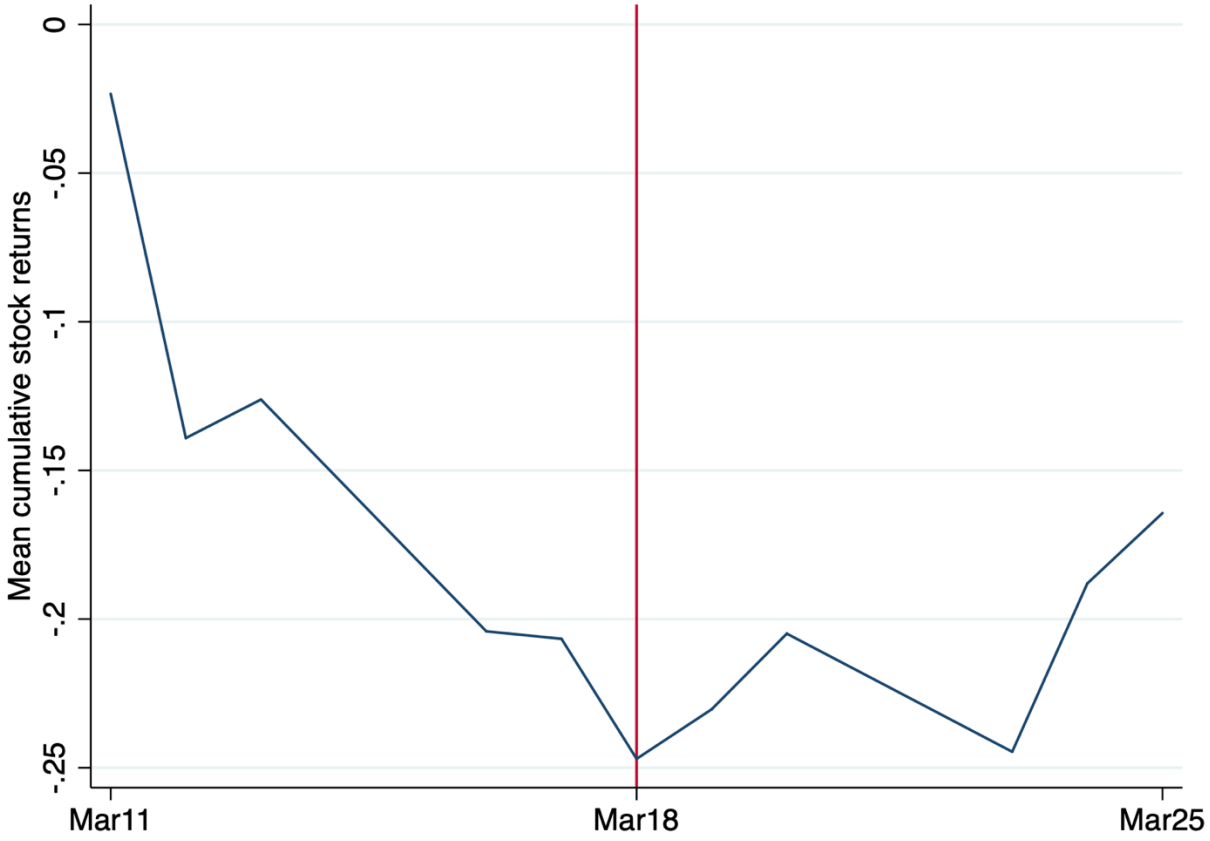

Figure 3: CDS spread changes around the announcement of the PEPP

This graph shows the unweighted average of the cumulative CDS spread changes of publicly traded European firms, excluding non-financial firms, utilities, not for profit and governmental firms, in a two-week window centered around the date of the PEPP announcement in the evening of March 18, 2020. Only ultimate parent companies are included.

