

Trade Credit and the Transmission of Unconventional Monetary Policy*

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Abstract

We show that production networks are important for the transmission of unconventional monetary policy. Firms with bonds eligible for purchase under the European Central Bank's Corporate Sector Purchase Program act as financial intermediaries by extending more trade credit to their customers. The increase in trade credit is more pronounced from core countries to periphery countries and for financially constrained customers. Customers increase investment and employment in response to the increase in trade financing, while suppliers expand their customer base, contributing to upstream industry concentration. Our findings suggest that trade credit redistributes the effects of monetary policy across regions and firms.

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1. Introduction

Conventional monetary policy affects access to external finance through its effects on bank lending and consequently impacts primarily small and bank dependent firms (Gertler and Hubbard 1988; Gertler and Gilchrist 1994; Holmstrom and Tirole 1997). Large firms with access to public debt markets are less sensitive to the monetary policy stance.

Unconventional monetary policy involves directly purchasing assets in public debt markets in order to lower interest rates and stimulate the economy. Central banks purchase short-term and long-term Treasury bonds and mortgage-backed securities, which can benefit firms indirectly (Foley-Fisher, Ramcharan, and Yu 2016), but more recently also target nonfinancial corporations directly through corporate bond purchases. One such program is the European Central Bank's (ECB) Corporate Sector Purchase Program (CSPP), which involves the purchase of investment grade corporate bonds. These large-scale asset purchases impact bond yields and issuance volumes (Abidi and Miquel-Flores 2018; Galema and Lugo 2019; Zaghini 2019; Todorov 2020), and benefit primarily large firms with access to bond markets. Small firms benefit indirectly from these purchases as large firms' demand for bank loans decreases and banks expand credit supply to small firms (Grosse-Rueschkamp, Steffen, and Streitz 2019; Arce, Mayordomo, and Gimeno 2020).

This paper proposes and tests a new channel through which the benefits of unconventional monetary policy can be redistributed to firms without access to bond markets: the *trade credit channel*, which operates independently from any effects of monetary policy on bank lending. Using the ECB's CSPP as a laboratory, we hypothesize that firms with bonds eligible under the CSPP act as financial intermediaries by providing trade credit to their customers. We examine whether this channel mitigates or exacerbates asymmetries in the transmission of monetary policy by studying which customers are supported by suppliers with CSPP-eligible bonds and the resulting real effects. We also explore how the CSPP affects eligible firms' ability to acquire and retain customers and thus their competitive position in product markets.

The CSPP was announced in March 2016 and implemented starting in June 2016 and it was designed with a strict eligibility criteria in place, as only investment grade bonds issued by

nonfinancial firms from the euro area can be purchased by the ECB. The design of the CSPP allows us to implement a difference-in-differences analysis to address concerns that concurrent shocks to the implementation of the CSPP can affect eligible firms and their customers.

The core of the euro area (including countries such as France, Germany and the Benelux, Bayoumi and Eichengreen (1993)) receives disproportionate flows from the CSPP as most firms with eligible bonds are located in the core. In fact, firms in core countries are able to issue more bonds thanks to more developed capital markets and stronger legal institutions (Becker and Josephson 2016). However, if targeted (large and financially unconstrained) firms pass on the additional liquidity to their customers through trade credit, unconventional monetary policy tools can also reach small and financially constrained firms through production networks. In addition, while firms located in core countries may experience a larger direct effect from the CSPP through bond issuance, whether the increase in liquidity spills over to other regions depends on the geography of production networks.

We investigate these questions using new data containing information on firm-level customer-supplier networks. We compare the amount of trade credit extended by eligible firms and non-eligible firms, before and after the CSPP announcement. We find that eligible firms increase the amount of trade credit they provide to customers (i.e., accounts receivable) more than non-eligible firms following the CSPP. As we would expect, at the same time, we find that the accounts payable of customers of eligible firms increase after the CSPP.

We find no statistically significant differences in trade credit usage between eligible firms, or their customers, and control firms before the start of the CSPP. This suggests that changes in trade credit are not triggered by demand shocks but rather by the decrease in the cost of external funding triggered by the ECB's asset purchases. One important feature of our setting is that eligible firms are, by the nature of the program, larger than most non-eligible firms. In order to account for the possibility of pre-existing differences between treated and control firms, we repeat our tests using matched samples. We also sort firms into size deciles and include size decile dummies interacted with year dummies in the regressions. We find similar estimates in these more stringent

specifications, which indicates that asymmetric shocks affecting firms of different sizes are unlikely to drive our findings.

The effects of the trade credit channel of monetary policy are heterogeneous across regions and firms. Firms targeted by the CSPP extend trade credit to customers that are more financially constrained. In particular, we find that smaller firms, non-investment grade firms, unrated firms, firms with higher leverage and firms with low tangible assets to pledge as collateral receive more trade credit.

The CSPP also produces redistributive effects across regions. While the ECB aimed to purchase investment grade bonds of firms in any euro area country, firms in core countries were able to issue more bonds after the announcement of the program than firms in periphery countries. Arguably as a consequence of the asymmetric change in financial conditions, we only detect an increase in accounts receivable for suppliers located in core countries and no significant effects in the periphery. We find the opposite when we consider the *customers* of eligible firms. Customers located in core countries show small and insignificant increases in accounts payable, while customers in periphery countries show a significant increase in accounts payable as a proportion of sales. We provide direct evidence that links between suppliers in core countries and customers in periphery countries drive the effects. These results suggest that trade credit helped to relax financial constraints in periphery countries where banks were more affected by the 2010-2011 European sovereign debt crisis. Monetary policy transmission through production networks mitigates the asymmetric effects that arise from the regional distribution of eligible firms and their ability to issue investment grade bonds, which benefits core countries to a larger extent.

Finally, we show that the trade credit channel of monetary policy produces real effects. As a result of the increase in accounts payable, the customers of eligible suppliers increase long-term investment in fixed assets and human capital. They also increase investment in working capital by extending more trade finance to their own customers and increasing inventories. At the same time, eligible firms improve their position in product markets. Eligible suppliers acquire new customers and are more likely to maintain existing business relationships, thus increasing their market share

as a result of the CSPP.

Our findings highlight mechanisms of tantamount importance in light of the expanded direct assets purchases announced by the Federal Reserve Board and the ECB in March 2020. Notably, both the unlimited quantitative easing program of the Federal Reserve Board and the Pandemic Emergency Purchase Program (PEPP) of the ECB involve direct interventions in corporate bond markets. We highlight a new channel through which quantitative easing affects the real economy and complements the stimulus arising from the effects of asset purchases on banks' balance sheets and lending. Trade credit can transmit the stimulus of unconventional monetary policy interventions to firms that are not directly targeted by the policy. However, monetary policy interventions may promote concentration in upstream industries with long-run consequences on industrial structure.

Our paper contributes to several strands of the literature. Several studies examine the effects of large-scale asset purchases on bank lending and real economic activity (Rodnyanski and Darmouni 2017; Acharya, Eisert, Eufinger, and Hirsch 2019; Grosse-Rueschkamp, Steffen, and Streit 2019; Chakraborty, Goldstein, and Mackinlay 2020; Di Maggio, Kermani, and Palmer 2020).

Previous research provides mixed evidence on whether trade credit attenuates or amplifies the transmission of conventional monetary policy to the real economy. While Gertler and Gilchrist (1993) find no substitution between bank loans and trade credit following a tightening of monetary policy, Nilsen (2002) provides evidence that both small and large firms increase trade credit following monetary contractions. Other studies explore whether trade credit can provide an alternative source of liquidity that mitigates the effects of bank liquidity shocks. Love, Preve, and Sarria-Allende (2007) find that trade credit collapses in the aftermath of the 1997 Asian crisis, while Garcia-Appendini and Montoriol-Garriga (2013) find that cash-rich suppliers extended more trade credit during the 2007-2009 global financial crisis. Restrepo, Cardona-Sosa, and Strahan (2019) show that firms rely less on short-term loans and more on cash and trade credit for liquidity management following an exogenous increase in the relative cost of short-term bank credit in

Colombia in 2011.

Our paper also adds to the growing literature on the importance of production networks in the transmission of economic shocks. A number of papers explore how negative shocks are transmitted through the supply chain and show that upstream negative liquidity shocks are amplified and transmitted to customers (Boissay and Gropp 2013; Jacobson and von Schedvin 2015; Barrot and Savagnat 2016). A few recent papers consider the role of bank liquidity shocks (Costello 2020; Huremovic, Jimenez, Moral-Benito, Peydro, and Vega-Redondo 2020; Alfaro, Garcia-Santana, and Moral-Benito 2021) and how banking structure is related to the propagation of shocks along the supply chain (Giannetti and Saidi 2019). Using the stock market reaction to monetary policy shocks, Ozdagli and Weber (2019) show that input-output linkages are an important transmission mechanism of macroeconomic shocks through higher-order demand effects.

To the best of our knowledge, we are the first to study the trade credit channel of unconventional monetary policy, which is independent of the bank lending channel. By exploiting exogenous variation in suppliers' ability to access external debt financing, we show that trade credit enhances the transmission of quantitative easing interventions to the real economy. We also contribute to a nascent strand of the literature that explores regional heterogeneity in the transmission of monetary policy (Beraja, Fuster, Hurst, and Vavra 2018) by studying how the effects of large-scale asset purchases are redistributed across regions through production networks.

2. Data and Methodology

This section describes the data, variables, and the empirical methodology.

2.1 Sample

Our initial sample consists of a panel of publicly listed and privately held firms in the period 2013-2017 drawn from the Bureau Van Dijk's Orbis database, which contains financial statements

for companies worldwide.¹ We restrict the sample to firms based in the 19 member states that are part of the Economic and Monetary Union of the European Union (euro area). We exclude from our sample firms that are either classified as small companies by Orbis or firms that have less than €1 million of total assets in the fiscal year of 2015.² We also exclude financial firms (SIC codes 6000-6999) and public administration entities (SIC codes 9000-9999). Finally, we require non-missing data on the main firm outcomes: the ratio of accounts receivable to sales (*Accounts Receivable*), and the ratio of accounts payable to sales (*Accounts Payable*).³ The control variables include total assets (*Assets*), the ratio of cash to total assets (*Cash*), the ratio of property, plant and equipment to total assets (*PPE*), the ratio of net income to sales (*Net Margin*), and the ratio of total liabilities to total assets (*Liabilities*).

We also consider additional firm outcomes for investment in short-term assets, investment in assets and capital expenditures, employment, and financing decisions. The investment variables include the change in accounts receivable over lagged total assets (Δ *Accounts Receivable*), the change in inventories over lagged total assets (Δ *Inventories*), the change in total assets over lagged total assets (*Asset Growth*), the change in tangible assets plus depreciation over lagged total assets (*CAPEX*), and the change in the number of employees over lagged number of employees (*Labor Growth*). The financing variables include the change in accounts payable over lagged total assets (Δ *Accounts Payable*), the change in financial debt over lagged total assets (Δ *Total Debt*), the change in long-term debt over lagged total assets (Δ *Long-Term Debt*), the change in short-term debt over lagged total assets (Δ *Short-Term Debt*), and the change in cash and equivalents over lagged total assets (Δ *Cash*).

Table 1 reports summary statistics for the variables used in our analysis. The final sample consists of 510,298 unique firms for a total of 2,248,514 firm-year observations. Table IA.1 of the

¹ Since the overwhelming majority of companies in Orbis report unconsolidated accounts, we only include data from unconsolidated financial statements in our sample to avoid double counting of financial reports.

² Companies on Orbis are considered to be small when they have less than €1 million in operating revenue, less than €2 million in total assets, and less than 15 employees.

³ We scale accounts payable by sales rather than cost of goods sold because the latter is not available in our dataset.

Internet Appendix lists the number of observations and firms by country. Table A.1 of the Appendix provides variable definitions.

2.2 CSPP and Eligible Firms

The ECB started a series of direct asset purchases programs to ease monetary conditions in the euro area and achieve the inflation target in 2012. Initially, the outright monetary transmission program and the asset purchase program were limited to asset backed securities and sovereign bonds. To further ease credit conditions in the euro area, on March 10, 2016, the ECB announced the CSPP, which implied an expansion of its asset purchase program to include investment grade corporate bonds, as a tool to strengthen its accommodative monetary policy stance and to improve firms' financing conditions.⁴

We start from the list of marketable bonds accepted as collateral for Eurosystem credit operations that was published by the ECB the day before the CSPP announcement on March 9th, 2016. From this list, consistent with the CSPP eligibility criteria, we retain euro-denominated securities (denomination EUR, DEM, FRF) classified as bonds (type AT01) or medium term notes (type AT02) issued by corporations (issuer group IG3) and financial corporations other than credit institutions (issuer group IG9) resident in a country member of the euro area.⁵

To assign each bond to a unique firm, we first consider the issuer name of each bond in the list of bonds accepted as collateral by the ECB. We also consider the name of corporations and financial corporations other than credit institutions (guarantor groups GG3 and GG9) that guarantee eligible bonds provided that the guarantors are resident in a country member of the euro area. In fact, several bonds are issued by financial subsidiaries and are guaranteed by the parent organization (e.g., bonds issued by “Volkswagen Intl Finance N.V.” and by “Iberdrola Finanzas S.A.U.” are guaranteed by “Volkswagen AG” and by “Iberdrola S.A.”, respectively). Next, we

⁴ The bond issue has to have an investment grade rating from at least one of the four rating agencies: S&P, Moody's, Fitch Ratings, and DBRS.

⁵ Data available at <https://www.ecb.europa.eu/paym/coll/assets/html/list-MID.en.html>. The issuer should not be a credit institution or have any parent undertaking. Other criteria include a remaining maturity of at least six months and less than 31 years, and a yield to maturity equal to or above the ECB's deposit facility rate.

apply a fuzzy-string matching technique to identify in Orbis the eligible firms (i.e., firms with bonds eligible for purchase under the CSPP before the CSPP announcement). As a result, our sample includes 151 unique nonfinancial eligible firms, domiciled in the euro area, for which we have data on the variables of interest. Table IA.1 of the Internet Appendix reports the number of eligible firms by country.

Figure 1 shows that the percentage that each country represents of the gross domestic product (GDP) in the euro area as of 2015 (Panel A) and the percentage that each country represents of the total number of eligible bonds (Panel B) and amount issued (Panel C) in the euro area just before the start of CSPP (as of March 2016). We find that about 77% of the universe of eligible bonds under the CSPP are issued by firms in core countries (Austria, Belgium, Finland, France, Germany, Luxembourg, and Netherlands), while countries in the core represent only about 66% of the GDP of the euro area.⁶

Previous literature shows that the CSPP fostered the ability of eligible firms to tap public debt markets stimulating new issuance of bonds and reducing the bond yield spreads of eligible firms (Abidi and Miquel-Flores 2018; Galema and Lugo 2019; Grosse-Rueschkamp, Steffen, and Streitz 2019; Zaghini 2019; Arce, Mayordomo, and Gimeno 2020; Todorov 2020).⁷

The geographic distribution of eligible firms implies that the consequences of the CSPP in terms of firms' ability to issue investment grade bonds and benefit from lower yields are asymmetric across regions. Panel A of Figure 2 shows the issuance of investment grade euro-denominated bonds before and after the CSPP. In core countries, the new issuance of investment grade euro-denominated bonds increased by €1 billion in 2016 (from €76 to €127 billion). New issuance of investment grade euro-denominated bonds in periphery countries increased by €1

⁶ The composition of assets in the overall asset purchase program is at the discretion of the ECB. The ECB's corporate bond purchases reflect the universe of outstanding corporate bonds, while sovereign bond purchases follow strict rules and have to be proportional to the capital key (i.e., euro area national central banks' individual shares in the ECB's capital). Figure IA.1 in the Internet Appendix shows that core countries represent 73% of the ECB's corporate bond holdings under the CSPP.

⁷ We also examine whether CSPP-eligible firms increase debt financing following the announcement of the CSPP in Section 5.1.

billion (from €18 to €29 billion).