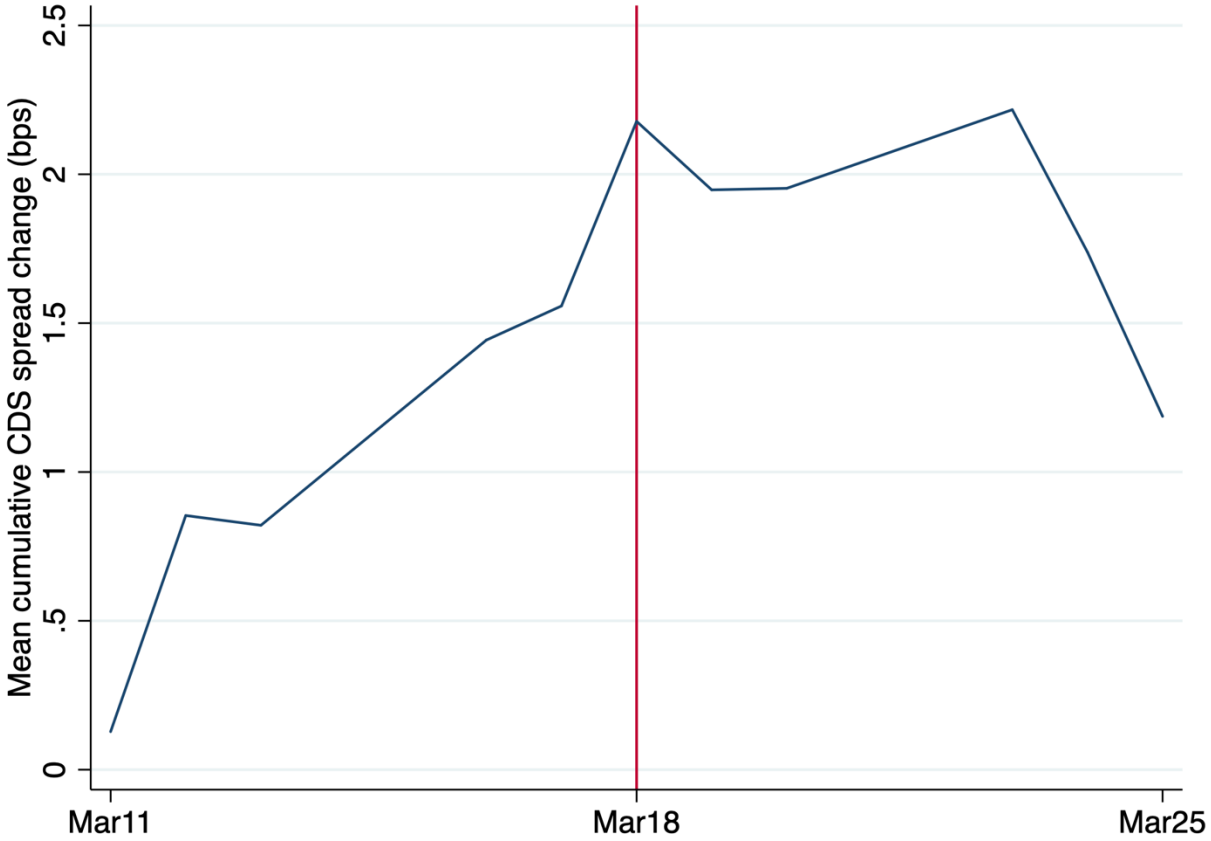

Table 1: Descriptive statistics

This table provides summary statistics. Abnormal return is the abnormal stock return observed on March 19, 2020. CDS change is the change in the CDS spread observed on March 19, 2020. dMVE/Book assets is the change in the market value of equity on March 19, 2020 divided by the book value of assets at the end of 2019. dMVD/Book assets is the change in the market value of debt on March 19, 2020 divided by the book value of assets at the end of 2019. dMVE/(dMVE + dMVD), dMVE > 0, dMVD > 0 is the change in the market value of equity on March 19, 2020 divided by the sum of the changes in the market values of equity and debt on March 19, 2020, conditional on both of these being positive. dMVE/(dMVE + dMVD), dMVE + dMVD > 0 is the change in the market value of equity on March 19, 2020 divided by the sum of the changes in the market values of equity and debt on March 19, 2020, conditional on the sum of these being positive. Investment grade is a dummy variable indicating a long term, domestic or foreign, issuer credit rating of at least BBB-/Baa3 issued by either Moody's, S&P or Fitch. Non-investment grade is a dummy variable indicating a long term, domestic or foreign, issuer credit rating lower than BBB-/Baa3 issued by either Moody's, S&P or Fitch. Bonds/assets is the sum of the principal amounts of outstanding bonds divided by the book value of assets at the last reporting date in 2019. Leverage is liabilities divided by assets at the end of 2019. Log of assets is the natural logarithm of assets at the end of 2019. ROA is net income before extraordinary items divided by assets at the end of 2019. Book-to-market is the book value of equity divided by the market value of equity at the end of 2019. Cash-to-price is cash from operating activities in 2019 divided by the market value of equity at the end of 2019. Earnings-to-price is net income before extraordinary items in 2019 divided by the market value of equity at the end of 2019. Cash/assets is the sum of cash, cash and equivalents and short-term investments divided by assets at the end of 2019. Redeployability is a measure of asset redeployability at the four-digit SIC industry level as of 2015 from Kim and Kung (2017). Beta is the coefficient of a regression of the daily log stock return on the daily log return of the MSCI World index. Affected industry is a dummy variable indicating industries that are relatively affected by the COVID-19 crisis. Fiscal response/GDP is the total amount of economic stimulus spending announced in a country until March 17, 2020 divided by GDP.

	Observations	Mean	SD	Min	Max
Abnormal return	2211	0.00555	0.0626	-0.157	0.150
CDS change	111	-4.508	7.874	-26.68	39.25
dMVE/Book assets	2211	0.0294	0.115	-0.671	0.510
dMVD/Book assets	111	0.000595	0.00114	-0.00653	0.00393
dMVE/(dMVE + dMVD), dMVE > 0, dMVD > 0	63	0.879	0.203	0.109	1.000
dMVE/(dMVE + dMVD), dMVE + dMVD > 0	84	0.812	0.555	-3.336	1.196
Investment grade	2211	0.0991	0.299	0	1
Non-investment grade	2211	0.0461	0.210	0	1
Bonds/assets	1873	0.0575	0.102	0	0.444
Leverage	2211	0.531	0.215	0.0323	0.964
Log assets	2211	19.62	2.516	14.33	26.44
ROA	2211	-0.0291	0.224	-1.203	0.304
Book-to-market	2211	0.650	0.705	0.0322	5.194
Cash-to-price	2195	0.0831	0.203	-0.694	1.048
Earnings-to-price	2211	-0.0259	0.225	-1.309	0.358
Cash/assets	2208	0.157	0.166	0.000189	0.903
Redeployability	2211	0.387	0.104	0.0603	0.600
Beta	2211	0.616	0.503	-2.194	2.810
Affected industry	2211	0.288	0.453	0	1
Fiscal response/GDP	2182	0.0441	0.0629	0	0.179

Table 2: Abnormal stock returns and the PEPP

The dependent variable is the abnormal return observed on March 19, 2020. Investment grade (Non-investment grade) is a dummy variable indicating a long term, domestic or foreign, issuer credit rating of at least (lower than) BBB-/Baa3 issued by either Moody's, S&P or Fitch. Leverage is liabilities divided by assets at the end of 2019. Log of assets is the natural logarithm of assets at the end of 2019. ROA is net income before extraordinary items divided by assets at the end of 2019. Book-to-market is the book value of equity divided by the market value of equity at the end of 2019. Bonds/assets is the sum of the principal amounts of outstanding bonds divided by the book value of assets at the last reporting date in 2019. Cash-to-price is cash from operating activities in 2019 divided by the market value of equity at the end of 2019. Earnings-to-price is net income before extraordinary items in 2019 divided by the market value of equity at the end of 2019. Cash/assets is the sum of cash, cash and equivalents and short-term investments divided by assets at the end of 2019. Redeployability is a measure of asset redeployability at the four-digit SIC industry level as of 2015 from Kim and Kung (2017). Regressions include country fixed effects. Robust standard errors clustered at the country level are in parentheses. *, ** and *** denote significance at 10%, 5%, and 1%, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Investment grade	0.0206***	0.0232***		0.0134**	0.0207***	0.0232***		0.0131*
	(0.00464)	(0.00515)		(0.00641)	(0.00462)	(0.00505)		(0.00682)
Leverage	-0.0133	-0.0145	-0.0159	-0.0117	-0.00383	-0.00494	-0.00672	-0.00291
	(0.00959)	(0.00889)	(0.0103)	(0.00997)	(0.00590)	(0.00557)	(0.00896)	(0.00831)
Log assets	-0.000924	-0.00134	0.000463	-0.00161	-0.000796	-0.00120	0.000741	-0.00130
	(0.000950)	(0.000936)	(0.000951)	(0.00106)	(0.00103)	(0.00100)	(0.00106)	(0.00110)
ROA	-0.0225***	-0.0211***	-0.0342***	-0.0288***	-0.0215***	-0.0204***	-0.0348***	-0.0289***
	(0.00639)	(0.00604)	(0.00818)	(0.00740)	(0.00505)	(0.00494)	(0.00912)	(0.00901)
Book-to-market	-0.00277	-0.00274	-0.00625***	-0.00487**	-0.00121	-0.00107	-0.00427***	-0.00302*
	(0.00202)	(0.00196)	(0.00157)	(0.00181)	(0.00144)	(0.00142)	(0.00153)	(0.00158)
Non-investment grade		0.0137*		0.00811		0.0131**		0.00747
		(0.00681)		(0.00662)		(0.00643)		(0.00673)
Bonds/assets			-0.00475	-0.0374*			-0.00516	-0.0376*
			(0.0195)	(0.0187)			(0.0194)	(0.0189)
Bonds/assets * Investment grade				0.0864*				0.0862*
				(0.0443)				(0.0475)
Cash-to-price					-0.000355	-0.00133	0.000131	0.000904
					(0.0104)	(0.00984)	(0.00853)	(0.00907)
Earnings-to-price					0.00537	0.00610	0.00991	0.00848

					(0.0109)	(0.0105)	(0.0124)	(0.0127)
Cash/assets					0.0281***	0.0273***	0.0363***	0.0362***
					(0.00635)	(0.00674)	(0.00532)	(0.00576)
Redeployability					-0.00496	-0.00535	0.000360	-0.000421
					(0.0168)	(0.0167)	(0.0156)	(0.0158)
Observations	2211	2211	1873	1873	2192	2192	1864	1864
Adjusted R-squared	0.045	0.047	0.043	0.055	0.048	0.049	0.048	0.059
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Table 3: Abnormal stock returns and the PEPP in euro area and non-euro area countries

The dependent variable is the abnormal return observed on March 19, 2020. Investment grade (Non-investment grade) is a dummy variable indicating a long term, domestic or foreign, issuer credit rating of at least (lower than) BBB-/Baa3 issued by either Moody's, S&P or Fitch. Leverage is liabilities divided by assets at the end of 2019. Log of assets is the natural logarithm of assets at the end of 2019. ROA is net income before extraordinary items divided by assets at the end of 2019. Book-to-market is the book value of equity divided by the market value of equity at the end of 2019. Bonds/assets is the sum of the principal amounts of outstanding bonds divided by the book value of assets at the last reporting date in 2019. Regressions 1 to 4 (5 to 8) in Panel A include firms that are incorporated (headquartered) in the euro area. Regressions 1 to 4 (5 to 8) in Panel B include firms that are not incorporated (headquartered) in the euro area. Regressions include country fixed effects. Robust standard errors clustered at the country level are in parentheses. *, ** and *** denote significance at 10%, 5%, and 1%, respectively.