While differences in bond issuance could also be explained by differences in firm-specific credit demand, Panel B of Figure 2 indicates that the new issuance of non-investment grade euro-denominated bonds (that were not targeted by the CSPP) was almost unchanged from 2015 to 2016 both in core and periphery countries. Given that before the CSPP investment grade bonds and non-investment grade bonds show similar behavior, differences in the demand for credit are unlikely to explain the differences in bond issuance.

2.3 Customers of Eligible Firms

We link each eligible firm (i.e., supplier) to all disclosed customers reported in the Factset Revere Supply Chain Relationship database. Factset Revere collects relationship information from primary public sources such as SEC 10-K annual filings, investor presentations, and press releases, and classifies them through normalized relationship types (e.g., customer, supplier, and competitor). If we consider customer and supplier relationships, Factset Revere include over 25,000 companies worldwide, which are the source of the supply chain relationship data, and over 105,000 target companies, which are disclosed by source companies.

Using Factset Revere, we can track the effects on suppliers and their customers. We identify customers of eligible firms using direct and reverse relationships. A direct relationship is disclosed by the company that lists the target company as a material customer, and a reverse relationship is disclosed by another company listing the source company as a material supplier. As a result, our data include a comprehensive network of supply-chain interconnections.

To better understand our data, consider “Deutsche Telekom AG” as an example. Using direct relationships, the company discloses 24 active material customers by the end of 2015. This list includes public entities such as “Government of Germany”, “Government of Switzerland”, and “European Commission”, and corporations such as “Deutsche Post AG”, “Daimler AG”, “ABB Ltd”, and “Netflix, Inc”. Using reverse relationships, “Deutsche Telekom AG” is disclosed as a material supplier by an additional 11 unique companies. Customers that reported the firm as a

supplier include corporations such as “Freenet AG”, “Drillisch AG”, and “KION Group AG”. In total, considering both direct and reverse relationships, “Deutsche Telekom AG” has a total of 35 unique customers identified using Factset Revere.

We begin by filtering the Factset Revere data only selecting suppliers that are CSPP-eligible firms. The sample includes 106 unique eligible firms and 463 unique customers domiciled in the euro area, which corresponds to 802 supplier-customers pairs. On average, eligible firms report 7.6 customers domiciled in the euro area. We then match the list of customers of eligible firms in Factset Revere to Orbis using ISIN identifiers, when available, and a fuzzy-string matching algorithm using names for the remaining firms. The final sample includes 318 unique nonfinancial customers of eligible firms, domiciled in the euro area, after matching with Orbis to obtain firm fundamentals.

Table IA.1 of the Internet Appendix reports the number of customers of eligible firms by country. On average, customers that we identify through direct and reverse relationships (i.e., from the reporting of customers or suppliers) have similar size. While the customers of eligible firms in our sample are, on average, smaller than their suppliers, our sample includes relatively large customers of eligible firms, which are less likely to be financially constrained than the typical firm in the sample.⁸ Table IA.2 of the Internet Appendix reports the interconnections between suppliers and their customers by country pair.⁹

2.4 Empirical Methodology

To identify whether differences in trade credit provision arise from the access to capital markets rather than demand shocks, our empirical methodology relies on CSPP-eligible firms and the timing of the policy. We perform difference-in-differences estimations by comparing changes in the outcome variables between treatment and control groups around the CSPP announcement

⁸ On average, eligible firms have €20.4 billion in assets and their customers €10.6 billion, while the average firm in the sample is much smaller with €0.1 million in assets.

⁹ We consider all active relationships as of 2014 or 2015 (the year before the introduction of the CSPP).

(the treatment). Specifically, we estimate the regression:

$$Y_{i,t} = \beta_0 + \beta_1 Treated_i \times Post_t + \beta_2 \times X_{i,t-1} + \eta_i + \eta_{j,t} + \eta_{c,t} + \varepsilon_{i,t} \quad (1)$$

where the main outcome variables ($Y_{i,t}$) are the ratio of accounts receivable to sales (*Accounts Receivable*) and the ratio of accounts payable to sales (*Accounts Payable*). The treatment group variable (*Treated*) is alternatively: (1) *Eligible*, a dummy variable that takes the value of one if a firm has bonds eligible for purchase under the CSPP before the CSPP announcement, and zero otherwise; (2) *Has Eligible Supplier*, a dummy variable that takes the value of one if a firm is a customer of a firm with eligible bonds, and zero otherwise; and (3) *Eligible Suppliers Share*, the firm's share of eligible suppliers relative to the firm's total number of suppliers.

Post is a dummy variable that takes the value of one in 2016, the year the CSPP is announced and implemented and thereafter, and zero otherwise. $X_{i,t-1}$ is a set of firm-specific control variables that includes $\log(Assets)$, *Cash*, *PPE*, *Net Margin*, and *Liabilities*. All control variables are lagged by one year. The regressions include firm fixed effects η_i , industry-year fixed effects $\eta_{j,t}$ (using the Fama-French 10-industry classification), and country-year fixed effects $\eta_{c,t}$. Standard errors are clustered at the firm level to correct for heteroscedasticity and within-firm residual correlation.

A positive and significant estimate of the coefficient β_1 indicates that eligible firms extend more trade credit (*Accounts Receivable*) or that customers of eligible firms receive more trade credit (*Accounts Payable*) due to the CSPP, as long as demand and other shocks evolve similarly for treated and control firms. To validate this assumption, as is customary in the application of difference-in-differences methods, we evaluate whether there are any pre-existing differential trends in the use of trade credit for eligible firms and their customers before the CSPP. The absence of pre-existing trends suggests that the CSPP, and not differences in demand, lead eligible suppliers to increase trade credit provision.

3. Effects of Unconventional Monetary Policy

In this section, we first examine whether eligible firms' enhanced ability to tap debt markets, following the purchases of eligible bonds by the ECB, is transmitted through trade credit in production networks. We then check the robustness of our results using different empirical approaches.

3.1 Accounts Receivable

The CSPP decreased the cost of capital of eligible firms by decreasing bond yields and fostering bond issuance. This, in turn, should have allowed CSPP-eligible firms to extend more trade credit to their customers.

To test our main hypothesis, we examine whether CSPP-eligible firms experienced an increase in the ratio of accounts receivable to sales (*Accounts Receivable*) following the CSPP. Table 2 shows the results. The estimates in column (1) show that eligible firms (treatment group) experience a significant increase in the ratio of accounts receivable to sales of about 10 percentage points relative to non-eligible firms (control group) after the announcement of the CSPP. The effect is economically significant as a 10 percentage point increase in accounts receivable indicates that firms in the treatment group increase days receivable, relative to those in the control group, by about 36 days ($36 = 0.1 \times 360$), which is about one third of the sample average. The results remain robust when we add firm-specific controls (column (3)) and country-year fixed effects (column (5)) to the specification in column (1), which already includes firm fixed effects and industry-year fixed effects.

Columns (2), (4), and (6) show the evolution of the differences in accounts receivable between the treatment and control groups in the years before and after the CSPP (based on estimates in which *Eligible* is interacted with dummy variables for each event year). Figure IA.2 in the Internet Appendix shows the evolution of the differential effect in accounts receivable as estimated in column (2). We do not find statistically significant differences between treatment and control groups in the pre-treatment period. While the increase in accounts receivable becomes statistically

significant after the start of the CSPP, we find a positive but insignificant increase in eligible firms' accounts receivable already in 2015.

A possible explanation is that the Public Sector Purchase Program (PSPP) implemented by the ECB in 2015 that involved purchasing large amounts of government bonds may have spilled over to investment grade corporate bonds (perhaps viewed as close substitutes), thus benefitting eligible firms. The ECB also implemented the Targeted Long Term Refinancing Operations (TLTRO-I) in July 2014, which might, again, have increased the demand for investment grade bonds on the part of banks (Pelizzon, Riedel, Simon, and Subrahmanyam, 2020), although we do not see any differential effects in 2014. Even if there is some increase in the provision of trade credit in 2015 by eligible firms, this would be consistent with an effect of unconventional monetary policy on the cost of capital of eligible firms and consequently on the provision of trade credit.

Given the acceleration of trade credit after the implementation of the CSPP for eligible firms in 2016 and the economically large results in 2017, it is unlikely that unobserved demand shocks could drive our main results. This conclusion is supported by a number of placebo tests. We estimate the change in the ratio of accounts receivable to sales of U.S. investment grade firms (the main criteria used by the ECB to determine eligible bonds), after the introduction of the CSPP. In this test, we use Compustat data, which only contains publicly listed firms, as Orbis offers a limited coverage of U.S. firms. Columns (1) and (2) of Table IA.3 in the Internet Appendix report the estimates. We find no evidence that U.S. investment grade firms experience an increase in accounts receivable relative to control firms after the CSPP.

Columns (3)-(6) of Table IA.3 consider a sample of firms domiciled in countries from the European Union that are not members of the euro area. Central banks in European Union countries outside of the euro zone initiated similar asset purchase programs around the same time. For example, the Bank of England announced a program to buy corporate bonds in August of 2016. In addition, the CSPP also included a fraction of eligible bonds issued by legal entities established in the euro area that were financing vehicles of firms from non-euro countries (representing about 7% of the total number of CSPP-eligible bonds). Thus, we expect investment grade firms in EU

countries outside the euro area to also benefit, albeit to a lower extent. Using a sample of non-euro European Union public firms in columns (3) and (4), we find no evidence that investment grade firms increase accounts receivable relative to control firms after the CSPP. We find a differential effect of 1 percentage point (only significant at the 10% level) when we use a sample of both public and private non-euro European Union firms in columns (5) and (6); this effect is much lower than that for eligible firms domiciled in euro area countries, which is 10 percentage points.

We also explore to what extent the effects of the CSPP may spill over beyond eligible firms. Non-eligible bonds may be affected by central banks' bond purchases as investors rebalance their portfolios towards these bonds (and thus decreasing their yields). If the CSPP produces spillovers to non-eligible bonds, our estimates are lower bounds for the actual effect of the CSPP. To check for this possibility, we estimate the accounts receivable regressions in Table 2 including the interaction of a dummy variable for firms whose bonds are not eligible under the CSPP (*Non-Eligible*) with the *Post* dummy variable. Table IA.4 in the Internet Appendix shows that the interaction term *Non-Eligible* \times *Post* coefficient is not statistically significant and the interaction term *Eligible* \times *Post* coefficient is similar to that in Table 2. We conclude that firms with non-eligible bonds do not seem to extend more trade credit to their customers after the CSPP and do not attenuate our estimates of the trade credit channel of monetary policy.

3.2 Accounts Payable

We examine the effect of CSPP on firms in the downstream network of eligible firms. Specifically, we test whether customers of eligible firms are indeed the recipients of the increase in trade financing by eligible suppliers following the CSPP. The dependent variable is the ratio of accounts payable to sales (*Accounts Payable*).

Table 3 shows the results. In Panel A, the explanatory variable of interest is the interaction of the treatment group dummy variable *Has Eligible Supplier* with the *Post* dummy variable. The interaction term *Has Eligible Supplier* \times *Post* measures the differential effect on accounts payable between firms with eligible suppliers and those without eligible suppliers following the CSPP.

In column (1), we find that customers of eligible firms (treatment group) experience an increase in the ratio of accounts payable to sales of about 5 percentage points relative to customers without a business relationship with eligible firms (control group). The effect is statistically and economically significant as customers of eligible firms relative to the control group benefit from an extension in payment terms of about 17 days ($17 = 0.048 \times 360$), which is about 20% of the sample mean. The results remain robust when we add firm-specific controls (column (3)) and country-year fixed effects (column (5)) to the specification in column (1), which already includes firm fixed effects and industry-year fixed effect. Importantly, columns (2), (4), and (6) show that treatment and control groups follow parallel trends in the pre-treatment period and that the increase in accounts payable is particularly pronounced in 2017, consistently with what we find in Table 2 for suppliers' provision of trade credit. Panel A of Figure IA.3 in the Internet Appendix shows the evolution of the differential effect in accounts payable as estimated in column (2). This confirms that the increase in trade credit usage by customers of eligible firms is unlikely to be driven by demand shocks concomitant to the CSPP.

We also examine whether customers with a larger share of eligible suppliers (measured as a the number of eligible suppliers divided by the total number of suppliers) benefited more from the increase in trade credit by eligible firms. Panel B of Table 3 shows the results. The explanatory variable of interest is the interaction of the treatment variable *Eligible Suppliers Share* with the *Post* dummy variable.

In column (1), we find that the *Eligible Suppliers Share* \times *Post* coefficient is positive and statistically significant. A one-standard-deviation increase in the share of eligible suppliers (0.362 in the sample of customers of eligible suppliers) leads to an increase of 2.5 percentage points ($= 0.362 \times 0.069$) in accounts payable of customers of eligible suppliers (i.e., a delay in payment terms of about 9 days), which corresponds to 11% of the sample mean. The results are robust across specifications in columns (3) and (5). In addition, columns (2), (4) and (6) show no evidence of significant preexisting differential trends between treatment and control groups indicating that the two groups of firms are unlikely to experience asymmetric demand shocks. Panel B of Figure

IA.3 in the Internet Appendix shows the evolution of the effect in accounts payable, which confirms the inexistence of preexisting differential trends.

Eligible suppliers can also extend more trade credit to customers located in European Union countries that are not part of the euro area. Table IA.5 in the Internet Appendix shows that non-euro area customers also benefit from an extension in payment terms by eligible suppliers but the estimates are smaller at about 2.5 percentage points than those for euro area customers in Table 3.

There are 82 customers of eligible firms whose bonds are eligible for purchase under the CSPP. To correct for the overlap between eligible firms and customers of eligible firms whose bonds are eligible for purchase under the CSPP, we estimate regressions in which the dependent variable is the ratio of accounts payable to sales (*Accounts Payable*) including both the *Has Eligible Supplier* \times *Post* and *Eligible* \times *Post* interaction terms. Table IA.6 of the Internet Appendix shows that the estimates of the *Has Eligible Supplier* coefficient are similar to those in Table 3.

It is also useful to ask whether following the announcement of the CSPP, eligible firms accelerate payments to their own suppliers, as this could also have positive spillovers in upstream industries (Barrot and Nanda 2020). Table IA.6 shows that eligible firms neither accelerate nor delay payments to their suppliers as the coefficient on *Eligible* \times *Post* is insignificant. This finding is consistent with the results of a number of papers showing that large customers receive plenty of trade credit from their smaller suppliers, but do not fund them (e.g., Murfin and Njoroge 2015; Giannetti, Serrano-Velarde, and Tarantino 2020). It should not come at a surprise in our context because suppliers may be able to acquire new customers and expand their market share by extending trade credit (as we will show in Subsection 5.3), but there are no obvious benefits to eligible firms from accelerating payments to smaller suppliers.

3.3 Robustness

A possible concern with our baseline results is that our firm-year panel regressions might be insufficient to cope with the heterogeneity of firms in the sample and the differential effects we estimate capture asymmetric demand shocks rather than an increase in the supply of trade credit.

To further establish the validity of our results, we employ several additional empirical approaches: (1) regressions with size-decile-by-year fixed effects; (2) a difference-in-differences estimation using a matched sample; (3) regressions excluding firms with less than €10 million in assets from the sample; (4) regressions with country-industry-year fixed effects; (5) regressions with industry-year fixed effects using two-digit SIC codes; (6) regressions with standard errors clustered at the industry-year level; and (7) regressions using the logarithm of the levels of trade finance.

First, we estimate specifications with firm size-decile-by-year fixed effects. We sort firms into size deciles each year based on total assets and interact each decile with yearly dummies. The size-by-year fixed effects control for time-varying demand shocks that could have asymmetric effects on firms of different sizes and contaminate our estimates.

Columns (1)-(3) of Table 4, Panel A, show a statistically significant increase of about 10 percentage points in the accounts receivable of eligible firms relative to non-eligible firms. Similarly, columns (1)-(3), Panel B, we find a corresponding increase in the accounts payable of customers of eligible firms of about 3 percentage points relative to firms without a link to the upstream network of eligible firms. When we estimate the dynamic effects of the CSPP in column (2) of Panels A and Panel B, we again find statistically significant effects for both accounts receivable of eligible firms and for accounts payable of their customers in the post-CSPP period. Overall, these findings address concerns that asymmetric demand shocks to firms of different size drive our findings.