Panel A	Incorporated in euro area				Headquartered in euro area			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Investment grade	0.00929	0.0124		-0.00475	0.0134*	0.0160*		-0.00142
	(0.00654)	(0.00769)		(0.00362)	(0.00693)	(0.00835)		(0.00239)
Leverage	-0.0151*	-0.0167*	-0.0236**	-0.0200**	-0.0153*	-0.0165*	-0.0236**	-0.0197*
	(0.00744)	(0.00797)	(0.00948)	(0.00939)	(0.00865)	(0.00926)	(0.00999)	(0.00984)
Log assets	0.000735	0.000231	0.00140	-0.00000153	0.000430	0.0000161	0.00144*	-0.000125
	(0.000784)	(0.000872)	(0.000832)	(0.00116)	(0.000776)	(0.000891)	(0.000777)	(0.00112)
ROA	-0.0415**	-0.0399**	-0.0375*	-0.0353	-0.0370**	-0.0357**	-0.0380*	-0.0351
	(0.0159)	(0.0155)	(0.0208)	(0.0211)	(0.0158)	(0.0156)	(0.0208)	(0.0212)
Book-to-market	-0.00360	-0.00364	-0.00845***	-0.00775***	-0.00468**	-0.00458**	-0.00807***	-0.00733***
	(0.00296)	(0.00286)	(0.00230)	(0.00236)	(0.00206)	(0.00202)	(0.00232)	(0.00240)
Non-investment grade		0.0131		0.00757		0.0111		0.00742
		(0.00925)		(0.00665)		(0.00879)		(0.00656)
Bonds/assets			-0.0128	-0.0443			-0.0154	-0.0456*
			(0.0312)	(0.0262)			(0.0305)	(0.0257)
Bonds/assets * Investment grade				0.131***				0.122***
				(0.0395)				(0.0362)
Observations	911	911	802	802	921	921	802	802
Adjusted R-squared	0.032	0.034	0.036	0.045	0.039	0.040	0.035	0.043
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Panel B	Not incorporated in euro area				Not headquartered in euro area			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Investment grade	0.0297***	0.0317***		0.0310**	0.0263***	0.0288***		0.0260*
	(0.00432)	(0.00441)		(0.0114)	(0.00394)	(0.00391)		(0.0129)
Leverage	-0.0132	-0.0143	-0.0101	-0.00505	-0.0119	-0.0133	-0.0105	-0.00609
	(0.0136)	(0.0124)	(0.0161)	(0.0156)	(0.0141)	(0.0126)	(0.0155)	(0.0147)
Log assets	-0.00212	-0.00241*	-0.000325	-0.00289*	-0.00196	-0.00233*	-0.000434	-0.00284*
	(0.00132)	(0.00122)	(0.00148)	(0.00139)	(0.00132)	(0.00123)	(0.00146)	(0.00139)
ROA	-0.0154**	-0.0143**	-0.0323***	-0.0257***	-0.0167**	-0.0153**	-0.0319***	-0.0256***
	(0.00656)	(0.00579)	(0.00987)	(0.00730)	(0.00656)	(0.00562)	(0.00943)	(0.00713)
Book-to-market	-0.00189	-0.00186	-0.00500**	-0.00316	-0.00150	-0.00155	-0.00515**	-0.00337
	(0.00205)	(0.00204)	(0.00184)	(0.00231)	(0.00262)	(0.00252)	(0.00184)	(0.00229)
Non-investment grade		0.0124		0.00816		0.0153		0.00857
		(0.0101)		(0.0120)		(0.0109)		(0.0120)
Bonds/assets			0.000423	-0.0348			0.00427	-0.0319
			(0.0205)	(0.0272)			(0.0207)	(0.0271)
Bonds/assets * Investment grade				0.0354				0.0517
				(0.0798)				(0.0910)
Observations	1297	1297	1069	1069	1290	1290	1071	1071
Adjusted R-squared	0.047	0.047	0.043	0.057	0.043	0.044	0.045	0.057
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Table 4: Abnormal stock returns and the PEPP in the United Kingdom

The dependent variable is the abnormal return observed on March 19, 2020. Investment grade (Non-investment grade) is a dummy variable indicating a long term, domestic or foreign, issuer credit rating of at least (lower than) BBB-/Baa3 issued by either Moody's, S&P or Fitch. Leverage is liabilities divided by assets at the end of 2019. Log of assets is the natural logarithm of assets at the end of 2019. ROA is net income before extraordinary items divided by assets at the end of 2019. Book-to-market is the book value of equity divided by the market value of equity at the end of 2019. Regressions 1 and 2 (3 and 4) include firms that are incorporated (headquartered) in the United Kingdom. Heteroskedasticity robust standard errors are in parentheses. *, ** and *** denote significance at 10%, 5%, and 1%, respectively.

	Incorporated in the UK		Headquartered in the UK	
	(1)	(2)	(3)	(4)
Investment grade	0.0288**	0.0328**	0.0203	0.0255*
	(0.0139)	(0.0149)	(0.0138)	(0.0148)
Leverage	0.0206	0.0171	0.0321	0.0268
	(0.0231)	(0.0237)	(0.0226)	(0.0229)
Log assets	-0.00185	-0.00252	-0.00107	-0.00191
	(0.00306)	(0.00319)	(0.00295)	(0.00310)
ROA	-0.0377	-0.0345	-0.0385	-0.0347
	(0.0308)	(0.0313)	(0.0310)	(0.0314)
Book-to-market	0.000842	0.000799	0.00377	0.00336
	(0.00679)	(0.00690)	(0.00614)	(0.00622)
Non-investment grade		0.0153		0.0203
		(0.0193)		(0.0186)
Constant	0.0163	0.0301	-0.00423	0.0137
	(0.0574)	(0.0606)	(0.0556)	(0.0590)
Observations	363	363	390	390
Adjusted R-squared	0.010	0.009	0.010	0.011