Second, we perform the difference-in-differences estimation around the CSPP announcement using a matched sample. We consider both the effect of the CSPP on eligible firms, and the effect of the CSPP on customers of eligible firms. We identify 144 eligible firms and 305 customers of eligible firms with non-missing information in Orbis in the pre-treatment period (2014 and 2015). We select control firms that best match each firm in the treatment group using propensity score matching with replacement (the nearest neighbor) on multiple covariates in the two years preceding the event: $\log(\text{Assets})$, Cash , PPE , Net Margin , Liabilities , and industry fixed effects. Each treated firm is matched to a control firm domiciled in the same region (i.e., either core or

periphery) of the euro area. Panel A of Table 5 reports the tests of equality of pre-treatment means and medians between the treatment and control groups. We cannot reject the hypothesis of equal means or medians between treatment and control groups in either the sample of eligible firms or the sample of customers of eligible firms with the exception of *Cash*.

Panel B of Table 5 presents the results of difference-in-differences estimators using the matched sample. The estimates are qualitatively and quantitatively similar to our baseline specifications. Columns (1) and (2) show a statistically significant 10 percentage points increase in accounts receivable of eligible firms (treated group) after the CSPP relative to non-eligible firms (control group). In columns (3) and (4), we find a positive and statistically significant increase in the accounts payable of customers of eligible firms. The effect is also economically significant as the accounts payable of customers of eligible firms increase by 7 to 8 percentage points relative to the control group after the CSPP.

Third, we assess the sensitivity of our baseline results to the exclusion of small firms from the sample. Specifically, we estimate our baseline specifications excluding firms with less than €10 million in assets as of 2015 (the year before the announcement of the CSPP) from the sample. The results in columns (1)-(3) of Table IA.7 of the Internet Appendix shows that the accounts receivable of eligible firms increase by about 10 percentage points relative to non-eligible firms in the post-CSPP period. The results in columns (4)-(6) show that the accounts payable of customers of eligible firms increase by about 4 percentage points relative to the control group in the post-CSPP period. The estimates are similar to those reported in Tables 2 and 3 and confirm that our baseline results are not significantly affected by firm size heterogeneity between treatment and control groups. We also check the sensitivity of our results using a sample excluding firms domiciled in Germany. We do so because Germany is under-represented in the Orbis database (see Panel A of Table IA.1 of the Internet Appendix). Table IA.8 of the Internet Appendix shows that our results are qualitatively unchanged when we exclude German firms from the sample.

Fourth, we estimate specifications with country-industry-year fixed effects to account for the possibility that our baseline results are driven by time-varying demand shocks across different

country-industry pairs. Table IA.9 in the Internet Appendix shows that the accounts receivable of eligible firms experience a statistically significant increase of about 9 percentage points relative to control firms after the CSPP, and the accounts payable of customers of eligible firms experience a statistically significant increase of about 3 percentage points relative to the control group.

Fifth, we estimate specifications with industry-year fixed effects using two-digit SIC codes instead of the Fama-French 10-industry classification. While the two-digit SIC codes capture better industry heterogeneity, there may be few firms in a given industry in each country. Table IA.10 of the Internet Appendix shows that our estimates are similar to those in Tables 2 and 3 when we use industry dummies based on two-digit SIC codes.

Sixth, we estimate specifications with alternative ways of clustering the standard errors. Table IA.11 of the Internet Appendix shows that our baseline results are robust when we use standard errors adjusted for clustering at the industry-year level instead of the firm level.

Finally, we estimate our baseline specifications using either the logarithm of accounts receivable or the logarithm of accounts payable as dependent variables. Table IA.12 of the Internet Appendix shows that our estimates are qualitatively unaffected when we use this approach.

4. Heterogeneous Effects

In this section, we investigate how different customer characteristics such as financial constraints, ability to access public markets, tangibility, and growth opportunities contribute to monetary policy transmission through trade finance. We also examine whether the effects of the trade credit channel of monetary policy are heterogeneous across regions within the euro area.

4.1 Customer Characteristics

To better understand the distributional consequences of the trade credit channel of monetary policy, we explore *which* customers receive more trade credit. We first consider whether the shock of monetary policy on the ability of eligible suppliers to tap bond markets is redistributed to more financially constrained firms. We consider several proxies for firm-specific financial constraints

and partition the sample by the median of these proxies. Table 6 presents the estimates of our baseline accounts payable regression (in column (2) of Table 3) for the subsamples of constrained and unconstrained firms (i.e., customers of eligible firms).

Columns (1) and (2) in Panel A show the estimates separately for the group of investment grade firms (i.e., long-term issuer credit rating of at least BBB- before the CSPP) versus the group of non-investment grade firms, which do not benefit directly from the CSPP. Columns (3) and (4) show the estimates for the group of rated firms (i.e., firms with long-term issuer credit rating before the CSPP) versus unrated firms. We find that only non-investment grade and unrated firms with eligible suppliers experience a statistically significant increase in accounts payable relative to control firms in the post-CSPP period. These results suggest that customers of eligible firms that are not able to tap (or with restricted access) public debt markets benefit from the increase in trade credit offered by eligible firms.

Columns (5) and (6) show that only customers of eligible firms with a high ratio of liabilities to assets experience a positive and statistically significant increase in accounts payable relative to control firms in the post-CSPP period. These results suggest that firms with higher external financial dependence benefit more from the increase in trade credit offered by eligible firms.

In columns (7) and (8), we find a positive and statistically significant increase in accounts payable for customers of eligible firms with both high and a low PPE to assets ratio in the post-CSPP period. While we cannot statistically distinguish the two coefficients, the magnitude of the coefficient of the *Has Eligible Supplier* \times *Post* variable in the group of low PPE firms (i.e., low tangibility firms) is almost the double that in the group of high PPE firms. These results suggest that customers of eligible firms that have less tangible assets to pledge as collateral are more likely to benefit from the increase in trade credit offered by eligible firms following the CSPP.

Panel B, column (1), shows statistically insignificant increases in accounts payable of large firms with eligible suppliers (where firm size is proxied by sales). The magnitude of the coefficient on the *Has Eligible Supplier* \times *Post* variable in the group of small firms (column (2)) is much higher than that in the sample of large firms, but it is imprecisely estimated.

Columns (3)-(6), Panel B, show that only customers of eligible firms with high rates of sales growth and asset growth experience a positive and statistically significant increase in accounts payable relative to control firms in the post-CSPP period. These results suggest that firms with greater growth opportunities and more external financing needs benefit from the increase in trade credit offered by eligible suppliers. In addition, columns (7) and (8) show that firms with lower cash flows from operations have a much higher increase in accounts payable than firms with higher ability to generate internal financing.

Finally, column (9) shows no statistically significant increase in the ratio of accounts payable to sales for customers of eligible firms that are publicly listed. Customers with better access to public markets are less likely to be financially constrained and rely less on trade finance. Column (10) shows that customers of eligible firms that are private experience a statistically significant increase in the ratio of accounts payable to sales. The results suggest that firms without the ability to tap the stock market obtain more trade credit from eligible suppliers.

Overall, our results suggest that the trade credit channel of monetary policy helps to redistribute the benefits of unconventional monetary policy interventions to financially constrained firms in the downstream network of eligible firms.

4.2 Regional Effects

In this section, we examine whether the CSPP produces heterogeneous effects across regions. Specifically, we study how the CSPP impacts firms domiciled in countries of either the core (Austria, Belgium, Finland, France, Germany, Luxembourg, and Netherlands) or the periphery of the euro area. This is important as countries in the euro area periphery were more negatively affected by the 2011-2012 sovereign debt crisis and firms in these countries were more likely to face financial constraints (both due to the sovereign debt crisis and its repercussions on the banking system and historically less developed financial markets). These tests allow us to evaluate whether there is redistribution of the benefits of the CSPP from firms domiciled in core countries to firms domiciled in periphery countries. Specifically, we investigate whether the customers of eligible

firms in periphery countries are able to fill their financing gap by delaying the payment of goods and services purchased from eligible firms, especially from those located in core countries. Panel A of Table 7 shows the estimates of our baseline regression model separately for the group of firms in core countries and periphery countries of the euro area. We find that eligible firms from core countries significantly increase accounts receivable relative to non-eligible firms following the CSPP, while eligible firms in the periphery show no effect. In contrast, customers from the *periphery* show a statistically significant increase in accounts payable, whereas customers in the core show no effect. This suggests that customers of eligible firms, facing deteriorating credit market conditions in periphery countries, were able to fill their financing gap using trade credit as the CSPP decreased the cost of extending trade credit for eligible suppliers.

Panel B of Table 7 provides a more direct test for the regional propagation of monetary policy through the trade credit channel by decomposing the treatment dummy variable into two dummy variables: *Has Core Eligible Supplier* dummy variable that takes the value of one if a firm has an eligible supplier domiciled in a core country, and zero otherwise; and *Has Periphery Eligible Supplier* dummy variable that takes the value of one if a firm has an eligible supplier domiciled in a periphery country, and zero otherwise.

In column (1), we find that customers of eligible suppliers located in core countries increase their accounts payable to a larger extent than customers of eligible suppliers located in periphery countries. Column (2) shows that these effects are not driven by customers in core countries, as they experience changes in accounts payable that are not statistically distinguishable from those of control firms, irrespective of where their suppliers are located. In column (3), we find that customers located in periphery countries have more access to trade credit during the post-CSPP period. The coefficient on the *Has Core Eligible Supplier* dummy variable is more than twice in magnitude than that of the *Has Periphery Eligible Supplier* dummy variable, even though it is imprecisely estimated.

Overall, our results suggest that suppliers from core countries extend more trade credit following the CSPP to firms located in periphery countries that are part of their production network.

5. Real Effects

In this section, we first investigate the impact of the CSPP on the investment and financial policies of eligible firms. We then investigate whether the trade credit channel of monetary policy has real effects on customers of CSPP-eligible firms. Finally, we examine whether the CSPP affects the competitive position of eligible suppliers.

5.1 Effects on Eligible Firms

In this section, we test whether the CSPP has an impact on the investment and financing decisions of eligible firms. Panel A of Table 8 shows that eligible firms experience a significant increase in total assets following the CSPP. Column (1) shows that eligible firms experience a statistically significant increase of 2.3 percentage points in *Asset Growth* relative to the control group. Next, we decompose the increase in total assets into *CAPEX*, Δ *Inventories*, and Δ *Accounts Receivable* (all variables scaled by lagged total assets). We find that eligible firms experience an increase of 0.2 percentage points in *CAPEX* (column (2)), an increase of 0.5 percentage points in inventories (column (3)), and an increase of 0.9 percentage points in accounts receivable (column (4)) relative to control firms. The increase in accounts receivable is consistent with our findings on the ratio of accounts receivable to sales in Table 2. In addition, column (5) shows a 1.8 percentage points increase in the growth rate of employment (*Labor Growth*) for treated firms relative to control firms. While the increases in *CAPEX*, Δ *Inventories*, and *Labor Growth* are not statistically significant, the increase in Δ *Accounts Receivable* is significant and consistent with our findings on the ratio of accounts receivable to sales in Table 2.

Panel B of Table 8 shows the effect on the external and internal financing of eligible firms. Column (1) shows an increase of 1.6 percentage points in external finance (Δ *Total Debt*) in the post-CSPP period, which can be decomposed in increases of 0.9 percentage points (column (2)) and 0.5 percentage points (column (3)) in long-term debt and short-term debt, respectively. Column (4) shows that eligible firms experience a statistically significant increase of 0.8

percentage points in Δ *Accounts Payable* relative to control firms. Column (5) shows no effect on internal financing (Δ *Cash*). While the positive effects of the CSPP on financial debt of eligible firms are imprecisely estimated in Panel B of Table 8, Table IA.13 of the Internet Appendix shows a statistically significant increase in net debt issuance in core countries.¹⁰

In sum, eligible firms increase total assets, which is mainly explained by the increase in trade credit to customers (accounts receivable) as a result of the CSPP. Our results suggest that for each additional euro of net debt issuance by eligible firms there is a pass-through of 56 cents (= 0.009 / 0.016 using the estimates in column (4) of Panel A and column (1) of Panel B) to extend trade credit to customers.

5.2 Effects on Customers of Eligible Firms

Our results show that firms in the downstream network receive more trade credit from eligible firms with easier access to the bond market thanks to unconventional monetary policy. In this section, we test whether the customers of eligible firms can take advantage of potential investment opportunities due to the increase in the supply of trade credit. We also explore how the trade credit channel of monetary policy impacts financial policy.

Panel A of Table 9 shows that the customers of eligible firms experience a statistically significant increase in total assets following the CSPP arguably due to the increased ability to rely on trade credit. Column (1) shows that firms in the treatment group experience a statistically significant (at the 10% level) increase of 2.5 percentage points in *Asset Growth* relative to the control group. Next, we decompose this increase in asset growth into *CAPEX*, Δ *Inventories*, and Δ *Accounts Receivable* (all variables scaled by lagged total assets). We find that customers of eligible firms experience an increase of 0.5 percentage points in *CAPEX* (column (2)), an increase of 0.4 percentage points in inventories (column (3)), and an increase of 1.1 percentage points in

¹⁰ Consistent with previous literature, Figure IA.4 of the Internet Appendix shows that eligible firms experience a statistically significant increase in net bond issuance relative to non-eligible firms after the announcement of the CSPP using a sample of publicly listed firms drawn from Capital IQ/Compustat Global. This effect is concentrated in core countries. In contrast, we find no differential effect on bank debt.

accounts receivable (column (4)) relative to control firms. In addition, column (5) shows a 3.4 percentage points increase in the growth rate of employment (*Labor Growth*) for treated firms relative to control firms.

In sum, the customers of eligible firms increase investment in fixed assets, human capital, and inventories, and extend more trade credit to their own customers (accounts receivable) as a result of the CSPP suggesting that the propagation of the monetary policy shocks through trade credit helps to relax financial constraints in the downstream network of eligible firms.

We also investigate how customers of eligible firms finance their asset growth. Panel B of Table 9 shows the effect on external and internal financing (all variables scaled by lagged total assets). We find that an increase in external finance ($\Delta Total Debt$) in column (1) but statistically insignificant, including long-term debt in column (2) and short-term debt in column (3). Column (4) shows that customers of eligible firms experience a statistically significant increase of 0.9 percentage points in $\Delta Accounts Payable$ relative to control firms in the post-CSPP period, which is consistent with our findings on the ratio of accounts payable to sales in Table 3. This increase in accounts payable represents more than one third of the capital needs to fund the asset growth of treated firms. Finally, we find no differential effect on internal financing ($\Delta Cash$) in column (5).

Overall, our findings confirm that the real effects we uncover are ascribed to suppliers' trade finance, and are not driven by an increase in access to bank credit.

5.3 Benefits to Eligible Firms in Product Markets

This section sheds light on the benefits to suppliers to extend more trade credit. We test the hypothesis that eligible suppliers extend more trade credit following the decrease in cost of capital due to the CSPP in order to strengthen their position in product markets. Specifically, we test whether CSPP-eligible firms retain existing customers and establish new relationships in the post-CSPP period more than non-eligible comparable firms. We consider the number of customer relationships that a firm is able to maintain and the number of new relationships that are initiated.

Panel A of Table 10 reports the results. In column (1), we find that eligible firms (treatment

group) are able to maintain a greater number of customer relationships relative to non-eligible firms (control group) after the CSPP (treatment). The results remain robust when we add firm-specific controls (column (2)) and country-year fixed effects (column (3)) to the specification in column (1), which already includes firm fixed effects and industry-year fixed effects.

In column (4), we find that eligible firms experience a statistically significant increase of 3.3 in new customer relationships relative to non-eligible firms in the post-CSPP period. The effect is economically significant as the sample average of new customer relationships is 8.3 in the group of eligible firms. The results remain robust in columns (5) and (6) when we add firm-specific controls and country-year fixed effects to the specification in column (4).

We also analyze product market outcomes separately for the group of eligible firms from core countries and the group of eligible firms from periphery countries; the latter group did not increase the provision of trade credit after the start of the CSPP. Panel B reports the results for suppliers in core countries. We find that eligible firms from core countries experience a significant increase in both the number of customer relationships maintained and the number of new customer relationships initiated relative to non-eligible firms after the CSPP. Panel C shows that eligible firms in periphery countries do not experience a similar increase.

Table IA.14 of the Internet Appendix shows that the results are robust when we use the logarithm of one plus either the number of customer relationships kept or the number of new customer relationships initiated as the dependent variables. The differential effect on the number of customers kept is statistically and economically significant at 15% to 26%, while the effect is 20% to 24% on the number of new customers. Table IA.15 in the Internet Appendix shows that the results in Table 10 are robust when we limit the analysis only to treated firms and their euro area competitors as identified by Factset Revere as a control group. The point estimates are both qualitatively and quantitatively similar.

Using sales market share at the four-digit SIC level as a product market outcome variable, we provide additional evidence that eligible firms strengthen their competitive position after the CSPP in Table 11. In column (1), we find that eligible firms increase market share by 0.37 percentage

points relative to non-eligible firms after the CSPP. Column (3) shows that eligible firms from core countries experience a statistically significant differential increase in market share of 0.50 percentage points, whereas column (5) shows that those from periphery countries do not experience a similar increase. The results remain robust when we add firm-specific controls to the specification with firm and year fixed effects (columns (2), (4), and (6)).

Overall, these findings suggest that unconventional monetary policy interventions that facilitate access to credit for large firms with access to capital markets may affect firms' competitive positions and contribute to concentration in upstream markets.

6. Conclusion

In current economic conditions with interest rates near the zero lower bound in most developed economies, monetary authorities have resorted to unconventional monetary policy interventions to achieve their inflation targets. Large-scale asset purchases lowering the cost of public debt favor large firms that have easier access to public debt markets (i.e., higher issuance volumes and lower offer yields). The concerns about the asymmetric effects of these unconventional monetary policies are particularly relevant in economic areas, such as the euro area, where there are differences in creditor protections and access to bond markets across regions.

We show that trade credit in production networks can mitigate the asymmetric effects of central banks' asset purchases programs. Firms with bonds eligible for purchase under the ECB's CSPP (i.e., investment grade bonds) expand the provision of trade credit to their customers. The expansion in trade credit benefits especially financially constrained customers and customers located in periphery countries, in which the European sovereign debt crisis was more severe and led to bank credit tightening.

We also provide evidence of real effects and product market effects of unconventional monetary policies. As a result of the increase in trade finance, firms with suppliers whose bonds are eligible under the CSPP increase employment and investment and provide more trade credit to their own customers. Trade credit thus plays an important role in the transmission of monetary

policy. While economic and financial integration through production networks can facilitate the transmission of monetary policy to economically depressed regions and to firms with limited access to financial markets, we also highlight that eligible firms are able to expand their customer base due to their ability to extend more trade finance to their customers. This suggests that unconventional monetary policy can increase concentration in upstream industries with potentially long-lasting consequences on the spatial distribution of economic activity.

Our paper has important implications for the understanding of the transmission mechanism of unconventional monetary policy interventions, a topic of tantamount importance as large-scale asset purchases have been considerably expanded worldwide in light of the looming recession due to the Covid-19 pandemic.

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Appendix

Table A.1
Variable Definitions

Variable	Definition
Accounts Receivable	Accounts receivable (Orbis item <i>DEBTORS</i>) divided by operating revenue (Orbis item <i>OPRE</i>).
Accounts Payable	Accounts payable (Orbis item <i>CREDITORS</i>) divided by operating revenue (Orbis item <i>OPRE</i>).
Assets	Total assets (Orbis item <i>TOAS</i>).
Sales	Operating revenue (Orbis item <i>OPRE</i>).
Cash	Cash and cash equivalent (Orbis item <i>CASH</i>) divided by total assets (Orbis item <i>TOAS</i>).
PPE	Tangible fixed assets (Orbis item <i>TFAS</i>) divided by total assets (Orbis item <i>TOAS</i>).
Net Margin	Net income (Orbis item <i>PL</i>) divided by operating revenue (Orbis item <i>OPRE</i>).
Liabilities	Current liabilities (Orbis item <i>CULI</i>) plus non-current liabilities (Orbis item <i>NCLI</i>) divided by total assets (Orbis item <i>TOAS</i>).
Eligible	Dummy variable that equals one if a firm has corporate bonds eligible for purchase under the CSPP rules before the CSPP announcement, and zero otherwise.
Has Eligible Supplier	Dummy variable that equals one if a firm is reported as a customer of eligible firms in Factset Revere Supply Chain Relationships database, and zero otherwise.
Eligible Suppliers Share	Number of eligible suppliers divided by total number of suppliers.
Has Core Eligible Supplier	Dummy variable that equals one if a firm is a customer of an eligible firm with headquarters in core countries, and zero otherwise.
Has Periphery Eligible Supplier	Dummy variable that equals one if a firm is a customer of an eligible firms with headquarters in periphery countries, and zero otherwise.
Asset Growth	Change in total assets (Orbis item <i>TOAS</i>) divided by previous year total assets.
CAPEX	Change in tangible fixed assets (Orbis item <i>TFAS</i>) plus depreciation and amortization (Orbis item <i>DEPR</i>) divided by the previous year total assets (Orbis item <i>TOAS</i>).
Labor Growth	Change in number of employees (Orbis item <i>EMPL</i>) divided by the previous year number of employees.
Δ Inventories	Change in inventories (Orbis item <i>STOK</i>) divided by the previous year total assets (Orbis item <i>TOAS</i>).
Δ Accounts Receivable	Change in accounts receivable (Orbis item <i>DEBTORS</i>) divided by the previous year total assets (Orbis item <i>TOAS</i>).
Sales Growth	Change in operating revenue (Orbis item <i>OPRE</i>) divided by the previous year operating revenue.
EBITDA	EBITDA (Orbis item <i>EBTA</i>) divided by the previous year total assets (Orbis item <i>TOAS</i>).
Δ Accounts Payable	Change in accounts payable (Orbis item <i>CREDITORS</i>) divided by the previous year total assets (Orbis item <i>TOAS</i>).
Δ Total Debt	Change in financial debt (Orbis item <i>LTDB</i> plus Orbis item <i>LOAN</i>) divided by the previous year total assets (Orbis item <i>TOAS</i>).
Δ Long-Term Debt	Change in long-term debt (Orbis item <i>LTDB</i>) divided by the previous year total assets (Orbis item <i>TOAS</i>).
Δ Short-Term Debt	Change in current loans (Orbis item <i>LOAN</i>) divided by the previous year total assets (Orbis item <i>TOAS</i>).
Δ Cash	Change in cash (Orbis item <i>CASH</i>) divided by the previous year total assets (Orbis item <i>TOAS</i>).

Table 1
Summary Statistics

This table shows mean, median, standard deviation, minimum, maximum, and number of observations for each variable. Variable definitions are provided in Table A.1 in the Appendix. The sample consists of Bureau Van Dijk's Orbis nonfinancial firms based in the euro area in the 2013-2017 period. Variables are winsorized at the top and bottom 1%.

	Mean	Median	Standard Deviation	Minimum	Maximum	Number of Observations
Accounts Receivable	0.3012	0.1849	0.5574	0.0000	4.6879	2,248,514
Accounts Payable	0.2284	0.1134	0.5555	0.0000	4.9558	2,248,514
Assets (€million)	30.1234	3.2753	703.8566	0.0000	198,929	2,248,514
Sales (€million)	22.5520	3.1251	367.4128	0.0000	107,970	2,248,514
Cash	0.1130	0.0480	0.1536	0.0000	0.8158	2,248,514
PPE	0.2358	0.1303	0.2600	0.0000	0.9767	2,248,514
Net Margin	-0.0528	0.0157	0.7375	-7.0694	1.7098	2,248,514
Liabilities	0.6402	0.6690	0.2958	0.0035	1.8202	2,248,514
Total Debt	0.1882	0.1094	0.2197	0.0000	1.0345	2,108,965
Eligible	0.0003	0.0000	0.0177	0.0000	1.0000	2,248,514
Has Eligible Supplier	0.0007	0.0000	0.0257	0.0000	1.0000	2,248,514
Eligible Suppliers Share	0.0002	0.0000	0.0125	0.0000	1.0000	2,248,514
Has Core Eligible Supplier	0.0006	0.0000	0.0238	0.0000	1.0000	2,248,514
Has Periphery Eligible Supplier	0.0001	0.0000	0.0122	0.0000	1.0000	2,248,514

Table 2
Effect of CSPP on Accounts Receivable of Eligible Firms

This table presents difference-in-differences estimates of firm-level panel regressions of the ratio of accounts receivable to sales (*Accounts Receivable*). *Eligible* is a dummy variable that takes the value of one if a firm had corporate bonds eligible for purchase under the CSPP before the CSPP announcement date, and zero otherwise. *Post* is a dummy variable that takes the value of one in the years of 2016 and 2017, and zero otherwise. The sample consists of Bureau Van Dijk's Orbis nonfinancial firms based in the euro area in the 2013-2017 period. All explanatory variables are lagged by one year. Variable definitions are provided in Table A.1 in the Appendix. Robust standard errors adjusted for firm-level clustering are reported in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
Eligible × Post	0.103*** (0.032)		0.102*** (0.032)		0.089*** (0.032)	
Eligible × 2014		-0.007 (0.022)		-0.007 (0.022)		-0.013 (0.022)
Eligible × 2015		0.046 (0.043)		0.046 (0.043)		0.042 (0.043)
Eligible × 2016		0.077** (0.038)		0.077** (0.038)		0.062* (0.038)
Eligible × 2017		0.156** (0.062)		0.156** (0.062)		0.139** (0.062)
log(Assets)			-0.013*** (0.002)	-0.013*** (0.002)	-0.014*** (0.002)	-0.014*** (0.002)
Cash			-0.050*** (0.005)	-0.050*** (0.005)	-0.045*** (0.005)	-0.045*** (0.005)
PPE			-0.086*** (0.007)	-0.086*** (0.007)	-0.087*** (0.007)	-0.087*** (0.007)
Net Margin			-0.006*** (0.002)	-0.006*** (0.002)	-0.006*** (0.002)	-0.006*** (0.002)
Liabilities			-0.010** (0.005)	-0.010** (0.005)	-0.007 (0.005)	-0.007 (0.005)
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry-year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Country-year fixed effects	No	No	No	No	Yes	Yes
Number of observations	2,248,514	2,248,514	2,248,514	2,248,514	2,248,514	2,248,514
R-squared	0.74	0.74	0.74	0.74	0.74	0.74

Table 3
Effect of CSPP on Accounts Payable of Eligible Firms' Customers

This table presents difference-in-differences estimates of firm-level panel regressions of the ratio of accounts payable to sales (*Accounts Payable*). *Has Eligible Supplier* is a dummy that takes the value of one if a firm had a supplier with CSPP-eligible bonds, and zero otherwise. *Eligible Suppliers Share* is the number of eligible suppliers divided by the total number of suppliers. *Post* is a dummy variable that takes the value of one in the years of 2016 and 2017, and zero otherwise. The sample consists of Bureau Van Dijk's Orbis nonfinancial firms based in the euro area in the 2013-2017 period. All explanatory variables are lagged by one year. Variable definitions are provided in Table A.1 in the Appendix. Robust standard errors adjusted for firm-level clustering are reported in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

Panel A: Eligible Supplier Dummy Variable						
	(1)	(2)	(3)	(4)	(5)	(6)
Has Eligible Supplier × Post	0.048*** (0.017)		0.045*** (0.017)		0.032* (0.017)	
Has Eligible Supplier × 2014		0.030 (0.023)		0.028 (0.023)		0.025 (0.023)
Has Eligible Supplier × 2015		0.039 (0.027)		0.038 (0.027)		0.039 (0.027)
Has Eligible Supplier × 2016		0.034** (0.016)		0.031* (0.017)		0.018 (0.017)
Has Eligible Supplier × 2017		0.110*** (0.034)		0.107*** (0.034)		0.092*** (0.034)
log(Assets)			-0.045*** (0.002)	-0.045*** (0.002)	-0.046*** (0.002)	-0.046*** (0.002)
Cash			0.022*** (0.005)	0.022*** (0.005)	0.026*** (0.005)	0.026*** (0.005)
PPE			-0.048*** (0.008)	-0.048*** (0.008)	-0.047*** (0.008)	-0.047*** (0.008)
Net Margin			-0.019*** (0.002)	-0.019*** (0.002)	-0.019*** (0.002)	-0.019*** (0.002)
Liabilities			0.066*** (0.006)	0.066*** (0.006)	0.069*** (0.006)	0.069*** (0.006)
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry-year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Country-year fixed effects	No	No	No	No	Yes	Yes
Number of observations	2,248,514	2,248,514	2,248,514	2,248,514	2,248,514	2,248,514
R-squared	0.71	0.71	0.71	0.71	0.71	0.71

Table 3 (continued)

Panel B: Share of Eligible Suppliers						
	(1)	(2)	(3)	(4)	(5)	(6)
Eligible Suppliers Share × Post	0.069** (0.030)		0.067** (0.029)		0.051* (0.029)	
Eligible Suppliers Share × 2014		0.051 (0.045)		0.043 (0.045)		0.040 (0.045)
Eligible Suppliers Share × 2015		0.039 (0.041)		0.035 (0.040)		0.036 (0.040)
Eligible Suppliers Share × 2016		0.050** (0.025)		0.042* (0.025)		0.027 (0.025)
Eligible Suppliers Share × 2017		0.159*** (0.062)		0.155** (0.060)		0.138** (0.060)
log(Assets)			-0.045*** (0.002)	-0.045*** (0.002)	-0.046*** (0.002)	-0.046*** (0.002)
Cash			0.022*** (0.005)	0.022*** (0.005)	0.026*** (0.005)	0.026*** (0.005)
PPE			-0.048*** (0.008)	-0.048*** (0.008)	-0.047*** (0.008)	-0.047*** (0.008)
Net Margin			-0.019*** (0.002)	-0.019*** (0.002)	-0.019*** (0.002)	-0.019*** (0.002)
Liabilities			0.066*** (0.006)	0.066*** (0.006)	0.069*** (0.006)	0.069*** (0.006)
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry-year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Country-year fixed effects	No	No	No	No	Yes	Yes
Number of observations	2,248,514	2,248,514	2,248,514	2,248,514	2,248,514	2,248,514
R-squared	0.71	0.71	0.71	0.71	0.71	0.71

Table 4
Size Decile-by-Year Fixed Effects

This table presents difference-in-differences estimates of firm-level panel regressions of the ratio of accounts receivable to sales (*Accounts Receivable*) and the ratio of accounts payable to sales (*Accounts Payable*). *Eligible* is a dummy variable that takes the value of one if a firm had corporate bonds eligible for purchase under the CSPP before the CSPP announcement date, and zero otherwise. *Has Eligible Supplier* is a dummy that takes the value of one if a firm had a supplier with CSPP-eligible bonds, and zero otherwise. *Post* is a dummy variable that takes the value of one in the years of 2016 and 2017, and zero otherwise. Firms are sorted into size deciles each year where size is defined as total assets in each year. Regressions include the same control variables as those in Table 2 (coefficients not shown). The sample consists of Bureau Van Dijk's Orbis nonfinancial firms based in the euro area in the 2013-2017 period. All explanatory variables are lagged by one year. Variable definitions are provided in Table A.1 in the Appendix. Robust standard errors adjusted for firm-level clustering are reported in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

Panel A: Effect of CSPP on Accounts Receivable of Eligible Firms				
	(1)	(2)	(3)	(4)
Eligible × Post	0.095*** (0.032)		0.094*** (0.032)	
Eligible × 2014		-0.015 (0.022)		-0.013 (0.022)
Eligible × 2015		0.042 (0.043)		0.045 (0.043)
Eligible × 2016		0.066* (0.038)		0.066* (0.038)
Eligible × 2017		0.144** (0.062)		0.144** (0.062)
Controls	No	No	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes
Industry-year fixed effects	Yes	Yes	Yes	Yes
Size decile-by-year fixed effects	Yes	Yes	Yes	Yes
Number of observations	2,248,512	2,248,512	2,248,512	2,248,512
R-squared	0.74	0.74	0.74	0.74