Table 5: CDS spread changes and the PEPP

The dependent variable is the change in the CDS spread observed on March 19, 2020. Investment grade (Non-investment grade) is a dummy variable indicating a long term, domestic or foreign, issuer credit rating of at least (lower than) BBB-/Baa3 issued by either Moody's, S&P or Fitch. Leverage is liabilities divided by assets at the end of 2019. Log of assets is the natural logarithm of assets at the end of 2019. ROA is net income before extraordinary items divided by assets at the end of 2019. Book-to-market is the book value of equity divided by the market value of equity at the end of 2019. Bonds/assets is the sum of the principal amounts of outstanding bonds divided by the book value of assets at the last reporting date in 2019. Cash-to-price is cash from operating activities in 2019 divided by the market value of equity at the end of 2019. Earnings-to-price is net income before extraordinary items in 2019 divided by the market value of equity at the end of 2019. Cash/assets is the sum of cash, cash and equivalents and short-term investments divided by assets at the end of 2019. Redeployability is a measure of asset redeployability at the four-digit SIC industry level as of 2015 from Kim and Kung (2017). Regressions include country fixed effects. Robust standard errors clustered at the country level are in parentheses. *, ** and *** denote significance at 10%, 5%, and 1%, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Investment grade	-7.971**	-8.587**		-2.344	-8.941**	-10.00**		-3.291
	(3.146)	(3.367)		(3.443)	(3.000)	(3.933)		(3.513)
Leverage	-13.34**	-13.25**	-8.237	-12.63*	-9.732*	-9.626*	-4.639	-7.495
	(4.168)	(4.105)	(4.609)	(5.876)	(4.448)	(4.523)	(6.554)	(4.960)
Log assets	0.690	0.720	0.105	0.666	0.865	0.938	0.229	0.911
	(0.667)	(0.669)	(0.573)	(0.566)	(0.701)	(0.734)	(0.664)	(0.690)
ROA	5.945	5.114	11.30	12.49	4.337	4.448	10.64	8.967
	(9.943)	(10.93)	(9.374)	(12.83)	(17.97)	(18.02)	(23.36)	(17.64)
Book-to-market	-7.389***	-7.487***	-5.874***	-7.422***	-5.730**	-5.784**	-4.280	-5.408**
	(1.723)	(1.818)	(1.602)	(1.945)	(2.156)	(1.972)	(3.440)	(2.192)
Non-investment grade		-1.561		-4.766		-2.657		-6.433
		(5.117)		(5.967)		(4.003)		(6.431)
Bonds/assets			-8.823	48.27			-9.099	54.76
			(9.180)	(56.25)			(8.121)	(57.17)
Bonds/assets * Investment grade				-59.18				-66.01
				(53.72)				(57.46)
Cash-to-price					-14.46	-14.64	-12.25	-18.05
					(11.42)	(11.38)	(13.91)	(13.48)
Earnings-to-price					4.568	2.920	4.219	6.983
					(17.11)	(18.56)	(16.83)	(10.36)

Cash/assets					27.99**	28.31**	22.45*	27.81**
					(10.47)	(10.79)	(11.28)	(10.60)
Redeployability					0.0565	1.211	2.137	1.311
					(6.544)	(5.967)	(6.182)	(6.928)
Observations	111	111	108	108	111	111	108	108
Adjusted R-squared	0.111	0.102	0.036	0.155	0.134	0.127	0.037	0.200
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Table 6: Change in the absolute and relative valuations of equity and debt and the PEPP

The dependent variable in regression 1 is the change in the market value of equity on March 19, 2020 divided by the book value of assets at the end of 2019. The dependent variable in regression 2 is the change in the market value of debt on March 19, 2020 divided by the book value of assets at the end of 2019. The dependent variable in regression 3 is the change in the market value of equity on March 19, 2020 divided by the sums of the changes in the market values of equity and debt on March 19, 2020, conditional on both of these being positive. The dependent variable in regression 4 is the change in the market value of equity on March 19, 2020 divided by the sums of the changes in the market values of equity and debt on March 19, 2020, conditional on the sum of these being positive. Investment grade is a dummy variable indicating a long term, domestic or foreign, issuer credit rating of at least (lower than) BBB-/Baa3 issued by either Moody's, S&P or Fitch. Leverage is liabilities divided by assets at the end of 2019. Log of assets is the natural logarithm of assets at the end of 2019. ROA is net income before extraordinary items divided by assets at the end of 2019. Book-to-market is the book value of equity divided by the market value of equity at the end of 2019. Beta is the coefficient of a regression of the daily log stock return on the daily log return of the MSCI World index. Regressions include country fixed effects. Robust standard errors clustered at the country level are in parentheses. *, ** and *** denote significance at 10%, 5%, and 1%, respectively.

	(1)	(2)	(3)	(4)
	dMVE/Book assets	dMVD/Book assets	dMVE/(dMVE + dMVD)	dMVE/(dMVE + dMVD)
			dMVE > 0, dMVD > 0	dMVE + dMVD > 0
Investment grade	0.0219***	0.00121**	-0.146***	-0.213**
	(0.00718)	(0.000527)	(0.0241)	(0.0742)
Leverage	-0.0661**	0.00214***	-0.540***	-0.990**
	(0.0247)	(0.000579)	(0.136)	(0.330)
Log assets	-0.00286	-0.000122	0.0213	-0.00812
	(0.00203)	(0.0000896)	(0.0151)	(0.0336)
ROA	-0.0805***	-0.000760	-0.120	1.491
	(0.0143)	(0.00164)	(0.251)	(1.115)
Book-to-market	-0.0239***	0.00109***	-0.243***	-0.303***
	(0.00503)	(0.000267)	(0.0641)	(0.0695)
Beta	0.0141**	-0.000324	-0.0757	-0.122
	(0.00563)	(0.000319)	(0.0503)	(0.112)
Observations	2211	111	63	84
Adjusted R-squared	0.094	0.113	0.383	-0.015
Country FE	Yes	Yes	Yes	Yes