Table 4 (continued)

Panel B: Effect of CSPP on Accounts Payable of Eligible Firms' Customers				
	(1)	(2)	(3)	(4)
Has Eligible Supplier × Post	0.028*		0.028*	
	(0.017)		(0.017)	
Has Eligible Supplier × 2014		0.019		0.019
		(0.023)		(0.023)
Has Eligible Supplier × 2015		0.027		0.030
		(0.027)		(0.027)
Has Eligible Supplier × 2016		0.009		0.011
		(0.016)		(0.017)
Has Eligible Supplier × 2017		0.082**		0.082**
		(0.034)		(0.034)
Controls	No	No	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes
Industry-year fixed effects	Yes	Yes	Yes	Yes
Size decile-by-year fixed effects	Yes	Yes	Yes	Yes
Number of observations	2,248,512	2,248,512	2,248,512	2,248,512
R-squared	0.71	0.71	0.71	0.71

Table 5
Matched Sample

This table presents difference-in-differences estimates of firm-level panel regressions of the ratio of accounts receivable to sales (*Accounts Receivable*) and accounts payable to sales (*Accounts Payable*). Panel A shows pre-treatment (CSPP announcement) means and medians of non-treated, treated, and control groups and tests of the difference in mean and median between treated and control groups. Treated firms consist of either 144 firms with eligible bonds or 305 firms with eligible suppliers. The samples includes only treated firms with non-missing information in Orbis on the two years preceding the treatment (2014 and 2015). Non-treated firms are all other firms. Control firms are firms that best match treated firms (nearest neighbor) using propensity score matching with replacement on multiple lagged covariates (two years before the event): $\log(\text{Assets})$, *Cash*, *PPE*, *Net Margin*, *Liabilities*, industry fixed effects, and region (exact match on core or periphery countries). Panel B shows estimates of the difference-in-differences regressions. *Eligible* is a dummy variable that takes the value of one if a firm had corporate bonds eligible for purchase under the CSPP before the CSPP announcement date, and zero otherwise. *Has Eligible Supplier* is a dummy that takes the value of one if a firm had a supplier with CSPP-eligible bonds, and zero otherwise. *Post* is a dummy variable that takes the value of one in the years of 2016 and 2017, and zero otherwise. The sample consists of a matched sample based on Bureau Van Dijk's Orbis nonfinancial firms based in the euro area in the 2013-2017 period. All explanatory variables are lagged by one year. Variable definitions are provided in Table A.1 in the Appendix. Robust standard errors adjusted for firm-level clustering are reported in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

Panel A: Summary Statistics (pre-treatment)

	Eligible Firms							
	Mean				Median			
	Non-Treated	Treated	Control	<i>t</i> -test (<i>p</i> -value)	Non-Treated	Treated	Control	Pearson χ^2 (<i>p</i> -value)
Assets (€million)	24.4	20,416.4	20,979.6	0.859	3.4	10,697.4	11,677.6	0.637
Cash	0.118	0.060	0.091	0.011	0.052	0.030	0.043	0.480
PPE	0.232	0.159	0.161	0.935	0.126	0.010	0.035	0.814
Net Margin	-0.051	0.284	0.083	0.204	0.018	0.183	0.078	0.000
Liabilities	0.637	0.624	0.631	0.813	0.662	0.614	0.710	0.059
	Customers of Eligible Firms							
	Mean				Median			
	Non-Treated	Treated	Control	<i>t</i> -test (<i>p</i> -value)	Non-Treated	Treated	Control	Pearson χ^2 (<i>p</i> -value)
Assets (€million)	23.8	10,567.5	9,902.6	0.700	3.4	1,986.4	1,566.9	0.224
Cash	0.118	0.088	0.098	0.347	0.052	0.042	0.023	0.019
PPE	0.232	0.105	0.094	0.450	0.126	0.017	0.010	0.124
Net Margin	-0.051	0.066	0.097	0.805	0.018	0.081	0.078	0.331
Liabilities	0.637	0.551	0.540	0.615	0.662	0.575	0.550	0.292

Table 5 (continued)

Panel B: Difference-in-Differences Estimates				
	Accounts Receivable		Accounts Payable	
	(1)	(2)	(3)	(4)
Eligible × Post	0.103** (0.047)	0.109** (0.050)		
Has Eligible Supplier × Post			0.079** (0.030)	0.066** (0.031)
Controls	No	Yes	No	Yes
Firm fixed effects	Yes	Yes	Yes	Yes
Industry-year fixed effects	Yes	Yes	Yes	Yes
Number of observations	1,401	1,371	2,863	2,797
R-squared	0.81	0.81	0.62	0.64

Table 6**Effect of CSPP on Accounts Payable of Eligible Firms' Customers: The Role of Financial Constraints**

This table presents difference-in-differences estimates of firm-level panel regressions of the ratio of accounts payable to sales. *Has Eligible Supplier* is a dummy that takes the value of one if a firm had a supplier with CSPP-eligible bonds, and zero otherwise. *Post* is a dummy variable that takes the value of one in the years of 2016 and 2017, and zero otherwise. Regressions include the same control variables as those in Table 2 (coefficients not shown). The sample consists of Bureau Van Dijk's Orbis nonfinancial firms based in the euro area in the 2013-2017 period. All explanatory variables are lagged by one year. In columns (1) and (2), Panel A, the sample is partitioned in firms with investment grade rating and firms with either a speculative grade rating or without a credit rating. In columns (3) and (4), Panel A, the sample is partitioned in firms that are rated and firms without a credit rating. In columns (5) and (6), Panel A, the low and high liabilities groups consist of those firms that are below or above the median of the distribution of the ratio of liabilities to assets. In columns (7) and (8), Panel A, the low and high PPE groups consist of those firms that are below or above the median of the distribution of the ratio of PPE to assets. In columns (1) and (2), Panel B, the low and high sales groups consist of those firms that are below or above the median of the distribution of sales. In columns (3) and (4), Panel B, the low and high sales growth groups consist of those firms that are below or above the median of the distribution of sales growth. In columns (5) and (6), Panel B, the low and high asset growth groups consist of those firms that are below or above the median of the distribution of asset growth. In columns (7) and (8), Panel B, the low and high EBITDA groups consist of those firms that are below or above the median of the distribution of EBITDA to assets ratio. In columns (9) and (10), Panel B, the sample is partitioned in publicly listed firms and privately held firms. For each sample split, we present the *p*-value of the *F*-test for the difference in on the *Has Eligible Supplier* \times *Post* coefficients. Variable definitions are provided in Table A.1 in the Appendix. Robust standard errors adjusted for firm-level clustering are reported in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

Panel A								
	Investment Grade	Non-Investment Grade	Rated	Unrated	Low Liabilities	High Liabilities	High PPE	Low PPE
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Has Eligible Supplier \times Post	-0.049 (0.048)	0.041** (0.021)	-0.055 (0.038)	0.047** (0.022)	0.023 (0.020)	0.082*** (0.031)	0.022** (0.010)	0.039* (0.023)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry-year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	697	2,247,817	1,169	2,247,345	1,124,258	1,124,256	1,124,256	1,124,258
R-squared	0.77	0.71	0.68	0.71	0.71	0.72	0.72	0.72
Difference (<i>p</i> -value)		0.07		0.02		0.11		0.51

Table 6 (continued)

Panel B

	High Sales	Low Sales	Low Sales Growth	High Sales Growth	Low Asset Growth	High Asset Growth	High EBITDA	Low EBITDA	Public Firms	Private Firms
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Has Eligible Supplier × Post	0.019 (0.015)	0.191 (0.371)	0.027 (0.032)	0.044** (0.019)	0.014 (0.029)	0.052** (0.026)	0.014** (0.006)	0.066*** (0.023)	0.010 (0.023)	0.073** (0.035)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry-year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	1,124,256	1,124,258	1,081,305	1,081,303	1,090,815	1,090,812	1,082,737	1,082,737	10,051	2,238,463
R-squared	0.68	0.72	0.76	0.75	0.75	0.73	0.71	0.72	0.69	0.71
Difference (<i>p</i> -value)		0.75		0.63		0.47		0.06		0.13

Table 7**Core versus Periphery Countries**

This table presents difference-in-differences estimates of firm-level panel regressions of the ratio of accounts receivable to sales and the ratio of accounts payable to sales. *Eligible* is a dummy variable that takes the value of one if a firm had corporate bonds eligible for purchase under the CSPP before the CSPP announcement date, and zero otherwise. *Has Eligible Supplier* is a dummy that takes the value of one if a firm had a supplier with CSPP-eligible bonds, and zero otherwise. *Has Core Eligible Supplier* is a dummy variable that takes the value of one if a firm is a customer of eligible firms headquartered in core countries, and zero otherwise. *Has Periphery Eligible Supplier* is a dummy variable that takes the value of one if a firm is a customer of eligible firms headquartered in periphery countries, and zero otherwise. *Post* is a dummy variable that takes the value of one in the years of 2016 and 2017, and zero otherwise. Regressions include the same control variables as those in Table 2 (coefficients not shown). The sample consists of Bureau Van Dijk's Orbis nonfinancial firms based in the euro area in the 2013-2017 period. All explanatory variables are lagged by one year. Variable definitions are provided in Table A.1 in the Appendix. Robust standard errors adjusted for firm-level clustering are reported in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

Panel A: Core versus Periphery Countries				
	Core Countries		Periphery Countries	
	Accounts Receivable (1)	Accounts Payable (2)	Accounts Receivable (3)	Accounts Payable (4)
Eligible × Post	0.126*** (0.045)		0.018 (0.025)	
Has Eligible Supplier × Post		0.017 (0.019)		0.072** (0.032)
Controls	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes
Industry-year fixed effects	Yes	Yes	Yes	Yes
Number of observations	650,691	650,691	1,597,823	1,597,823
R-squared	0.77	0.71	0.73	0.71

Panel B: Core versus Periphery Countries Eligible Suppliers				
	Euro Area Countries	Core Countries	Periphery Countries	
	Accounts Payable			
	(1)	(2)	(3)	
Has Core Eligible Supplier × Post	0.044** (0.020)	0.018 (0.020)	0.077 (0.051)	
Has Periphery Eligible Supplier × Post	0.024* (0.013)	0.003 (0.023)	0.034* (0.018)	
Controls		Yes	Yes	Yes
Firm fixed effects		Yes	Yes	Yes
Industry-year fixed effects		Yes	Yes	Yes
Number of observations		2,248,514	650,691	1,597,823
R-squared		0.71	0.71	0.71

Table 8**Real Effects of CSPP: Investment and Financing of Eligible Firms**

This table presents difference-in-differences estimates of firm-level panel regressions of firm outcomes. Panel A shows regressions for asset growth, CAPEX (scale by lagged assets), change in inventories (scaled by lagged assets), change in receivable (scaled by lagged assets), and labor growth. Panel B shows regressions for change in total debt, change in long-term debt, change in short-term debt, change in accounts payable, and change in cash (all variables scaled by lagged assets). *Eligible* is a dummy variable that takes the value of one if a firm had corporate bonds eligible for purchase under the CSPP before the CSPP announcement date, and zero otherwise. *Post* is a dummy variable that takes the value of one in the years of 2016 and 2017, and zero otherwise. Regressions include the same control variables as those in Table 2 (coefficients not shown). The sample consists of Bureau Van Dijk's Orbis nonfinancial firms based in the euro area in the 2013-2017 period. All explanatory variables are lagged by one year. Variable definitions are provided in Table A.1 in the Appendix. Robust standard errors adjusted for firm-level clustering are reported in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

Panel A: Investment in Fixed Assets, Working Capital and Human Capital

	Asset Growth	CAPEX	Δ Inventories	Δ Accounts Receivable	Labor Growth
	(1)	(2)	(3)	(4)	(5)
Eligible \times Post	0.023*	0.002	0.005	0.009**	0.018
	(0.014)	(0.005)	(0.004)	(0.004)	(0.024)
Controls	Yes	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes	Yes
Industry-year fixed effects	Yes	Yes	Yes	Yes	Yes
Number of observations	2,248,512	2,116,731	2,246,443	2,247,599	1,779,908
R-squared	0.55	0.48	0.32	0.29	0.28

Panel B: External and Internal Financing

	Δ Total Debt	Δ Long-Term Debt	Δ Short-Term Debt	Δ Accounts Payable	Δ Cash
	(1)	(2)	(3)	(4)	(5)
Eligible \times Post	0.016	0.009	0.005	0.008**	0.003
	(0.011)	(0.011)	(0.006)	(0.003)	(0.005)
Controls	Yes	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes	Yes
Industry-year fixed effects	Yes	Yes	Yes	Yes	Yes
Number of observations	2,081,233	2,090,098	2,236,327	2,238,452	2,231,250
R-squared	0.26	0.22	0.18	0.27	0.43

Table 9**Real Effects of CSPP: Investment and Financing of Eligible Firms' Customers**

This table presents difference-in-differences estimates of firm-level panel regressions of firm outcomes. Panel A shows regressions for asset growth, CAPEX (scale by lagged assets), change in inventories (scaled by lagged assets), change in receivable (scaled by lagged assets), and labor growth. Panel B shows regressions for change in total debt, change in long-term debt, change in short-term debt, change in accounts payable, and change in cash (all variables scaled by lagged assets). *Has Eligible Supplier* is a dummy that takes the value of one if a firm had a supplier with CSPP-eligible bonds, and zero otherwise. *Post* is a dummy variable that takes the value of one in the years of 2016 and 2017, and zero otherwise. Regressions include the same control variables as those in Table 2 (coefficients not shown). The sample consists of Bureau Van Dijk's Orbis nonfinancial firms based in the euro area in the 2013-2017 period. All explanatory variables are lagged by one year. Variable definitions are provided in Table A.1 in the Appendix. Robust standard errors adjusted for firm-level clustering are reported in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

Panel A: Investment in Fixed Assets, Working Capital and Human Capital

	Asset Growth	CAPEX	Δ Inventories	Δ Accounts Receivable	Labor Growth
	(1)	(2)	(3)	(4)	(5)
Has Eligible Supplier \times Post	0.025* (0.015)	0.005* (0.003)	0.004** (0.002)	0.011** (0.005)	0.034* (0.020)
Controls	Yes	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes	Yes
Industry-year fixed effects	Yes	Yes	Yes	Yes	Yes
Number of observations	2,248,512	2,116,731	2,246,443	2,247,599	1,779,908
R-squared	0.55	0.48	0.32	0.29	0.28

Panel B: External and Internal Financing

	Δ Total Debt	Δ Long-Term Debt	Δ Short-Term Debt	Δ Accounts Payable	Δ Cash
	(1)	(2)	(3)	(4)	(5)
Has Eligible Supplier \times Post	0.008 (0.007)	0.005 (0.007)	0.004 (0.004)	0.009*** (0.003)	-0.007 (0.004)
Controls	Yes	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes	Yes
Industry-year fixed effects	Yes	Yes	Yes	Yes	Yes
Number of observations	2,081,233	2,090,098	2,236,327	2,238,452	2,231,250
R-squared	0.26	0.22	0.18	0.27	0.43

Table 10**Effect of CSPP on Customer Relationships Maintained and New Relationships Initiated**

This table presents difference-in-differences estimates of firm-level panel regressions of the number of customer relationships maintained and number of new customer relationships initiated. The dependent variable in columns (1)-(3) is the number of customer relationships maintained by a supplier relative to the existing relationships in the previous year. The dependent variable in columns (4)-(6) is the number of new customer relationships initiated by a supplier relative to the existing relationships in the previous year. *Eligible* is a dummy variable that takes the value of one if a firm had corporate bonds eligible for purchase under the CSPP before the CSPP announcement date, and zero otherwise. *Post* is a dummy variable that takes the value of one in the years of 2016 and 2017, and zero otherwise. Regressions include the same control variables as those in Table 2 (coefficients not shown). The sample consists of Factset Revere Supply Chain Relationship nonfinancial firms based in the euro area in the 2013-2017 period. All explanatory variables are lagged by one year. Variable definitions are provided in Table A.1 in the Appendix. Robust standard errors adjusted for firm-level clustering are reported in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

Panel A: Euro Area Countries

	Number of Customers Kept			Number of New Customers		
	(1)	(2)	(3)	(4)	(5)	(6)
Eligible × Post	9.514*** (1.935)	8.223*** (2.073)	7.624*** (2.043)	3.281*** (1.234)	2.767** (1.231)	2.715** (1.219)
Controls	No	Yes	Yes	No	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry-year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Country-year fixed effects	No	No	Yes	No	No	Yes
Number of observations	9,434	6,045	6,037	9,434	6,045	6,037
R-squared	0.84	0.84	0.84	0.58	0.57	0.57

Panel B: Core Countries

	Number of Customers Kept			Number of New Customers		
	(1)	(2)	(3)	(4)	(5)	(6)
Eligible × Post	11.700*** (2.334)	9.968*** (2.510)	9.729*** (2.481)	4.247*** (1.482)	3.429** (1.501)	3.612** (1.471)
Controls	No	Yes	Yes	No	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry-year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Country-year fixed effects	No	No	Yes	No	No	Yes
Number of observations	6,558	3,883	3,883	6,558	3,883	3,883
R-squared	0.84	0.84	0.84	0.59	0.58	0.58

Table 10 (continued)

Panel C: Periphery Countries

	Number of Customers Kept			Number of New Customers		
	(1)	(2)	(3)	(4)	(5)	(6)
Eligible × Post	0.624 (1.318)	-0.359 (1.445)	-0.580 (1.548)	-0.419 (1.152)	0.275 (1.058)	-0.648 (1.248)
Controls	No	Yes	Yes	No	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry-year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Country-year fixed effects	No	No	Yes	No	No	Yes
Number of observations	2,876	2,162	2,154	2,876	2,162	2,154
R-squared	0.85	0.85	0.85	0.51	0.5	0.52

Table 11
Effect of CSPP on Sales Market Share of Eligible Firms

This table presents difference-in-differences estimates of firm-level panel regressions of sales market share at the four-digit SIC level. *Eligible* is a dummy variable that takes the value of one if a firm had corporate bonds eligible for purchase under the CSPP before the CSPP announcement date, and zero otherwise. *Post* is a dummy variable that takes the value of one in the years of 2016 and 2017, and zero otherwise. Regressions include the same control variables as those in Table 2 (coefficients not shown). The sample consists of Bureau Van Dijk's Orbis nonfinancial firms based in the euro area in the 2013-2017 period. All explanatory variables are lagged by one year. Variable definitions are provided in Table A.1 in the Appendix. Robust standard errors adjusted for firm-level clustering are reported in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

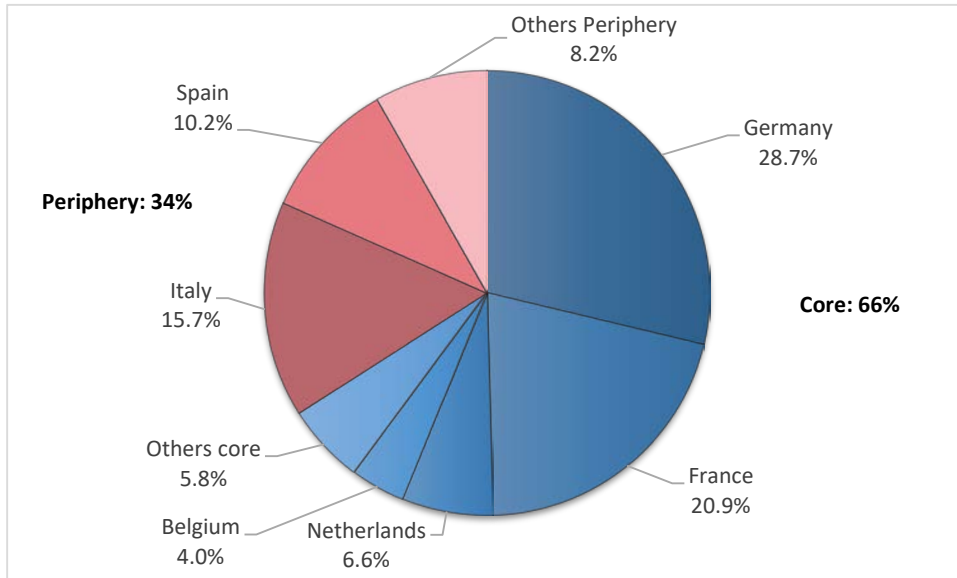
	Euro Area Countries		Core Countries		Periphery Countries	
	(1)	(2)	(3)	(4)	(5)	(6)
Eligible × Post	0.373*	0.374*	0.499*	0.499*	0.108	0.109
	(0.226)	(0.226)	(0.302)	(0.302)	(0.297)	(0.297)
Controls	No	Yes	No	Yes	No	Yes
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	2,248,514	2,248,514	650,691	650,691	1,597,823	1,597,823
R-squared	0.98	0.98	0.98	0.98	0.97	0.97

Figure 1

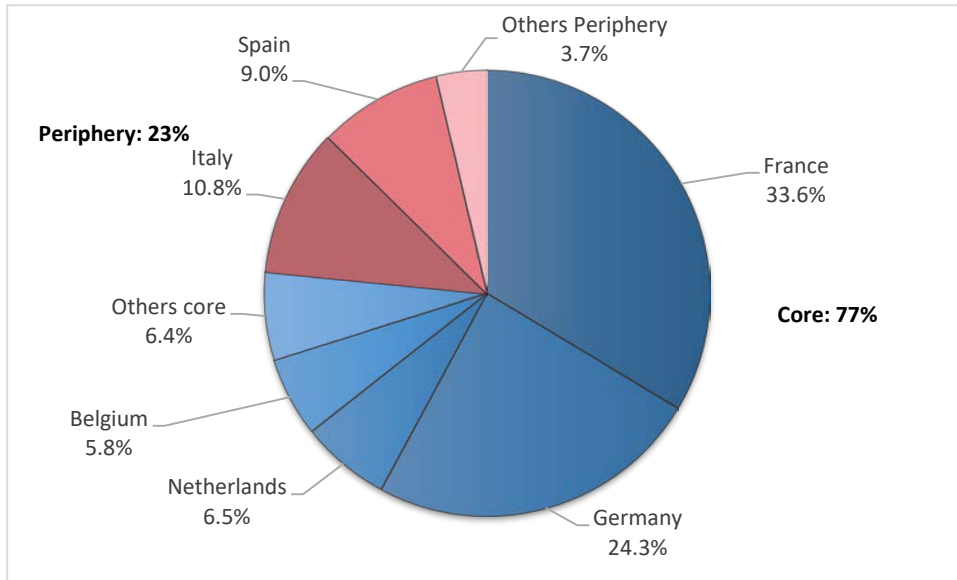
Eligible Corporate Bonds under the CSPP by Country

Panel A shows the percentage that each country represents of the GDP in the euro area as of 2015. Panels B and C show the percentage that each country (i.e., country of risk) represents of the ECB's CSPP in terms of the number of eligible bonds and total amount issued in the euro area as of March 2016. The sample consists of bond issues of nonfinancial firms based in the euro area.

Panel A: GDP by Country



Panel B: Eligible Bonds by Country – Number of Bonds



Panel C: Eligible Bonds by Country – Amount Issued

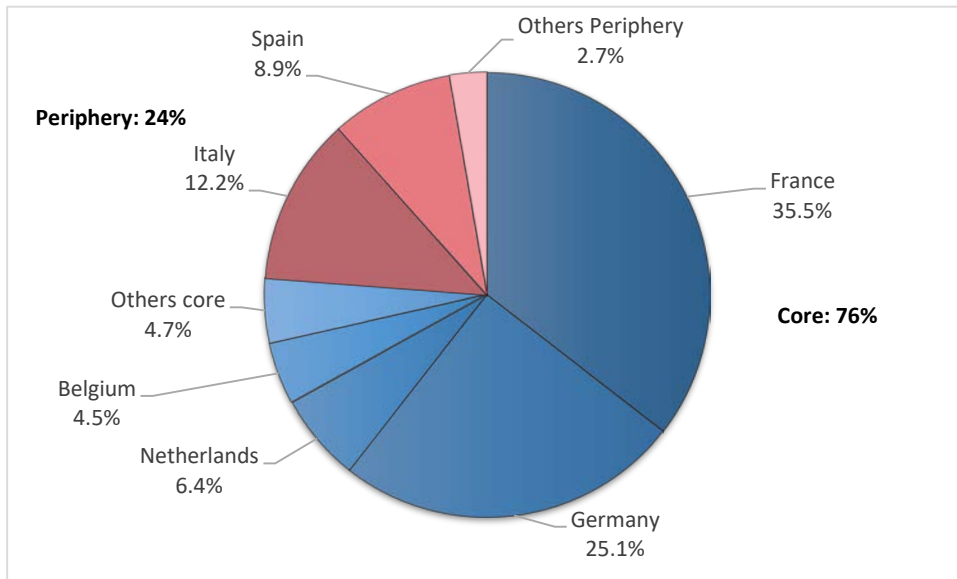
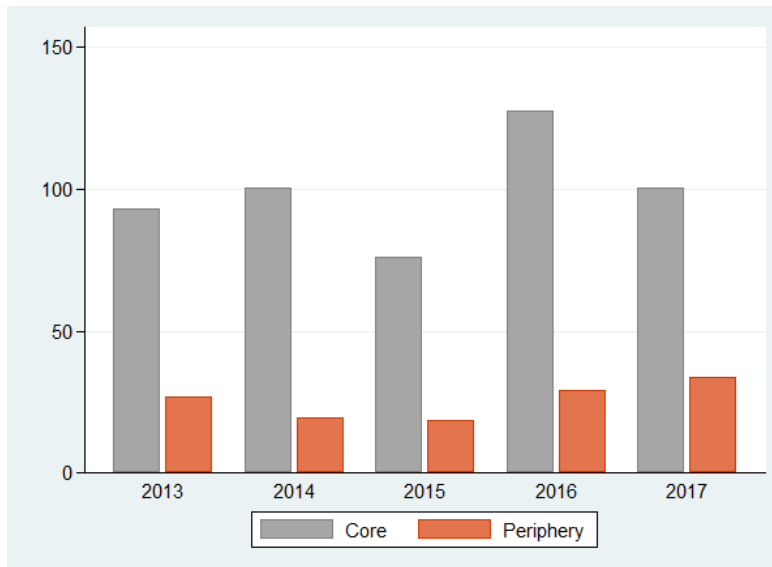


Figure 2

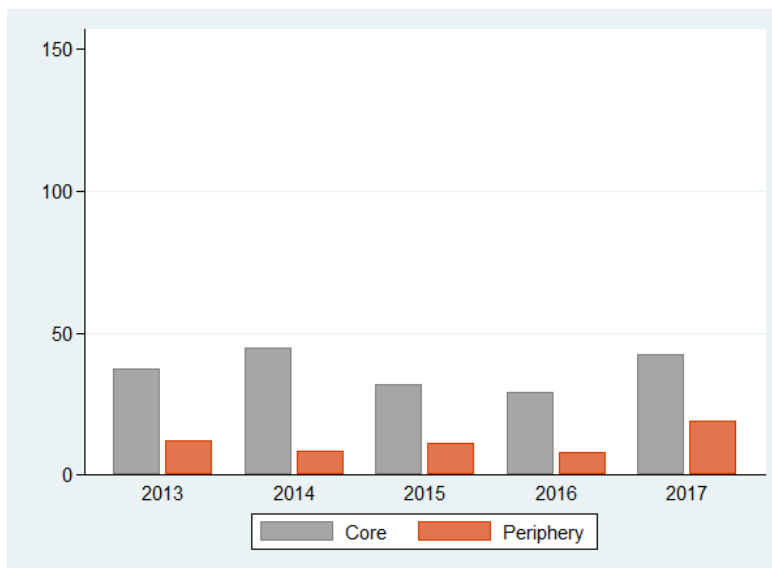
New Issuance of Corporate Bonds around the CSPP: Core versus Periphery Countries

This figure shows the amount of bonds issued (€billion) by core and periphery euro area firms in the euro-denominated corporate bond market. Bond issuance data are obtained from SDC New Issues and includes bonds issued by nonfinancial firms based in the euro area in the 2013-2017 period. Panel A shows new issuance of investment grade bonds. Panel B shows new issuance of non-investment grade bonds.

Panel A: New Issuance of Investment Grade Bonds (€billion)



Panel B: New Issuance of Non-Investment Grade Bonds (€billion)



Internet Appendix for
“Trade Credit and the Transmission of Unconventional Monetary Policy”

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Table IA.1
Sample Description by Country

This table shows the frequency distribution of the sample by country using a sample of Bureau Van Dijk's Orbis nonfinancial firms based in the euro area in the 2013-2017 period.

	Number of Observations	Number of Firms	Number of Eligible Firms	Number of Customers of Eligible Firms
Austria	7,749	2,358	8	6
Belgium	76,449	17,540	16	13
Cyprus	1,783	534	1	0
Estonia	16,763	3,610	2	2
Finland	49,511	12,663	4	15
France	453,503	109,989	44	89
Germany	53,214	14,602	28	80
Greece	45,561	10,492	0	6
Ireland	9,787	2,575	1	9
Italy	831,072	177,920	16	42
Latvia	17,432	3,698	1	0
Lithuania	10,092	2,537	0	0
Luxembourg	5,657	1,712	1	4
Malta	1,616	468	0	0
Netherlands	4,608	1,656	1	2
Portugal	122,214	26,200	8	8
Slovakia	45,735	9,964	1	1
Slovenia	23,613	5,121	2	0
Spain	472,155	106,659	17	41
Total	2,248,514	510,298	151	318

Table IA.2**Supply Chain Relationships: Distribution by Country**

This table shows the frequency distribution of the sample of supplier-customer pairs by country. The sample includes nonfinancial suppliers based in the euro area as reported by Factset Revere before the CSPP announcement.