Table 7: The impact of the PEPP on highly affected firms

In regression 1 the dependent variable is the abnormal stock return observed on March 19, 2020. In regression 2 the dependent variable is the change in the CDS spread observed on March 19, 2020. In regression 3 the dependent variable is the change in the market value of equity on March 19, 2020 divided by the book value of assets at the end of 2019. In regression 4 the dependent variable is the change in the market value of debt on March 19, 2020 divided the book value of assets at the end of 2019. In regression 5 the dependent variable is the change in the market value of equity on March 19, 2020 divided by the sum of the change in the market values of equity and debt on March 19, 2020, conditional on both of these being positive. In regression 6 the dependent variable is the change in the market value of equity on March 19, 2020 divided by the sum of the change in the market values of equity and debt on March 19, 2020, conditional on the sum of these being positive. Affected industry is a dummy variable indicating industries that are relatively affected by the COVID-19 crisis. Investment grade is a dummy variable indicating a long term, domestic or foreign, issuer credit rating of at least (lower than) BBB-/Baa3 issued by either Moody's, S&P or Fitch. Leverage is liabilities divided by assets at the end of 2019. Log of assets is the natural logarithm of assets at the end of 2019. ROA is net income before extraordinary items divided by assets at the end of 2019. Book-to-market is the book value of equity divided by the market value of equity at the end of 2019. Beta is the coefficient of a regression of the daily log stock return on the daily log return of the MSCI World index. Regressions include country fixed effects. Robust standard errors clustered at the country level are in parentheses. *, ** and *** denote significance at 10%, 5%, and 1%, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
	Abnormal return	CDS change	dMVE/Book assets	dMVD/Book assets	dMVE/(dMVE + dMVD) dMVE > 0, dMVD > 0	dMVE/(dMVE + dMVD) dMVE + dMVD > 0
Affected industry	-0.00511**	2.438*	-0.00816**	-0.000362*	-0.0280	-0.253
	(0.00220)	(1.311)	(0.00357)	(0.000163)	(0.0619)	(0.145)
Investment grade	0.0204***	-7.871**	0.0215***	0.00119**	-0.152***	-0.253***
	(0.00451)	(3.036)	(0.00696)	(0.000515)	(0.0311)	(0.0603)
Leverage	-0.0110	-16.57***	-0.0625**	0.00265***	-0.517***	-0.695**
	(0.0103)	(3.003)	(0.0252)	(0.000361)	(0.135)	(0.292)
Log assets	-0.000848	0.852	-0.00270	-0.000143	0.0216	-0.00905
	(0.000934)	(0.719)	(0.00199)	(0.0000951)	(0.0154)	(0.0363)
ROA	-0.0221***	3.543	-0.0799***	-0.000235	-0.0699	1.954
	(0.00629)	(9.186)	(0.0142)	(0.00151)	(0.294)	(1.270)
Book-to-market	-0.00259	-8.429***	-0.0236***	0.00124***	-0.234***	-0.214*
	(0.00197)	(1.241)	(0.00497)	(0.000218)	(0.0510)	(0.111)
Beta			0.0137**	-0.000251	-0.0672	-0.0513
			(0.00562)	(0.000318)	(0.0585)	(0.122)

Observations	2211	111	2211	111	63	84
Adjusted R-squared	0.046	0.120	0.095	0.123	0.374	0.012
Country FE	Yes	Yes	Yes	Yes	Yes	Yes

Table 8: The interaction of the PEPP and national fiscal responses to COVID-19

In regressions 1 to 4 the dependent variable is the one-day abnormal return observed on March 19, 2020. In regressions 5 to 8 the dependent variable is the CDS spread change observed on March 19, 2020. Investment grade (Non-investment grade) is a dummy variable indicating a long term, domestic or foreign, issuer credit rating of at least (lower than) BBB-/Baa3 issued by either Moody's, S&P or Fitch. Fiscal response/GDP is the total amount of economic stimulus spending announced in a country until March 17, 2020 divided by GDP. Bonds/assets is the sum of the principal amounts of outstanding bonds divided by the book value of assets at the last reporting date in 2019. Leverage is liabilities divided by assets at the end of 2019. Log of assets is the natural logarithm of assets at the end of 2019. ROA is net income before extraordinary items divided by assets at the end of 2019. Book-to-market is the book value of equity divided by the market value of equity at the end of 2019. Regressions include country fixed effects. Robust standard errors clustered at the country level are in parentheses. *, ** and *** denote significance at 10%, 5%, and 1%, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Abnormal return	Abnormal return	Abnormal return	Abnormal return	CDS change	CDS change	CDS change	CDS change
Investment grade	0.0164***	0.0184***		0.0180**	-8.585*	-9.842*		-5.792
	(0.00539)	(0.00570)		(0.00871)	(3.905)	(4.702)		(7.114)
Fiscal response/GDP * Investment grade	0.0696*	0.0823**		-0.146**	14.00	21.12		-44.39
	(0.0347)	(0.0354)		(0.0582)	(21.39)	(24.76)		(54.71)
Non-investment grade		0.00655		0.00218		-0.666		-11.65
		(0.00868)		(0.00880)		(5.222)		(10.64)
Fiscal response/GDP * Non-investment grade		0.133*		0.112*		-288.3		477.5
		(0.0675)		(0.0652)		(392.7)		(635.4)
Bonds/assets			-0.0242	-0.0358			-0.263	96.13
			(0.0226)	(0.0233)			(10.80)	(79.29)
Fiscal response/GDP * Bonds/assets			0.420***	-0.0702			-142.7*	-5744.3
			(0.144)	(0.202)			(67.60)	(5016.7)
Fiscal response/GDP * Bonds/assets * Investment grade				1.310***				5636.3
				(0.309)				(4993.7)
Bonds/Assets * Investment grade				0.0277				-100.7
				(0.0409)				(76.60)
Leverage	-0.0149	-0.0166*	-0.0178*	-0.0141	-13.23**	-13.23**	-7.539	-10.17*
	(0.00962)	(0.00865)	(0.0102)	(0.00958)	(4.179)	(4.176)	(4.414)	(4.565)
Log assets	-0.000787	-0.00119	0.000549	-0.00136	0.621	0.615	0.132	0.807
	(0.000962)	(0.000937)	(0.000967)	(0.00106)	(0.640)	(0.648)	(0.596)	(0.820)
ROA	-0.0226***	-0.0211***	-0.0344***	-0.0294***	5.704	4.361	18.45	15.96
	(0.00647)	(0.00614)	(0.00819)	(0.00754)	(9.553)	(11.05)	(10.86)	(13.97)