Supplier country	Customer country																				Total
	AT	BE	CY	DE	EE	ES	FI	FR	GR	IE	IT	LT	LU	LV	MT	NL	PT	SI	SK	Other	
AT	40	4	0	50	2	8	7	15	2	3	9	0	6	0	0	9	4	2	0	381	542
BE	1	32	0	35	1	4	2	49	4	3	6	0	2	0	0	22	0	0	0	408	569
CY	1	0	3	2	0	5	0	6	3	1	6	0	0	0	0	5	0	0	0	133	165
DE	64	37	3	1,348	3	45	38	215	21	31	78	2	34	1	1	117	7	1	1	3,208	5,255
EE	0	0	0	0	25	0	2	2	0	0	0	4	0	4	0	0	0	0	0	7	44
ES	4	10	0	54	2	209	6	64	8	9	33	0	7	3	0	26	17	1	0	860	1,313
FI	13	13	4	61	9	6	194	40	3	5	14	4	5	2	0	16	1	2	1	843	1,236
FR	15	73	2	316	8	78	35	1,158	13	28	113	0	41	1	1	170	13	4	6	3,514	5,589
GR	10	4	3	38	0	9	2	30	83	7	17	0	5	0	2	34	4	1	0	468	717
IE	0	10	1	17	0	2	1	23	1	24	9	0	2	1	0	19	2	0	0	616	728
IT	6	8	1	122	0	29	11	112	9	13	414	1	9	0	1	41	1	1	3	1,224	2,006
LT	0	1	0	3	1	0	2	0	0	0	0	12	0	3	1	0	1	0	0	26	50
LU	1	5	0	22	0	11	2	32	3	2	6	1	7	0	0	16	1	0	1	386	496
LV	0	0	0	0	0	0	0	0	0	1	0	3	0	1	0	1	0	0	0	8	14
MT	1	1	0	0	1	3	1	1	1	0	0	0	0	0	0	0	0	0	0	7	16
NL	8	15	3	159	3	27	10	76	9	19	32	0	6	1	1	130	7	0	0	1,374	1,880
PT	0	0	0	0	0	1	0	2	2	1	1	0	0	0	0	2	29	0	0	49	87
SI	1	0	0	3	0	0	1	1	0	0	0	0	1	0	0	1	0	3	0	15	26
SK	0	1	0	2	0	1	0	0	0	0	1	0	0	0	0	0	0	2	9	18	34
Total	165	214	20	2,232	55	438	314	1,826	162	147	739	27	125	17	7	609	87	17	21	13,545	20,767

Table IA.3**Effect of CSPP on Accounts Receivable of Eligible Firms: Placebo Test**

This table presents difference-in-differences estimates of firm-level panel regressions of the ratio of accounts receivable to sales. *Investment Grade* is a dummy variable that takes the value of one if a firm had an investment grade credit rating (AAA to BBB-) before the CSPP announcement, and zero otherwise). *Post* is a dummy variable that takes the value of one in the years of 2016 and 2017, and zero otherwise. Regressions include the same control variables as those in Table 2 (coefficients not shown). Columns (1) and (2) show the results for a sample of Compustat U.S. publicly listed nonfinancial firms in the 2013-2017 period. Columns (3) and (4) show the results for a sample of Bureau Van Dijk's Orbis publicly listed nonfinancial firms based in European Union countries that are not part of the euro area in the 2013-2017 period. Columns (5) and (6) show the results for a sample of Bureau Van Dijk's Orbis public and private nonfinancial firms based in European Union countries that are not part of the euro area in the 2013-2017 period. All explanatory variables are lagged by one year. Variable definitions are provided in Table A.1 in the Appendix. Robust standard errors adjusted for firm-level clustering are reported in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

	U.S. Public Firms (Compustat)		EU Non-Euro Public Firms (Orbis)		EU Non-Euro Firms (Orbis)	
	(1)	(2)	(3)	(4)	(5)	(6)
Investment Grade × Post	0.004 (0.005)		-0.014 (0.013)		0.013* (0.007)	
Investment Grade × 2014		0.001 (0.004)		0.019 (0.015)		0.011** (0.005)
Investment Grade × 2015		0.005 (0.006)		-0.017 (0.018)		0.018** (0.008)
Investment Grade × 2016		0.004 (0.007)		-0.021 (0.020)		0.031*** (0.009)
Investment Grade × 2017		0.007 (0.007)		-0.008 (0.021)		0.017 (0.011)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry-year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	17,209	17,209	11,837	11,837	747,924	747,924
R-squared	0.65	0.65	0.74	0.74	0.76	0.76

Table IA.4**Effect of CSPP on Accounts Receivable of Eligible Firms: Non-Eligible Bond Issuers**

This table presents difference-in-differences estimates of firm-level panel regressions of the ratio of accounts receivable to sales. *Eligible* is a dummy variable that takes the value of one if a firm had corporate bonds eligible for purchase under the CSPP before the CSPP announcement date, and zero otherwise. *Non-Eligible* is a dummy variable that takes the value of one if a firm's corporate bonds are non-eligible for purchase under the CSPP before the CSPP announcement date, and zero otherwise. *Post* is a dummy variable that takes the value of one in the years of 2016 and 2017, and zero otherwise. Regressions include the same control variables as those in Table 2 (coefficients not shown). The sample consists of Bureau Van Dijk's Orbis nonfinancial firms based in the euro area in the 2013-2017 period. All explanatory variables are lagged by one year. Variable definitions are provided in Table A.1 in the Appendix. Robust standard errors adjusted for firm-level clustering are reported in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

	(1)	(2)	(3)
Eligible × Post	0.103*** (0.032)	0.102*** (0.032)	0.090*** (0.032)
Non-Eligible × Post	0.020 (0.015)	0.021 (0.015)	0.016 (0.015)
Controls	No	Yes	Yes
Firm fixed effects	Yes	Yes	Yes
Industry-year fixed effects	Yes	Yes	Yes
Country-year fixed effects	No	No	Yes
Number of observations	2,248,514	2,248,514	2,248,514
R-squared	0.74	0.74	0.74

Table IA.5**Sample of Non-Euro Area European Union Countries**

This table presents difference-in-differences estimates of firm-level panel regressions of the ratio of accounts payable to sales. *Has Eligible Supplier* is a dummy that takes the value of one if a firm had a supplier with CSPP-eligible bonds, and zero otherwise. *Post* is a dummy variable that takes the value of one in the years of 2016 and 2017, and zero otherwise. Regressions include the same control variables as those in Table 2 (coefficients not shown). The sample consists of Bureau Van Dijk's Orbis nonfinancial firms based in European Union countries that are not members of the euro area in the 2013-2017 period. All explanatory variables are lagged by one year. Variable definitions are provided in Table A.1 in the Appendix. Robust standard errors adjusted for firm-level clustering are reported in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

	(1)	(2)	(3)
Has Eligible Supplier \times Post	0.027** (0.012)	0.023** (0.012)	0.024** (0.012)
Controls	No	Yes	Yes
Firm fixed effects	Yes	Yes	Yes
Industry-year fixed effects	Yes	Yes	Yes
Country-year fixed effects	No	No	Yes
Number of observations	717,485	717,485	717,485
R-squared	0.70	0.70	0.70

Table IA.6**Effect of CSPP on Accounts Payable**

This table presents difference-in-differences estimates of firm-level panel regressions of the ratio of accounts payable to sales. *Has Eligible Supplier* is a dummy that takes the value of one if a firm had a supplier with CSPP-eligible bonds, and zero otherwise. *Eligible* is a dummy variable that takes the value of one if a firm had corporate bonds eligible for purchase under the CSPP before the CSPP announcement date, and zero otherwise. *Post* is a dummy variable that takes the value of one in the years of 2016 and 2017, and zero otherwise. Regressions include the same control variables as those in Table 2 (coefficients not shown). The sample consists of Bureau Van Dijk's Orbis nonfinancial firms based in the euro area in the 2013-2017 period. All explanatory variables are lagged by one year. Variable definitions are provided in Table A.1 in the Appendix. Robust standard errors adjusted for firm-level clustering are reported in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

	(1)	(2)	(3)
Has Eligible Supplier × Post	0.040** (0.019)	0.039** (0.019)	0.028 (0.019)
Eligible × Post	0.027 (0.021)	0.025 (0.021)	0.015 (0.021)
Controls	No	Yes	Yes
Firm fixed effects	Yes	Yes	Yes
Industry-year fixed effects	Yes	Yes	Yes
Country-year fixed effects	No	No	Yes
Number of observations	2,248,514	2,248,514	2,248,514
R-squared	0.71	0.71	0.71

Table IA.7**Sample Excluding Firms with less than €10 million in Assets**

This table presents difference-in-differences estimates of firm-level panel regressions of the ratio of accounts receivable to sales and the ratio of accounts payable to sales. *Eligible* is a dummy variable that takes the value of one if a firm had corporate bonds eligible for purchase under the CSPP before the CSPP announcement date, and zero otherwise. *Has Eligible Supplier* is a dummy that takes the value of one if a firm had a supplier with CSPP-eligible bonds, and zero otherwise. *Post* is a dummy variable that takes the value of one in the years of 2016 and 2017, and zero otherwise. Regressions include the same control variables as those in Table 2 (coefficients not shown). The sample consists of Bureau Van Dijk's Orbis nonfinancial firms based in the euro area in the 2013-2017 period. The sample excludes firms with less than €10 million in Assets as of 2015 (the year before the announcement of the CSPP). All explanatory variables are lagged by one year. Variable definitions are provided in Table A.1 in the Appendix. Robust standard errors adjusted for firm-level clustering are reported in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

	Accounts Receivable			Accounts Payable		
	(1)	(2)	(3)	(4)	(5)	(6)
Eligible × Post	0.098** (0.041)	0.097** (0.041)	0.088** (0.041)			
Has Eligible Supplier × Post				0.043** (0.021)	0.041** (0.020)	0.037* (0.020)
Controls	No	Yes	Yes	No	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry-year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Country-year fixed effects	No	No	Yes	No	No	Yes
Number of observations	478,265	478,265	478,265	478,265	478,265	478,265
R-squared	0.74	0.74	0.74	0.71	0.71	0.71

Table IA.8
Sample Excluding Germany

This table presents difference-in-differences estimates of firm-level panel regressions of the ratio of accounts receivable to sales and the ratio of accounts payable to sales. *Eligible* is a dummy variable that takes the value of one if a firm had corporate bonds eligible for purchase under the CSPP before the CSPP announcement date, and zero otherwise. *Has Eligible Supplier* is a dummy that takes the value of one if a firm had a supplier with CSPP-eligible bonds, and zero otherwise. *Post* is a dummy variable that takes the value of one in the years of 2016 and 2017, and zero otherwise. Regressions include the same control variables as those in Table 2 (coefficients not shown). The sample consists of Bureau Van Dijk's Orbis nonfinancial firms based in the euro area in the 2013-2017 period. The sample excludes firms domiciled in Germany. All explanatory variables are lagged by one year. Variable definitions are provided in Table A.1 in the Appendix. Robust standard errors adjusted for firm-level clustering are reported in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

	Accounts Receivable			Accounts Payable		
	(1)	(2)	(3)	(4)	(5)	(6)
Eligible × Post	0.125*** (0.040)	0.124*** (0.040)	0.112*** (0.040)			
Has Eligible Supplier × Post				0.055** (0.022)	0.053** (0.022)	0.041* (0.022)
Controls	No	Yes	Yes	No	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry-year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Country-year fixed effects	No	No	Yes	No	No	Yes
Number of observations	2,195,300	2,195,300	2,195,300	2,195,300	2,195,300	2,195,300
R-squared	0.74	0.74	0.74	0.71	0.71	0.71

Table IA.9**Country-Industry-Year Fixed Effects**

This table presents difference-in-differences estimates of firm-level panel regressions of the ratio of accounts receivable to sales and the ratio of accounts payable to sales. *Eligible* is a dummy variable that takes the value of one if a firm had corporate bonds eligible for purchase under the CSPP before the CSPP announcement date, and zero otherwise. *Has Eligible Supplier* is a dummy that takes the value of one if a firm had a supplier with CSPP-eligible bonds, and zero otherwise. *Post* is a dummy variable that takes the value of one in the years of 2016 and 2017, and zero otherwise. Regressions include the same control variables as those in Table 2 (coefficients not shown). The sample consists of Bureau Van Dijk's Orbis nonfinancial firms based in the euro area in the 2013-2017 period. All explanatory variables are lagged by one year. Variable definitions are provided in Table A.1 in the Appendix. Robust standard errors adjusted for firm-level clustering are reported in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

	Accounts Receivable		Accounts Payable	
	(1)	(2)	(3)	(4)
Eligible × Post	0.090*** (0.032)	0.089*** (0.032)		
Has Eligible Supplier × Post			0.033* (0.017)	0.031* (0.017)
Controls	No	Yes	No	Yes
Firm fixed effects	Yes	Yes	Yes	Yes
Country-industry-year fixed effects	Yes	Yes	Yes	Yes
Number of observations	2,248,514	2,248,514	2,248,514	2,248,514
R-squared	0.74	0.74	0.71	0.71

Table IA.10**Two-digit SIC Industry Fixed Effects**

This table presents difference-in-differences estimates of firm-level panel regressions of the ratio of accounts receivable to sales and the ratio of accounts payable to sales. *Eligible* is a dummy variable that takes the value of one if a firm had corporate bonds eligible for purchase under the CSPP before the CSPP announcement date, and zero otherwise. *Has Eligible Supplier* is a dummy that takes the value of one if a firm had a supplier with CSPP-eligible bonds, and zero otherwise. *Post* is a dummy variable that takes the value of one in the years of 2016 and 2017, and zero otherwise. Regressions include the same control variables as those in Table 2 (coefficients not shown). The sample consists of Bureau Van Dijk's Orbis nonfinancial firms based in the euro area in the 2013-2017 period. All explanatory variables are lagged by one year. Variable definitions are provided in Table A.1 in the Appendix. Robust standard errors adjusted for firm-level clustering are reported in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

	Accounts Receivable			Accounts Payable		
	(1)	(2)	(2)	(4)	(5)	(6)
Eligible × Post	0.099*** (0.032)	0.098*** (0.032)	0.087*** (0.032)			
Has Eligible Supplier × Post				0.041** (0.017)	0.039** (0.017)	0.028* (0.017)
Controls	No	Yes	Yes	No	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry-year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Country-year fixed effects	No	No	Yes	No	No	Yes
Number of observations	2,248,514	2,248,514	2,248,514	2,248,514	2,248,514	2,248,514
R-squared	0.74	0.74	0.74	0.71	0.71	0.71

Table IA.11
Clustering at the Industry-Year Level

This table presents difference-in-differences estimates of firm-level panel regressions of the ratio of accounts receivable to sales and the ratio of accounts payable to sales. *Eligible* is a dummy variable that takes the value of one if a firm had corporate bonds eligible for purchase under the CSPP before the CSPP announcement date, and zero otherwise. *Has Eligible Supplier* is a dummy that takes the value of one if a firm had a supplier with CSPP-eligible bonds, and zero otherwise. *Post* is a dummy variable that takes the value of one in the years of 2016 and 2017, and zero otherwise. Regressions include the same control variables as those in Table 2 (coefficients not shown). The sample consists of Bureau Van Dijk's Orbis nonfinancial firms based in the euro area in the 2013-2017 period. All explanatory variables are lagged by one year. Variable definitions are provided in Table A.1 in the Appendix. Robust standard errors adjusted for industry-year-level clustering are reported in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

	Accounts Receivable			Accounts Payable		
	(1)	(2)	(2)	(4)	(5)	(6)
Eligible × Post	0.103*** (0.036)	0.102*** (0.036)	0.089** (0.036)			
Has Eligible Supplier × Post				0.048** (0.021)	0.045** (0.020)	0.032 (0.021)
Controls	No	Yes	Yes	No	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry-year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Country-year fixed effects	No	No	Yes	No	No	Yes
Number of observations	2,248,514	2,248,514	2,248,514	2,248,514	2,248,514	2,248,514
R-squared	0.74	0.74	0.74	0.71	0.71	0.71

Table IA.12**Logarithm of Accounts Receivable and Accounts Payable**

This table presents difference-in-differences estimates of firm-level panel regressions of the logarithm of accounts receivable and the logarithm of accounts payable. *Eligible* is a dummy variable that takes the value of one if a firm had corporate bonds eligible for purchase under the CSPP before the CSPP announcement date, and zero otherwise. *Has Eligible Supplier* is a dummy that takes the value of one if a firm had a supplier with CSPP-eligible bonds, and zero otherwise. *Post* is a dummy variable that takes the value of one in the years of 2016 and 2017, and zero otherwise. Regressions include the same control variables as those in Table 2 (coefficients not shown). The sample consists of Bureau Van Dijk's Orbis nonfinancial firms based in the euro area in the 2013-2017 period. All explanatory variables are lagged by one year. Variable definitions are provided in Table A.1 in the Appendix. Robust standard errors adjusted for firm-level clustering are reported in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

	Log(Accounts Receivable)			Log(Accounts Payable)		
	(1)	(2)	(3)	(4)	(5)	(6)
Eligible × Post	0.239** (0.094)	0.244*** (0.094)	0.222** (0.094)			
Has Eligible Supplier × Post				0.080* (0.043)	0.073* (0.043)	0.060 (0.043)
Controls	No	Yes	Yes	No	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry-year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Country-year fixed effects	No	No	Yes	No	No	Yes
Number of observations	2,055,571	2,055,571	2,055,571	2,011,980	2,011,980	2,011,980
R-squared	0.92	0.92	0.92	0.92	0.92	0.92

Table IA.13**Effect of CSPP on Net Debt Issuance of Eligible Firms**

This table presents difference-in-differences estimates of firm-level panel regressions of the change in total debt ($\Delta Total Debt$). The dependent variable is the change in total debt scaled by lagged assets. *Eligible* is a dummy variable that takes the value of one if a firm had corporate bonds eligible for purchase under the CSPP before the CSPP announcement date, and zero otherwise. *Post* is a dummy variable that takes the value of one in the years of 2016 and 2017, and zero otherwise. Regressions include the same control variables as those in Table 2 (coefficients not shown). The sample consists of Bureau Van Dijk's Orbis nonfinancial firms in the 2013-2017 period. All explanatory variables are lagged by one year. Variable definitions are provided in Table A.1 in the Appendix. Robust standard errors adjusted for firm-level clustering are reported in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

	Core Countries	Periphery Countries
	(1)	(2)
Eligible \times Post	0.022* (0.014)	-0.007 (0.017)
Firm fixed effects	Yes	Yes
Industry-year fixed effects	Yes	Yes
Number of observations	633,211	1,448,022
R-squared	0.25	0.26

Table IA.14**Customer Relationships Maintained and New Relationships: Log Specification**

This table presents difference-in-differences estimates of firm-level panel regressions of customer relationships maintained and new customer relationships obtained. The dependent variable in columns (1)-(3) is the logarithm of one plus the number of customer relationships maintained by a supplier relative to the existing relationships in the previous year. The dependent variable in columns (4)-(6) is the logarithm of one plus the number of new customer relationships initiated by a supplier relative to the existing relationships in the previous year. *Eligible* is a dummy variable that takes the value of one if a firm had corporate bonds eligible for purchase under the CSPP before the CSPP announcement date, and zero otherwise. *Post* is a dummy variable that takes the value of one in the years of 2016 and 2017, and zero otherwise. Regressions include the same control variables as those in Table 2 (coefficients not shown). The sample consists of Factset Revere Supply Chain Relationship nonfinancial firms based in the euro area in the 2013-2017 period. All explanatory variables are lagged by one year. Variable definitions are provided in Table A.1 in the Appendix. Robust standard errors adjusted for firm-level clustering are reported in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

Panel A: Euro Area Countries

	log(1 + Number of Customers Kept)			log(1 + Number of New Customers)		
	(1)	(2)	(3)	(4)	(5)	(6)
Eligible × Post	0.261*** (0.052)	0.181*** (0.058)	0.148** (0.061)	0.235*** (0.067)	0.202*** (0.074)	0.201*** (0.077)
Controls	No	Yes	Yes	No	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry-year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Country-year fixed effects	No	No	Yes	No	No	Yes
Number of observations	9,434	6,045	6,037	9,434	6,045	6,037
R-squared	0.85	0.86	0.86	0.72	0.7	0.71

Panel B: Core Countries

	log(1 + Number of Customers Kept)			log(1 + Number of New Customers)		
	(1)	(2)	(3)	(4)	(5)	(6)
Eligible × Post	0.316*** (0.054)	0.204*** (0.062)	0.193*** (0.064)	0.256*** (0.074)	0.216*** (0.083)	0.252*** (0.084)
Controls	No	Yes	Yes	No	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry-year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Country-year fixed effects	No	No	Yes	No	No	Yes
Number of observations	6,558	3,883	3,883	6,558	3,883	3,883
R-squared	0.86	0.86	0.86	0.74	0.71	0.71

Table IA.14 (continued)

Panel C: Periphery Countries						
	log(1 + Number of Customers Kept)			log(1 + Number of New Customers)		
	(1)	(2)	(3)	(4)	(5)	(6)
Eligible × Post	-0.033 (0.133)	-0.124 (0.151)	-0.046 (0.160)	0.138 (0.153)	0.134 (0.173)	0.025 (0.185)
Controls	No	Yes	Yes	No	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry-year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Country-year fixed effects	No	No	Yes	No	No	Yes
Number of observations	2,876	2,162	2,154	2,876	2,162	2,154
R-squared	0.84	0.84	0.85	0.66	0.66	0.68

Table IA.15**Customer Relationships Maintained and New Relationships: Sample of Competitors as Control Group**

This table presents difference-in-differences estimates of firm-level panel regressions of the number of customer relationships maintained and number of new customer relationships obtained. The dependent variable in columns (1)-(3) is the number of customer relationships maintained by a supplier relative to the existing relationships in the previous year. The dependent variable in columns (4)-(6) is the number of new customer relationships initiated by a supplier relative to the existing relationships in the previous year. *Eligible* is a dummy variable that takes the value of one if a firm had corporate bonds eligible for purchase under the CSPP before the CSPP announcement date, and zero otherwise. *Post* is a dummy variable that takes the value of one in the years of 2016 and 2017, and zero otherwise. Regressions include the same control variables as those in Table 2 (coefficients not shown). The sample consists of Factset Revere Supply Chain Relationship nonfinancial firms based in the euro area in the 2013-2017 period. The control group includes the competitors of eligible firms, domiciled in the euro area, as reported in Factset Revere. All explanatory variables are lagged by one year. Variable definitions are provided in Table A.1 in the Appendix. Robust standard errors adjusted for firm-level clustering are reported in parentheses. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

Panel A: Euro Area Countries

	Number of Customers Kept			Number of New Customers		
	(1)	(2)	(3)	(4)	(5)	(6)
Eligible × Post	7.573*** (2.233)	6.377*** (2.412)	5.297** (2.451)	2.972** (1.412)	2.444* (1.462)	2.278 (1.478)
Controls	No	Yes	Yes	No	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry-year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Country-year fixed effects	No	No	Yes	No	No	Yes
Number of observations	1,761	1,507	1,504	1,761	1,507	1,504
R-squared	0.84	0.85	0.85	0.56	0.56	0.58

Panel B: Core Countries

	Number of Customers Kept			Number of New Customers		
	(1)	(2)	(3)	(4)	(5)	(6)
Eligible × Post	8.983*** (2.754)	7.520** (2.998)	7.146** (3.021)	3.981** (1.729)	3.359* (1.848)	3.417* (1.840)
Controls	No	Yes	Yes	No	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry-year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Country-year fixed effects	No	No	Yes	No	No	Yes
Number of observations	1,282	1,078	1,078	1,282	1,078	1,078
R-squared	0.84	0.84	0.85	0.57	0.57	0.58

Table IA.15 (continued)

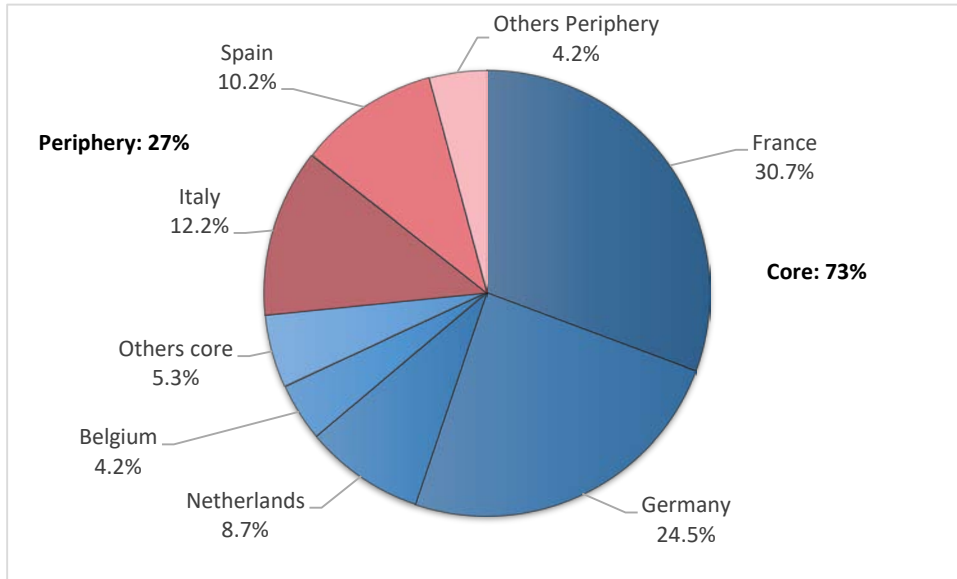
Panel C: Periphery Countries						
	Number of Customers Kept			Number of New Customers		
	(1)	(2)	(3)	(4)	(5)	(6)
Eligible × Post	-0.228 (1.896)	-1.147 (2.015)	-1.839 (2.172)	-1.329 (1.544)	-0.582 (1.470)	-1.303 (1.514)
Controls	No	Yes	Yes	No	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry-year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Country-year fixed effects	No	No	Yes	No	No	Yes
Number of observations	479	426	421	479	426	421
R-squared	0.88	0.9	0.9	0.57	0.57	0.58

Figure IA.1

ECB's Corporate Bond Holdings under the CSPP by Country

Panels A and B show the percentage that each country (i.e., country of risk) represents of the ECB's holdings under the CSPP in terms of the number of eligible bonds and total amount issued in the euro area as of March 2016.

Panel A: Number of Bonds



Panel B: Amount Issued

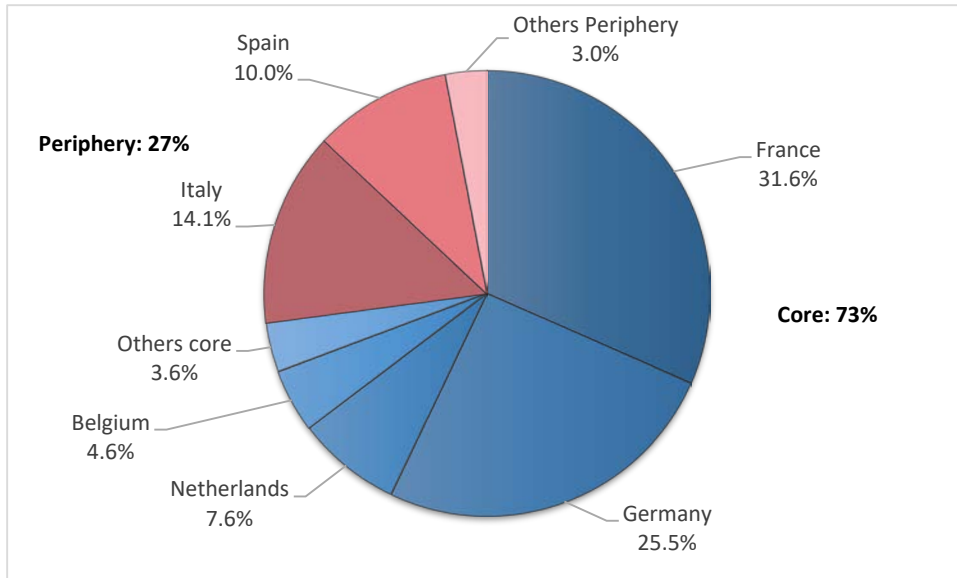


Figure IA.2

Accounts Receivable of Eligible Firms around the CSPP

This figure shows point estimates and 90% confidence interval of the difference in the ratio of accounts receivable to sales between treated firms (eligible firms) and control firms around the CSPP announcement. The results are based on the estimates in column (2) of Table 2. The sample consists of Bureau Van Dijk's Orbis nonfinancial firms based in the eurozone area in the 2013-2017 period.

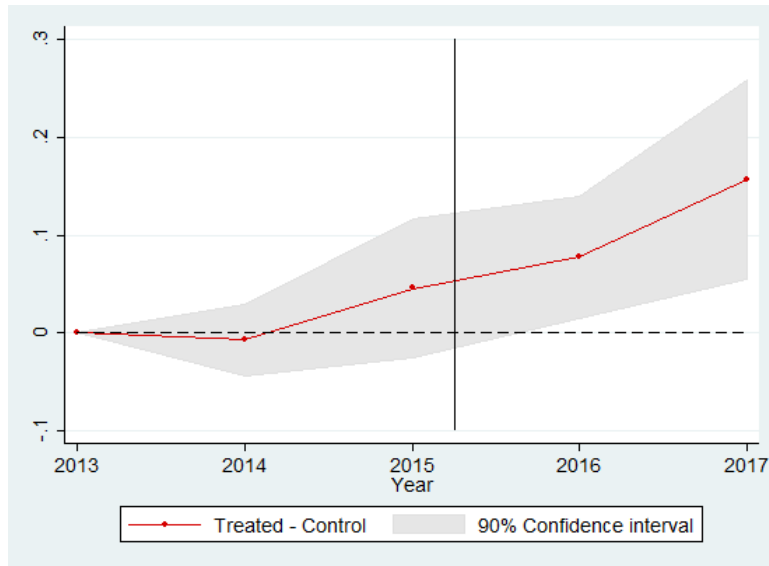
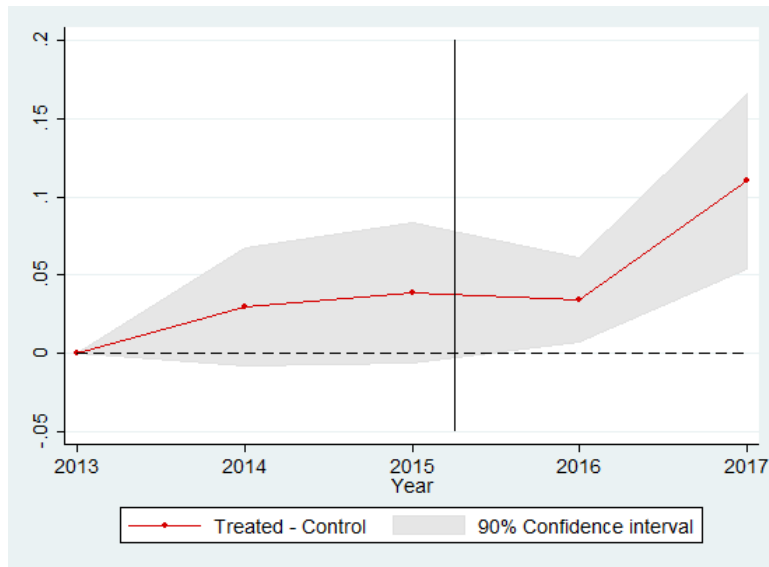


Figure IA.3

Accounts Payable of Eligible Firms' Customers around the CSPP

This figure shows point estimates and 90% confidence interval of the difference in the ratio of accounts payable to sales between treated firms (firms with a supplier with CSPP-eligible bonds) and control firms around the CSPP announcement. The results in Panel A are based on the estimates in column (2) of Panel A of Table 3. The results in Panel B are based on the estimates in column (2) of Panel B of Table 3. The sample consists of Bureau Van Dijk's Orbis nonfinancial firms based in the eurozone area in the 2013-2017 period.

Panel A: Effect of CSPP on Accounts Payable of Customers of Eligible Firms (*Eligible*)



Panel B: Effect of CSPP on Accounts Payable of Customers of Eligible Firms (*Eligible Suppliers Share*)

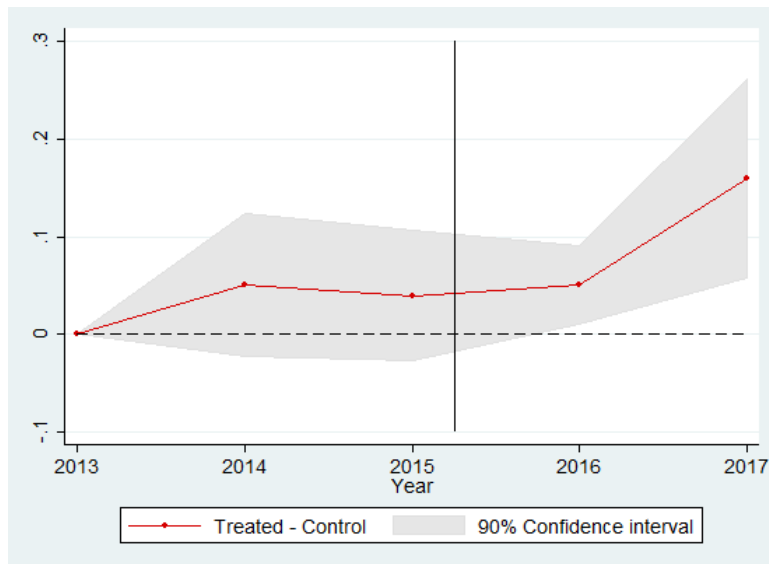


Figure IA.4

Net Bond Issuance of Eligible Firms around the CSPP - Sample of Publicly Listed Firms

This figure shows point estimates and 90% confidence interval of the differences in the change in bond debt (senior bonds and notes, subordinated bonds and notes, and commercial paper) scaled by lagged assets between treated firms (eligible firms) and control firms around the CSPP announcement. The sample consists of Capital IQ/Compustat Global nonfinancial firms based in the euro area in the 2013-2017 period.