Book-to-market	-0.00287	-0.00293	-0.00645***	-0.00490**	-7.355***	-7.356***	-6.145***	-7.144**
	(0.00203)	(0.00189)	(0.00154)	(0.00186)	(1.740)	(1.866)	(1.500)	(2.257)
Observations	2182	2182	1859	1859	111	111	108	108
Adjusted R-squared	0.043	0.045	0.047	0.058	0.103	0.089	0.049	0.209
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Appendix

Table A1: Description of variables

Variable	Description	Source
Abnormal return	Excess stock return observed on March 19, 2020. It is calculated as the difference between the actual and predicted returns for a stock. Actual returns are calculated as the difference between the natural logarithms of the closing prices between March 19 and 18, 2020.	Thomson Reuters Eikon
CDS change	Change of the CDS spread observed on March 19, 2020.	Thomson Reuters Eikon
dMVE/Book assets	Change in the market value of equity on March 19, 2020 divided by the book value of assets at the end of 2019. Market value of equity is calculated as the sum of the market values of issued shares.	Thomson Reuters Eikon
dMVD/Book assets	Change in the market value of debt on March 19, 2020 divided by the book value of assets at the end of 2019. The change in the market value of debt is calculated using CDS spreads on March 18 and 19, 2020.	Thomson Reuters Eikon
dMVE/(dMVE + dMVD) dMVE > 0, dMVD > 0	Change in the market value of equity on March 19, 2020 divided by the sum of the changes in the market values of equity and debt on March 19, 2020, conditional on both of these being positive.	Thomson Reuters Eikon
dMVE/(dMVE + dMVD) dMVE + dMVD > 0	Change in the market value of equity on March 19, 2020 divided by the sum of the changes in the market values of equity and debt on March 19, 2020, conditional on the sum of these being positive.	Thomson Reuters Eikon
Investment grade	Dummy variable indicating a long term, domestic or foreign, issuer credit rating of at least BBB-/Baa3 issued by either Moody's, S&P or Fitch.	Thomson Reuters Eikon
Non-investment grade	Dummy variable indicating a long term, domestic or foreign, issuer credit rating lower than BBB-/Baa3 issued by either Moody's, S&P or Fitch.	Thomson Reuters Eikon
Bonds/assets	The sum of the principal amounts of outstanding bonds divided by the book value of assets at the last reporting date in 2019. Bonds include Commercial Paper, Bonds and Notes as reported in Capital IQ.	S&P Capital IQ, Compustat
Leverage	Labilities divided by assets at the end of 2019.	Thomson Reuters Eikon
Log assets	Natural logarithm of assets at the end of 2019.	Thomson Reuters Eikon
ROA	Net income before extraordinary items divided by assets at the end of 2019.	Thomson Reuters Eikon
Book-to-market	Book value of equity divided by market value of equity at the end of 2019.	Thomson Reuters Eikon
Cash-to-price	Cash from operating activities in 2019 divided by the market value of equity at the end of 2019.	Thomson Reuters Eikon
Earnings-to-price	Net income before extraordinary items in 2019 divided by the market value of equity at the end of 2019.	Thomson Reuters Eikon
Cash/assets	The sum of cash, cash and equivalents and short-term investments divided by assets at the end of 2019.	Thomson Reuters Eikon
Redeployability	A measure of asset redeployability at the four-digit SIC industry level as of 2015. The measure is computed as the value-weighted averages of asset-level redeployability indices across business	Kim and Kung (2017)

	segments for Compustat firms, using market capitalization of Compustat firms in each industry-year as the weight.	
Beta	The coefficient of a regression of the daily log stock return on the daily log return of the MSCI Europe index.	Datastream
Affected industry	Dummy variable indicating the following Fama-French-49 industries: Entertainment; Construction materials; Automobiles and trucks; Aircraft; Shipbuilding, railroad equipment; Personal services; Business services; Transportation; Wholesale; Retail; Restaurants, hotels, motels.	Fahlenbrach et al. (2020)
Fiscal response/GDP	The total amount of economic stimulus spending announced in a country until March 17, 2020 divided by GDP.	Hale et al. (2020)

Table A2: Number of firms in the sample by headquarter country

Country	Number of firms	
	With abnormal returns	With CDS spread changes
Austria	20	
Belgium	36	
Bulgaria	3	
Croatia	6	
Cyprus	6	
Denmark	53	2
Finland	100	5
France	226	28
Germany	205	16
Greece	34	
Guernsey	2	
Hungary	8	
Iceland	9	
Ireland	45	
Isle of Man	4	
Italy	100	5
Jersey	8	
Luxembourg	18	
Macedonia	2	
Malta	5	
Monaco	8	
Netherlands	63	9
Norway	78	
Poland	136	

Portugal	10	
Romania	5	
Russian Federation	38	
Slovenia	3	
Spain	50	3
Sweden	429	8
Switzerland	109	7
Ukraine	2	
United Kingdom	390	28
Total	2211	111

Table A3: CDS spread changes and the PEPP in euro area and non-euro area countries

The dependent variable is the change in the CDS spread observed on March 19, 2020. Investment grade (Non-investment grade) is a dummy variable indicating a long term, domestic or foreign, issuer credit rating of at least (lower than) BBB-/Baa3 issued by either Moody's, S&P or Fitch. Leverage is liabilities divided by assets at the end of 2019. Log of assets is the natural logarithm of assets at the end of 2019. ROA is net income before extraordinary items divided by assets at the end of 2019. Book-to-market is the book value of equity divided by the market value of equity at the end of 2019. Bonds/assets is the sum of the principal amounts of outstanding bonds divided by the book value of assets at the last reporting date in 2019. Regressions 1 to 4 (5 to 8) in Panel A include firms that are incorporated (headquartered) in the euro area. Regressions 1 to 4 (5 to 8) in Panel B include firms that are not incorporated (headquartered) in the euro area. In Panel B Non-investment grade is excluded because of insufficient variation in this variable. Regressions include country fixed effects. Robust standard errors clustered at the country level are in parentheses. *, ** and *** denote significance at 10%, 5%, and 1%, respectively.

Panel A	Incorporated in euro area				Headquartered in euro area			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Investment grade	-8.695*	-11.04		-5.060	-9.707*	-12.34		-5.164
	(4.411)	(6.169)		(5.958)	(4.295)	(6.314)		(6.036)
Leverage	-14.14*	-14.28*	-13.16***	-19.72***	-19.99***	-20.23***	-13.71***	-20.18***
	(5.882)	(6.054)	(3.189)	(1.659)	(2.777)	(2.533)	(3.383)	(1.566)
Log assets	-0.0174	0.0864	-1.148	0.527	0.374	0.486	-0.729	0.803
	(1.155)	(1.162)	(0.664)	(1.203)	(1.150)	(1.186)	(0.969)	(1.178)
ROA	-19.84	-28.23	-20.80	-15.58	-33.76	-43.45	-20.56	-15.29
	(26.46)	(30.87)	(30.12)	(50.73)	(20.71)	(24.97)	(27.55)	(49.58)
Book-to-market	-7.435***	-7.755***	-6.687***	-9.112***	-8.739***	-9.121***	-6.637***	-9.133***
	(1.497)	(1.669)	(1.339)	(1.869)	(0.549)	(1.136)	(1.227)	(1.882)
Non-investment grade		-4.440		-7.179		-4.983		-7.261
		(6.004)		(8.149)		(6.035)		(8.176)
Bonds/assets			0.461	54.00			-1.063	54.11
			(13.13)	(66.63)			(13.59)	(66.48)
Bonds/assets * Investment grade				-61.90				-63.04
				(66.51)				(65.97)
Observations	67	67	64	64	66	66	65	65
Adjusted R-squared	0.129	0.123	0.041	0.220	0.161	0.158	0.031	0.221
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Panel B	Incorporated in euro area				Headquartered in euro area			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Investment grade	-4.548	-4.548		-7.212*	-2.717	-2.717		-2.275
	(4.378)	(4.378)		(2.266)	(2.840)	(2.840)		(2.170)
Leverage	-6.822	-6.822	-2.488	-7.724	-4.603	-4.603	0.668	-0.947
	(6.504)	(6.504)	(6.760)	(7.223)	(9.962)	(9.962)	(11.60)	(13.28)
Log assets	0.717	0.717	0.419	1.061*	0.525	0.525	0.340	0.592
	(0.619)	(0.619)	(0.341)	(0.401)	(0.517)	(0.517)	(0.358)	(0.304)
ROA	29.68**	29.68**	29.25**	26.11	33.34	33.34	33.11	32.50
	(8.817)	(8.817)	(8.131)	(12.35)	(17.42)	(17.42)	(18.66)	(21.84)
Book-to-market	-5.439	-5.439	-5.498	-7.545	-2.110	-2.110	-2.863	-3.592
	(4.852)	(4.852)	(4.979)	(5.377)	(6.093)	(6.093)	(6.830)	(7.605)
Bonds/assets			-13.23	-95.15**			-16.31	-72.72*
			(6.925)	(25.11)			(7.777)	(30.27)
Bonds/assets * Investment grade				84.80**				55.89
				(22.63)				(24.53)
Observations	42	42	41	41	45	45	43	43
Adjusted R-squared	0.066	0.066	0.080	0.070	-0.078	-0.078	-0.027	-0.073
Country FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes