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. We find that firms with bonds eligible for purchase under the European Central Bank's Corporate Sector Purchase Program act as financial intermediaries and extend 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, potentially contributing to upstream industry concentration. Our findings suggest that the trade credit channel of monetary policy redistributes the effects of unconventional monetary policy across regions and firms.

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1. Introduction

Conventional monetary policy largely affects access to external finance through its effects on bank lending and consequently impacts primarily small and young firms that rely on bank loans (Gertler and Hubbard, 1988; Gertler and Gilchrist, 1994; Holmstrom and Tirole, 1997). Large firms with access to public 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, and more recently directly target non-financial corporations through corporate bond purchases. One such program is the European Central Bank (ECB)'s Corporate Sector Purchase Program (CSPP), which involves the purchase of investment grade corporate bonds. These large-scale asset purchases affect bond yields and issuance volumes and benefit primarily large firms that are able to access bond markets (Foley-Fisher, Ramcharan and Yu, 2016). Small firms benefit indirectly from these programs as large firms' demand for bank loans decrease and banks expand credit supply to small firms (Grosse-Rueschkamp, Steffen, and Streitz, 2019).

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 unconventional monetary policy on bank lending. Using the ECB's CSPP announced in March 2016 and implemented starting in June 2016 as a laboratory, we hypothesize that firms with access to bond markets can 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 eligible bonds under the CSPP 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 designed with strict eligibility criteria in place, as only bonds issued by investment grade non-financial firms from the euro area can be purchased by the ECB. The design

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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 also affect eligible firms and their customers. We show that the CSPP resulted in a significant increase in financial debt of eligible firms versus non-eligible firms. This increase is driven by the issuance of bonds in the core of the euro area (including countries such as France and Germany), where more developed capital markets and stronger legal institutions allow firms to issue larger amount of bonds (Becker and Josephson, 2016).

This asymmetric reaction favoring large firms in more financially and economically developed countries is a potentially unintended consequence of the CSPP. However, if targeted (large and unconstrained) firms pass on the additional liquidity to their customers through trade credit, unconventional monetary policy tools can also benefit small and financially constrained firms through production networks. In addition, while firms located in core countries may experience a larger direct benefit from the CSPP, 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 (i.e., firms with eligible bonds under the CSPP) 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 as a proportion of sales) more than non-eligible firms following the CSPP. As we would expect, at the same time, we find that the amount of trade credit received by customers of eligible firms (i.e., accounts payable as a proportion of sales) increases after the CSPP.

Crucially, we detect no evidence of pre-existing trends, suggesting that changes in trade credit are not triggered by customers' demand shocks but rather by the decrease in suppliers' cost of external funding triggered by the CSPP. We also consider that one important feature of our setting is that eligible (treated) firms are, by the nature of the program, larger than most non-eligible (control) firms. In order to account for the possibility of differential trends by size over time, we

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repeat our tests using matched samples of suppliers and customers. We also sort firms into size bins (splitting firms into deciles) and include size bin dummies interacted with year dummies in the regressions. We find similar estimates in this more stringent specification, which indicates that asymmetric shocks affecting firms of different size are unlikely to drive our findings.

We also examine whether the effects of the trade credit channel of monetary policy are heterogeneous across regions, industries, and firms. We show that the CSPP reduces financial constraints *indirectly* for firms in the production network of firms targeted by the CSPP. Eligible firms extend trade credit to customers that are more financially constrained. In particular, 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 from eligible suppliers.

A program like the CSPP has the potential to produce redistributive effects across regions. While by program design the ECB aimed to purchase investment grade bonds of firms in any euro area country, firms in core countries with more developed bond markets were able to issue many more bonds at lower yields after the announcement of the program. Arguably as a consequence of the asymmetric improvement in financial conditions, we only detect an increase in accounts receivable for suppliers located in core countries and no significant effects for suppliers in the periphery.

However, we find the exact 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. We conclude that 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.

Finally, we show that the trade credit channel of monetary policy produces real effects. As a

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result of the increase in trade financing, the customers of eligible suppliers increase employment and investment and provide more trade credit to their own customers. While trade credit in production networks is an important channel of transmission for (unconventional) monetary policy to the real economy, there are also important effects on product market competition. Eligible suppliers that are able to extend more trade credit acquire new customers and thus enhance their competitive position in product markets, which may have long-lasting effects on real economic activity.

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 that 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 that systematically benefit firms with better access to capital markets in core areas may promote concentration in upstream industries with long-run consequences on industrial structure. Hence, measures that directly target small firms are an important complement to the central bank's asset purchases.

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 Streitz, 2019; Chakraborty, Goldstein, and Mackinlay, 2020; Di Maggio, Kermani, and Palmer, 2020). To the best of our knowledge, we are the first to highlight a trade credit channel of unconventional monetary, which bypasses the banking sector.

Previous research provides mixed evidence on whether trade credit attenuates the transmission of conventional monetary policy to the real economy. While Gertler and Gilchrist (1993) find no

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substitution between bank loans and trade credit following monetary and credit contractions, Nilsen (2002) provides evidence that both small and large firms increase trade credit during monetary contractions. Other studies explore whether trade credit may provide an alternative source of liquidity that can mitigate the effects of bank liquidity shocks. Love, Preve, and Sarria-Allende (2007) find that the amount of trade credit provided 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 financial crisis. Restrepo, Cardona-Sosa, and Strahan (2019) show that trade credit may provide an alternative source of liquidity that can mitigate the effects of bank liquidity shocks. By exploiting exogenous variation in suppliers' ability to access external finance, we show that production networks enhance the transmission of quantitative easing interventions. Thus, we contribute to the understanding of the transmission of unconventional monetary policy to the real economy. We also contribute to a nascent strand of the literature exploring regional heterogeneity in the transmission of monetary policy (Beraja, Fuster, Hurst, Vavra, 2018) by studying how the effects of direct asset purchases are transmitted across regions through production networks.

Our paper also adds to the growing literature on the importance of customer-supplier 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 transmitted to customers and are potentially amplified (Boissay and Gropp, 2013; Jacobson and von Schedvin, 2015; Barrot and Savagnat, 2016). A few recent papers consider the role of bank liquidity shocks (Alfaro, Garcia-Santana, and Moral-Benito, 2017; Costello, 2020; Huremovic, Jimenez, Moral-Benito, Peydro, and Vega-Redondo, 2020) 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 through higher-order demand effects are an important transmission mechanism of macroeconomic shocks. To the best of our knowledge, we are the first to consider how monetary policy is transmitted through trade credit in production networks. Further, we examine the

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transmission of quantitative easing policies to the real economy through trade credit, which has been largely unexplored in the literature.

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, Global financials for industrial companies database.[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 (eurozone 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 ratio of accounts receivable to sales, the ratio of accounts payable to sales (*Accounts Payable*), total assets (*Assets*), the ratio of cash and cash equivalent 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*). Table A.1 of the Appendix provides variable definitions. The final sample consists of 510,298 unique firms for a total of 2,248,514 firm-year observations. Panel A of Table IA.1 lists the number of observations by country. Table 1 reports summary statistics for the variables used in our analysis.

2.2 CSPP and Eligible firms

The ECB started a series of direct asset purchases programs to ease monetary conditions in the

[1] To avoid double counting of financial reports and since the overwhelming majority of companies in Orbis report unconsolidated accounts, we only include data from unconsolidated financial statements in our sample.
[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.

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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. 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.

Panel A of Figure 1 shows that the percentage that each country represents of the gross domestic product (GDP) in the euro area as of 2015 and the percentage each country represents of the total number of eligible firms in the euro area. We find that 70% of the universe of eligible bonds under the CSPP are issued by firms in eurozone area core countries. Countries in the core represent about 66% of the GDP of the euro area.

The consequences of the policies in terms of the firms' ability to issue investment grade bonds, that is, the securities that benefitted most from the program in terms of lower yields appear to be more asymmetric. Panel B shows that the issuance of investment grade bonds (as a percentage of GDP) after the CSPP is much higher in core countries, which have more developed bond markets and stronger creditor protection enhancing firms' ability to issue investment grade bonds. For example, from 2015 to 2016, in core countries, the new issuance of investment grade bonds (eligible bonds) increased by 2.74 percentage points (from 1.91% to 4.66% of GDP). In contrast, in periphery countries, the new issuance of investment grade bonds only increased by 0.58 percentage points (from 0.58% to 1.16% of GDP).

While differences in bond issuance could also be explained by differences in firm-specific credit demand, Panel C indicates that new issuance of non-investment grade bonds (that were not targeted by the CSPP) was almost unchanged from 2015 to 2016 both in core and periphery countries, and if anything increased more in the periphery. This suggests that differences in the demand for credit are unlikely to play a role.

To identify whether differences in access to capital markets and trade credit provision arise from credit demand shocks, our empirical methodology relies on CSPP-eligible firms. We start from the list of marketable bonds accepted as collateral for Eurosystem credit operations that was

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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.[3]

To assign each bond to a unique firm, we first collect the issuer name of each bond in the list of bonds accepted as collateral by the ECB. Since several bonds are issued by financial subsidiaries and most are guaranteed by the core 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), we also collect 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. Next, we apply a fuzzy-string matching technique to identify in Orbis the firm that has issued CSPP-eligible bonds. We are able to match 304 unique eligible firms to Orbis. We next exclude financial firms (SIC codes 6000-6999) from the sample. As a result, our final sample includes 151 unique non-financial eligible firms, domiciled in the euro area, for which we have data on the variables of interest. Panel B of Table IA.1 of the Internet Appendix reports the number of eligible firms by country.

2.3 Customers of Eligible Firms

We match each eligible firm (supplier) to all disclosed customers reported in the Factset Revere Supply Chain Relationship database. Using Factset Revere, we can track the effects on suppliers and on their customers.

Factset 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., disclosed customer, disclosed supplier, and competitor). If we consider customer and supplier relationship type only, Factset Revere include over 25,000 global

[3] Data available at https://www.ecb.europa.eu/paym/coll/assets/html/list-MID.en.html.

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companies, which are the source of the supply chain relationship data and over 105,000 global target companies, which are disclosed by source companies.

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.[4]

To better understand our data, consider "Deutsche Telekom AG" as an example. Using direct relationships, the company discloses a list of 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 disclosures, "Deutsche Telekom AG" has a total of 35 unique customers identified using Factset Revere.

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 firm. We begin by filtering the Revere data only selecting suppliers that are CSPP-eligible firms. The initial sample consists of 802 supplier-customers pairs with 106 unique eligible firms and 463 unique customers domiciled in the euro area. On average, eligible firms report 7.6 customers domiciled in the euro area by the end of 2015.[5]

Our final sample includes 318 unique non-financial customers of eligible firms, domiciled in the euro area, after matching with Orbis to obtain firm fundamentals. Panel B of Table IA.1 of the Internet Appendix reports the number of customers of eligible firms by country. Table IA.2 of the

[4] We consider all business relationships that started on or before 2015 (the year before the introduction of the CSPP) and were still active on or after 2014 (we use a one year lag to include recent relationships).
[5] We can only find financial statements for 406 firms out of the 463 unique customers with header information in Orbis.

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Internet Appendix reports the interconnections between eligible suppliers and their customers.

2.4 Empirical Methodology

We perform difference-in-differences estimations by comparing changes in the outcome variables between treatment and control groups around the CSPP announcement. Specifically, we estimate the regression:

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

Our 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*). We also estimate additional regressions with outcome variables for investment in short-term assets (Δ*Accounts Receivable,* Δ*Inventories*), investment in long-term assets (*Assets Growth*, *CAPEX*), employment (*Labor Growth*), increase in turnover (*Sales Growth*), profitability (*EBITDA*), and financing decisions (Δ*Accounts Payable*, Δ*Financial Debt*, Δ*Long-term Debt*, Δ*Short-term Loans*, Δ*Cash*).

The treatment 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, 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*, a variable that measures 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. In our baseline estimates, we use full sample but we also assess the robustness of our estimates using a matched sample approach.

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A positive and significant estimate of the coefficient β_1 indicates that eligible firms are able to extend more trade credit and customers of eligible firms receive more trade credit due to the CSPP as long as the demand for trade credit and other shocks evolve similarly for treated and control firms. To ascertain whether this case, as is customary in applications of difference-in-differences methodologies, we evaluate the dynamic effects of the CSPP announcement (the treatment) and whether there are any pre-existing differential trends in the use of trade credit and performance for eligible firms and their customers, which may indicate differences in demand. The absence of pre-existing trends would suggest that the CSPP increases the eligible suppliers' ability to extent trade credit to their customers. In Subsection 3.4, we present a number of additional tests that mitigate any remaining concerns that asymmetric shocks to demand drive our findings.

3. Effects of Unconventional Monetary Policy

In this section, we first examine whether CSPP-eligible firms increase debt financing following the announcement and implementation of the CSPP. We then establish whether the shock to eligible firms, following the purchases of eligible bonds by the ECB, is transmitted through production networks. We then check the robustness of our results using different empirical approaches.

3.1 Debt Financing

Existing 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; Todorov, 2020).

We begin by testing whether CSPP-eligible firms experience an increase in financial debt (the dependent variable is the change of financial debt scaled by lagged assets, Δ*Financial Debt*) following the CSPP. The variable of interest is the interaction of the treatment dummy variable *Eligible* (that takes a value of one if a firm has bonds eligible for purchase by the ECB immediately

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before the announcement of the CSPP, and zero otherwise) with the *Post* dummy variable. The interaction term *Eligible* × *Post* measures the differential effect between eligible firms and non-eligible firms around the CSPP. Panel A of Table 2 shows the estimates for the sample all countries in the eurozone in column (1), core countries in column (2), and periphery countries in column (3). We find that the *Eligible* × *Post* coefficient is positive in columns (1) and (2) but only statistically significant in column (2). We conclude that eligible firms experience an increase in financial debt relative to non-eligible firms after the announcement of the CSPP, which is concentrated in core countries.

Panel B of Table 2 uses a sample of publicly listed firms with bond debt outstanding before the CSPP, drawn from Capital IQ/Compustat Global. For this sample, we can breakdown the change in total debt scaled by lagged assets (Δ*Total Debt*) into the change in bond debt (Δ*Bond Debt*) and change in bank debt (Δ*Bank Debt*). Column (1) shows a positive but statistically insignificant differential effect on total debt. Column (2) shows that eligible firms experience a statistically significant increase in net bond debt issuance relative to non-eligible firms, after the announcement of the CSPP. In contrast, we find a negative but insignificant effect on bank debt. Columns (4)-(6) present the estimates for the sample of core countries and columns (7)-(9) present the estimates of the sample of periphery countries. We find that bond issuance is concentrated in the core countries. We do not observe analogous effects in periphery countries.[6]

3.2 Accounts Receivable

The CSPP should have decreased the cost of capital of eligible firms by decreasing bond yields and fostering 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 experience an increase

[6] We also investigate the impact of the CSPP on eligible firm outcomes such as investment, turnover and profitability. Table IA.3 of the Internet Appendix reports the results. We find that eligible firms experience a statistically significant increase in the change in accounts receivable scaled by lagged assets. Consistent with Grosse-Rueschkamp, Steffen, and Streitz (2019), we also find that eligible firms experience a statistically significant increase in assets growth but other estimates are statistically insignificant.

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in the ratio of accounts receivable to sales (*Accounts Receivable*) following the CSPP. Table 3 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 relative those in the control group increase days receivable 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 announcement of the CSPP (based on estimates in which *Treated* is interacted with indicators for each event year). We find that treatment and control groups follow parallel trends in the pre-treatment period and that the increase in accounts receivable occurs after the CSPP. Hence, it appears unlikely that differences in demand drive eligible suppliers increase in trade credit following the start of the CSPP, which supports a causal interpretation of the results. Panel A of Figure IA.1 of the Internet Appendix plots the evolution of the estimated differences.

As further evidence that investment grade firms do not experience stronger demand for their output and consequently trade credit concomitantly to the start of the CSPP, we also perform a placebo test. 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 for most financial items. Columns (1) and (2) of Table IA.4 and Panel B of Figure IA.1 of 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.

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Columns (3)-(6) of Table IA.4 show the results of an alternative placebo test using a sample of investment grade firms domiciled in countries from the European Union that are not members of the euro area. We find a statistically significant increase of 1 percentage point in accounts receivable of non-euro European Union investment grade firms relative to control firms after the CSPP. The magnitude of the effect is much lower for non-euro European Union investment grade firms (1 percentage point) than that for eligible firms that are domiciled in euro area countries (10 percentage points). The significance of the effects does not raise concerns on the interpretation of the results because the placebo using investment grade firms from non-euro European Union countries is not as clean as the placebo using U.S. investment grade firms. Other central banks in the European Union, wishing to stabilizing exchange rates in a highly integrated area, initiated similar policies. For example, the Bank of England announced a program to buy corporate bonds in August 2016. In addition, the CSPP also included a fraction of eligible bonds issued by legal entities established in the eurozone that were financing vehicles of firms resident in non-euro countries (representing about 7% of the total number of CSPP-eligible bonds).

We also explore to what extent the effects of the CSPP may spillover beyond eligible firms. Non-eligible bonds may also be affected by central banks asset purchases as investors may rebalance their portfolios towards these bonds thus decreasing their yields. If the CSPP produces spill overs to non-eligible bonds then our estimates are lower bound as bond yields and issuance volumes of non-eligible bonds may also increase. To check for this possibility, we estimate the accounts receivable regressions in Table 3 including the interaction of a dummy variable for firms whose bonds are not eligible under the CSPP (*Non-Eligible Bonds*) with the *Post* dummy variable. Table IA.5 in the Internet Appendix shows that the interaction term *Non-Eligible Bonds* × *Post* coefficient is statistically insignificant and the interaction term *Eligible* × *Post* coefficient is similar to that in Table 3. We conclude that firms with non-eligible bond in the control group do not seem to extend more trade credit to their customers after the CSPP and attenuate our estimates of the trade credit channel of monetary policy.

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3.3 Accounts Payable

We have shown that eligible firms increase trade financing to customers relative to non-eligible firms following the CSPP announcement. We also 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 4 shows the results. In Panel A, the explanatory variable of interest is the interaction of the treatment dummy variable *Has Eligible Supplier* (that takes a value of one if a firm is a customer of a firm with CSPP-eligible bonds, and zero otherwise) with the *Post* dummy variable. The interaction term *Has Eligible Supplier* × *Post* measures the differential effect on accounts payable between firms with eligible suppliers and otherwise similar firms (without eligible suppliers) following the announcement of the CSPP.

In column (1), we find that customers of eligible suppliers (treatment group) experience an increase in the ratio of accounts payable to sales by about 5 percentage points relative to customers without a business relationship with eligible firms (control group) following the CSPP announcement. The effect is statistically and economically significant as, on average, eligible firms relative to non-eligible firms benefit from an extension in payment terms of about 17 days (17 = 0.048 × 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 both the treatment and control groups follow parallel trends in the pre-treatment period and that the increase in accounts payable occurs after the CSPP. In addition, Panel A of Figure IA.2 of the Internet Appendix shows no evidence of preexisting differential trends in accounts payable between treatment and control groups. This confirms that the increase in trade credit usage by customers of eligible firms is unlikely to be driven by customers' demand shocks concomitant to the CSPP.

We also examine whether customers with a larger share of eligible suppliers benefit most from

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the increase in trade credit by eligible firms. Panel B of Table 4 shows the results. The explanatory variable of interest is the interaction of the treatment variable *Eligible Suppliers Share* (i.e., the firm's share of eligible suppliers relative to the firm's total number of suppliers) with the *Post* dummy variable. The interaction term *Eligible Suppliers Share* × *Post* measures the differential effect on accounts payable, following the announcement of the CSPP.

In column (1), we find that the *Eligible Suppliers Share* × *Post* coefficient is positive and statistically significant. The effect is also economically 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 × 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 shocks. Panel B of Figure IA.2 in the Internet Appendix plots the evolution of the estimated differences.

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.6 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 than those for euro area customers in Table 4.

3.4 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 that the differential effects we estimate capture asymmetric demand shocks rather than an increase in the supply of trade credit by firms that directly benefits from the CSPP (eligible suppliers). To further establish the validity of our baseline results, we employ four additional empirical approaches: (1) a difference-in-differences estimation using a matched sample; (2) regressions with size-bins-by-year fixed

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effects; (3) regressions excluding firms with less than €10 million in assets from the sample; (4) regressions with country-industry-year fixed effects; regressions with industry-year fixed effects using two-digit SIC codes; and (5) regressions using the logarithm of the levels of the dependent variables.

First, we perform the difference-in-differences estimation around the CSPP announcement (March 2016) 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(*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 countries) 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. In general, 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.

Panel B of Table 5 presents the results of difference-in-differences estimators using the matched sample and firm and industry-year fixed effects specifications. The estimates are qualitatively and quantitatively similar to our baseline specifications. Column (1) shows a statistically significant 10 percentage-points increase in accounts receivable of eligible firms (treated group) after the announcement of the CSPP relative to non-eligible firms (control group). In column (3), we find a positive and statistically significant increase in the accounts payable of eligible firms' customers. The effect is also economically significant as the accounts payable of eligible firms' customers increase by 8 percentage points after the announcement of the CSPP relative to firms without eligible suppliers. Column (5) shows that the *Eligible Suppliers Share* × *Post* coefficient is positive and statistically significant coefficient at 0.08, which indicates a positive association between the share of eligible suppliers and the increase in accounts payable of customers of eligible firms.

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These findings that rely on a control group of firms that are similar to eligible firms and their customers further mitigate concerns that our estimates are driven by asymmetric demand shocks affecting eligible firms and their customers at the time of the CSPP.

Second, we estimate specifications with firm size-decile-by-year fixed effects to account for the possibility that the CSPP might have affected differently large and small companies. We sort firms into size deciles each year where size is defined as total assets in each year. This adjustment controls for firm size heterogeneity in a given year between treatment and control groups.

Table 6 shows the results. In columns (1)-(2), the accounts receivable of eligible firms experience a statistically significant increase of about 10 percentage points relative to non-eligible firms in the post-CSPP period. In columns (3)-(4), the accounts payable of eligible firms' customers experience a statistically significant increase of about 3 percentage points relative to firms without a material link to the downstream network of eligible firms in the post-CSPP period. Overall, these findings address concerns that asymmetric shocks to firms of different sizes drive our findings.

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 eligible firms' customers increase by about 4 percentage points relative to those of non-eligible' firms customers in the post-CSPP period. The estimates are similar to those reported in Tables 3 and 4 and confirm that our baseline results are not significantly affected by 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

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sample.

Fourth, we estimate specifications with country-industry-year fixed effects to account for the possibility that our baseline results are driven by time-variant demand shocks across different industry-country 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 non-eligible firms in the post-CSPP period, and the accounts payable of eligible firms' customers experience a statistically significant increase of about 3 percentage points. These findings help to further address concerns that asymmetric shocks to firms of different country-industry pairs drive our findings.

Fifth, we estimate we specifications with industry-year fixed effects using two-digit SIC codes other than the Fama-French 10-industry classification. While the two-digit SIC codes can 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 when we use two-digit SIC codes to define industries.

Finally, we estimate our baseline specifications using either the logarithm of accounts receivable or the logarithm of accounts payable as dependent variables. Table IA.11 of the Internet Appendix shows that our estimates are qualitatively unaffected when we use this approach.

4. Heterogenous 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 the differential regional effects of the trade credit channel of monetary policy within the euro area.

4.1 Customer Financial Constraints

To better understand the distributional consequences of the trade credit channel of monetary policy, we explore which customers more. If the positive shock of monetary policy on the ability

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of eligible suppliers to tap bond markets is indeed redistributed to firms without direct access to the bond market, we expect the effect to be stronger for customers that are more likely to be financially constrained. We consider several proxies for firm-specific financial constraints and partition the sample according to the median of these proxies. Table 7 presents the estimates of our baseline regression model for the subsamples of constrained and unconstrained firms.

Columns (1) and (2) in Panel A show the estimates separately for the group of investment grade firms (i.e., firm with an investment grade long-term issuer credit rating of at least BBB-, by S&P before the CSPP announcement) 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., firm with a long-term issuer credit rating by S&P before the CSPP announcement) 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 following the CSPP announcement. [7]

Columns (5) and (6) show that only customers of eligible firms with a high liabilities to assets ratio 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 following the CSPP.

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, relative to control firms in the post-CSPP period. However, the magnitude of the coefficient on the *Has Eligible Supplier* × *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

[7] This test also indicates that the results are not driven by the 82 customers of eligible firms whose bonds are eligible for purchase.

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eligible firms that have less tangible assets to pledge as collateral, and are therefore more likely to be financially constrained, benefit more from the increase in trade credit offered by eligible firms following the CSPP.

Small firms are typically more financially constrained than large firms. We do not find a statistically significant increase in accounts payable of firms with eligible suppliers when we partition the sample by firm size as proxied by sales. However, Panel B, columns (1) and (2) show that the magnitude of the coefficient on the *Has Eligible Supplier* × *Post* variable in the group of small firms is much higher than that in the sample of large firms, which suggests that eligible firms increase trade credit more to smaller customers than to larger customers after the CSPP.

Columns (3)-(6), Panel B, show that only customers of eligible firms with high rates of sales growth and assets 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.

Finally, columns (7) and (8) show a positive and statistically significant increase in accounts payable for customers of eligible firms with both a high and a low profitability (*EBITDA*) relative to control firms. However, the magnitude of the coefficient on the *Has Eligible Supplier* × *Post* variable in the sample of low *EBITDA* firms is almost five times higher than that in the sample of high *EBITDA* firms. Thus, customers of eligible firms with a lower ability to generate internal cash flows to finance operations benefit more from the increase in trade credit by eligible firms.

Overall, our results suggest that the trade credit channel of monetary policy is more important for financially constrained firms, low tangibility firms, firms with greater growth opportunities and external finance needs, and firms with lower ability to generate cash flows. These findings indicate that trade credit helps to redistribute the benefits of unconventional monetary policy interventions to firms without direct access to bond markets.

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4.2 Publicly Listed versus Private Firms

Privately held firms are often considered to be more financially constrained than public firms because they have no access to public markets. We thus investigate how access to public markets determines the decision of both eligible suppliers to extend more trade credit and of eligible firms' customers to rely more on trade credit. We do so by partitioning the sample in firms with shares publicly listed in the stock market and firms that are privately held.

Panel A of Table IA.12 of the Internet Appendix presents the results for the sample of public firms (i.e., firm is publicly listed in the year before the CSPP announcement date according to Orbis). Columns (1)-(3) show that publicly listed eligible firms experience a statistically significant increase in the ratio of accounts receivable to sales relative to publicly listed non-eligible firms after the announcement of the CSPP. In contrast, columns (4)-(6) show 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 more on trade finance.

Panel B of Table IA.12 presents the results for the sample of private firms. In columns (1)-(3), we still find that private eligible firms significantly increase the ratio of accounts receivable to sales relative to private non-eligible firms after the announcement of the CSPP. However, the magnitude of the effect is less pronounced for eligible firms that are privately held than to eligible firms that are publicly listed suggesting that even eligible private firms face constraints in issuing bonds. Columns (4)-(6) show that customers of eligible firms that are private experience a statistically significant increase in the ratio of accounts payable to sales relative to controls firms.

Overall, the results suggest that firms without the ability to tap the stock market obtain more trade credit from eligible suppliers. In addition, publicly listed eligible firms are better able to benefit from the CSPP and thus in a favorable position to extend more trade credit to customers. We conclude that trade credit plays an important role in transmission mechanism of monetary policy as financially unconstrained suppliers provide trade credit to their financially constrained customers.

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4.3 Regional Effects

In this section, we examine whether the CSPP produces heterogenous effects across regions. Specifically, we study how the CSPP impacts firms domiciled in countries of either the core 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. Firms in these countries are therefore more likely to face financial constraints as the sovereign debt crisis had severe repercussions on the banking system and led to a credit crunch. 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 those located in core countries.

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. This is an important perspective of analysis because eligible firms from core countries appear to benefit more than those from periphery countries in terms of their ability to tap the primary bond market following the CSPP announcement (as shown in Figure 1).

Panel A of Table 8 shows the estimates of our baseline regression model separately for the group of firms in core countries (Austria, Belgium, Finland, France, Germany, Luxembourg, and Netherlands) and periphery countries of the euro area. We find that only eligible firms from the core eurozone countries significantly increase accounts receivable relative to non-eligible firms following the CSPP. This finding suggests that only suppliers in core countries that were able to issue bonds at lower yields following the CSPP extend more trade credit. We do not observe any pre-existing trends in accounts receivable of eligible firms, which mitigates concerns that these firms face different demand for trade credit.

We also explore the effects of the CSPP on eligible firms' customers separately for the group of firms in core and periphery countries. Eligible firms' customers from the periphery benefit from a statistically significant increase in accounts payable relative to control firms in the post-CSPP period. 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

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the cost of extending trade credit for eligible suppliers.

Panel B of Table 8 provides a more direct test for the regional propagation of monetary policy through the trade credit channel by decomposing the treatment dummy variable into the *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 the *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), customers of eligible suppliers located in core countries seem to 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 for which changes in accounts payable are not statistically distinguishable from those of control firms. 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 that of the *Has Periphery Eligible Supplier* dummy variable.

Overall, our results suggest suppliers from the less financially constrained countries extended more trade credit during the CSPP period to firms located in periphery countries that are part of their production network.

5. Real Effects

In this section, we investigate whether the trade credit channel of monetary policy has real effects on operating activities, investment policy and financial policy of customers of CSPP-eligible firms, and affects the competitive position of eligible suppliers.

5.1 Effects on Customers

Our results show that firms in the downstream network receive more trade finance from 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

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channel of monetary policy impacts financial policies.

Panel A of Table 9 shows that the customers of eligible firms experience a statistically significant increase in investment following the CSPP arguably thanks to the increased ability to rely on trade credit. Column (1) shows that firms in the treatment group experience an increase of 2.5 percentage points in *Assets Growth* relative to the control group after the CSPP announcement. Next, we decompose this increase in assets 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 a 1.1 percentage points increase in Δ*Accounts Receivable* (column (4)) relative to control firms in the post-CSPP period. Column (5) shows a 3.4 percentage points increase in the growth rate of employment (*Labor Growth*) for treated firms relative to control firms following the CSPP.

We also test whether customers of eligible firms experience changes in their level of operating activities. Column (6) shows that customers of eligible firms experience a 2.4 percentage points increase in *Sales Growth*, even though this coefficient is imprecisely estimated. In column (7), we are unable to detect any short-term effects on the profitability of eligible firms' customers (*EBITDA*).

In sum, the customers of eligible firms are able to increase investment in fixed assets, human capital, and inventories, and to provide 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.

Finally, we investigate how customers of eligible firms finance their assets growth. Panel B of Table 9 shows the effect on the liabilities scaled by lagged total assets. Column (1) shows that firms with eligible suppliers experience a statistically significant increase of 0.9 percentage points in Δ*Accounts Payable* relative to control firms in the post-CSPP period, confirming our findings on the ratio of account payables to sales. This increase in accounts payable represents more than one third of the capital needs to fund the assets growth of treated firms relative to control firms.

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We find that customers of eligible firms experience statistically insignificant increases in other sources of external finance (Δ*Financial Debt*), including long-term debt and short-term debt, and internal financing (Δ*Cash*). This confirms that the real effects we uncover are to be ascribed to suppliers' trade finance and are not driven by an increase in access to bank credit.

5.2 Effects on Suppliers

This section sheds some light on the benefits to suppliers to extend more trade credit. While we find no effects on suppliers' profitability, we test the hypothesis that 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 located in the eurozone is able to maintain and the number of new relationships that is able to initiate.

Panel A of Table 10 reports the results. All specifications include firm fixed effects so that we can test how the number of customers changes for eligible firms following the CSPP. In column (1), we find that eligible firms (treatment group) are able to maintain a larger number of customer relationships relative to non-eligible firms (control group) after the announcement of 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 after the announcement of the CSPP. The effect is economically significant as the sample average of new customer relationships is 2.3. The results remain robust when we add firm-specific controls (column (5)) and country-year fixed effects (column (6)) to the specification in columns (4).

We also analyze whether eligible firms from core countries experienced differential effects in product market outcomes relative to eligible firms from periphery countries, which did not increase

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the provision of trade credit after the start of the CSPP. Panel B of Table 10 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 relative to non-eligible firms after the CSPP. Panel C of Table 10 shows that eligible firms from periphery countries did not experience a similar increase. Importantly, Table IA.13 in the Internet Appendix shows that the results are robust when we consider the eurozone competitors (as identified by Factset Revere) of eligible firms as a control group.

Table IA.14 in the Internet Appendix provides some evidence on the suppliers' incentives to expand their customer base. It shows that the trade credit channel is largely driven by eligible suppliers in industries with lower competition and higher concentration. While we do not find any significant effects of the CSPP on the profitability of the suppliers, this evidence suggests that suppliers have incentives to fund customers in order to ensure business relationships and high profit-margin sales to firms in better times.

Overall these findings provide further support for the importance of the trade credit channel of monetary policy, but also suggest that unconventional monetary policies interventions that facilitate access to credit for large firms with easier access to capital markets may affect firms' competitive positions and contribute to concentration in upstream markets.

6. Conclusion

In today's environment with nominal interest rates near zero in most developed economies, monetary authorities have resorted on unconventional monetary policies interventions to achieve their inflation targets. Direct asset purchases lowering the cost of public debt favor large firms that have access to public debt markets. 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 geographical differences in credit protection and access to bond markets.

We show that trade credit in production networks can mitigate the asymmetric effects of direct asset purchases programs. Firms that benefit the most from an easier access to public debt markets

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(i.e., higher issuance volumes and lower offer yields) 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 for the CSPP increase employment and investment and provide more trade credit to their own customers. Eligible suppliers that are able to extend more trade credit acquire new customers and thus enhance their competitive position in product markets.

Our paper has important implications to the understanding of the transmission mechanisms of unconventional monetary policy interventions, a topic of tantamount importance given that direct asset purchases of corporate bonds have been considerably expanded worldwide in light of the looming recession due to the Covid-19 pandemic.

We show that trade credit plays an important role in the transmission mechanism of monetary policy and that trade credit in production networks matter above and beyond demand effects. While economic and financial integration through supplier-customer networks can facilitate the transmission of monetary policy interventions to economically depressed regions and to firms with limited access to financial markets, we also highlight that firms benefiting from direct asset purchases are able to expand their customer base due to their ability to provide more trade finance. This suggests that unconventional monetary policy may increase concentration in upstream industries with potentially long-lasting consequences on the spatial distribution of economic activity.

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Appendix

Table A.1
Variable Definitions

Variable	Definition
Accounts Receivable	Accounts receivable (Orbis item *DEBTORS*) divided by operating revenue (Orbis item *OPRE*).
Accounts Payable	Accounts payable (Orbis item *CREDITORS*) divided by operating revenue (Orbis item *OPRE*).
Assets	Total assets (Orbis item *TOAS*).
Sales	Operating revenue (Orbis item *OPRE*).
Cash	Cash and cash equivalent (Orbis item *CASH*) divided by total assets (Orbis item *TOAS*).
PPE	Tangible fixed assets (Orbis item *TFAS*) divided by total assets (Orbis item *TOAS*).
Net Margin	Net income (Orbis item *PL*) divided by operating revenue (Orbis item *OPRE*).
Liabilities	Current liabilities (Orbis item *CULI*) plus non-current liabilities (Orbis item *NCLI*) divided by total assets (Orbis item *TOAS*).
Financial Debt	Long term debt (Orbis item *LTDB*) plus loans (Orbis item *LOAN*) divided by total assets (Orbis item *TOAS*).
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	The firm's share of eligible suppliers relative to the firm's 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 eurozone 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 eurozone countries, and zero otherwise.
Assets Growth	Change in total assets (Orbis item *TOAS*) divided by previous year total assets.
CAPEX	Change in tangible fixed assets (Orbis item *TFAS*) plus depreciation and amortization (Orbis item *DEPR*) divided by the previous year total assets (Orbis item *TOAS*).
Labor Growth	Change in number of employees (Orbis item *EMPL*) divided by the previous year number of employees.
ΔInventories	Change in inventories (Orbis item *STOK*) divided by the previous year total assets (Orbis item *TOAS*).
ΔAccounts Receivable	Change in accounts receivable (Orbis item *DEBTORS*) divided by the previous year total assets (Orbis item *TOAS*).
Sales Growth	Change in operating revenue (Orbis item *OPRE*) divided by the previous year operating revenue.
EBITDA	EBITDA (Orbis item *EBTA*) divided by the previous year total assets (Orbis item *TOAS*).
ΔAccounts Payable	Change in accounts payable (Orbis item *CREDITORS*) divided by the previous year total assets (Orbis item *TOAS*).
ΔFinancial Debt	Change in financial debt (Orbis item *LTDB* plus Orbis item *LOAN*) divided by the previous year total assets (Orbis item *TOAS*).
ΔLong-term Debt	Change in long-term debt (Orbis item *LTDB*) divided by the previous year total assets (Orbis item *TOAS*).
ΔShort-term Loans	Change in current loans (Orbis item *LOAN*) divided by the previous year total assets (Orbis item *TOAS*).
ΔCash	Change in cash (Orbis item *CASH*) divided by the previous year total assets (Orbis item *TOAS*).
ΔTotal Debt	Change in total debt (Capital IQ items *senior bonds and notes*, *subordinated bonds and notes, commercial paper*, *revolving credit*, *term loans*, *capital leases*, and *other borrowings*) divided by the previous year total assets (Compustat Global item *AT*).
ΔBond Debt	Change in bond debt (Capital IQ items *senior bonds and notes*, *subordinated bonds and notes*, and *commercial paper*) divided by the previous year total assets (Compustat Global item *AT*).
ΔBank Debt	Change in bank debt (Capital IQ items *revolving credit* and *term loans*) divided by the previous year total assets (Compustat Global item *AT*).

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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 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
Financial Debt	0.1938	0.1170	0.2218	0.0000	1.0345	2,105,609
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
Assets Growth	0.0854	0.0226	0.3315	-0.4848	2.9298	2,248,512
CAPEX	0.0449	0.0149	0.0980	-0.1187	0.7761	2,116,731
Labor Growth	0.0643	0.0000	0.3237	-0.6154	2.0000	1,779,908
ΔInventories	0.0095	0.0000	0.0754	-0.2499	0.4933	2,246,443
ΔAccounts Receivable	0.0177	0.0001	0.1404	-0.3881	0.7492	2,247,599
Sales Growth	0.1587	0.0301	0.8279	-0.8701	7.0343	2,248,514
EBITDA	0.0922	0.0697	0.1213	-0.2832	0.7113	2,161,872
ΔAccounts Payable	0.0129	0.0000	0.1212	-0.3467	0.6517	2,238,452
ΔFinancial Debt	0.0062	0.0000	0.1273	-0.4347	0.7314	2,081,233
ΔLong-term Debt	0.0027	0.0000	0.1106	-0.5351	0.8165	2,090,098
ΔShort-term Loans	0.0036	0.0000	0.0803	-0.3079	0.4568	2,236,327
ΔCash	0.0152	0.0010	0.0983	-0.3164	0.6058	2,231,250

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Table 2
Effect of CSPP on Debt of Eligible Firms

This table presents difference-in-differences estimates of firm-level panel regressions of the change in debt. The dependent variable in Panel A is the change in financial debt scaled by lagged assets. The dependent variable in Panel B is the change in total debt scaled by lagged assets (columns (1), (4), and (7)), the change in bond debt scaled by lagged assets (columns (2), (5), and (8)), and the change in bank debt scaled by lagged assets (in columns (3), (6), and (9)). *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 in Panel B include the same control variables as those in Panel A (coefficients not shown). The sample in Panel A consists of Bureau Van Dijk's Orbis nonfinancial firms in the 2013-2017 period. The sample in Panel B consists of Capital IQ/Compustat Global 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.

Panel A: Sample of All Firms

	Eurozone	Core Countries	Periphery Countries
	ΔFinancial Debt		
	(1)	(2)	(3)
Eligible × Post	0.016	0.022*	-0.007
	(0.011)	(0.014)	(0.017)
log(*Assets*)	-0.070***	-0.074***	-0.068***
	(0.001)	(0.002)	(0.001)
Cash	0.001	-0.005	0.003
	(0.002)	(0.003)	(0.002)
PPE	-0.071***	-0.100***	-0.063***
	(0.002)	(0.006)	(0.003)
Net Margin	-0.001***	-0.003***	-0.001***
	(0.000)	(0.001)	(0.000)
Liabilities	-0.179***	-0.157***	-0.191***
	(0.002)	(0.003)	(0.002)
Firm fixed effects	Yes	Yes	Yes
Industry-year fixed effects	Yes	Yes	Yes
Number of observations	2,081,233	633,211	1,448,022
R-squared	0.26	0.25	0.26

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Table 2 (continued)

Panel B: Sample of Publicly Listed Firms

	Eurozone			Core Countries			Periphery Countries		
	ΔTotal Debt	ΔBond Debt	ΔBank Debt	ΔTotal Debt	ΔBond Debt	ΔBank Debt	ΔTotal Debt	ΔBond Debt	ΔBank Debt
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Eligible × Post	0.007	0.016**	-0.008	0.005	0.013*	-0.003	0.006	0.016	-0.029
	(0.010)	(0.006)	(0.007)	(0.012)	(0.007)	(0.007)	(0.023)	(0.018)	(0.022)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry-year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	3,908	3,908	3,908	2,463	2,463	2,463	1,445	1,445	1,445
R-squared	0.39	0.29	0.26	0.39	0.31	0.29	0.4	0.29	0.23

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Table 3
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. *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 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***		0.102***		0.089***	
	(0.032)		(0.032)		(0.032)	
Eligible × 2014		-0.007		-0.007		-0.013
		(0.022)		(0.022)		(0.022)
Eligible × 2015		0.046		0.046		0.042
		(0.043)		(0.043)		(0.043)
Eligible × 2016		0.077**		0.077**		0.062*
		(0.038)		(0.038)		(0.038)
Eligible × 2017		0.156**		0.156**		0.139**
		(0.062)		(0.062)		(0.062)
log(*Assets*)			-0.013***	-0.013***	-0.014***	-0.014***
			(0.002)	(0.002)	(0.002)	(0.002)
Cash			-0.050***	-0.050***	-0.045***	-0.045***
			(0.005)	(0.005)	(0.005)	(0.005)
PPE			-0.086***	-0.086***	-0.087***	-0.087***
			(0.007)	(0.007)	(0.007)	(0.007)
Net Margin			-0.006***	-0.006***	-0.006***	-0.006***
			(0.002)	(0.002)	(0.002)	(0.002)
Liabilities			-0.010**	-0.010**	-0.007	-0.007
			(0.005)	(0.005)	(0.005)	(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

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Table 4
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. *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 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 the years of 2016 and 2017, and zero otherwise. 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.

Panel A: Eligible Supplier Dummy Variable

	(1)	(2)	(3)	(4)	(5)	(6)
Has Eligible Supplier × Post	0.048***		0.045***		0.032*	
	(0.017)		(0.017)		(0.017)	
Has Eligible Supplier × 2014		0.030		0.028		0.025
		(0.023)		(0.023)		(0.023)
Has Eligible Supplier × 2015		0.039		0.038		0.039
		(0.027)		(0.027)		(0.027)
Has Eligible Supplier × 2016		0.034**		0.031*		0.018
		(0.016)		(0.017)		(0.017)
Has Eligible Supplier × 2017		0.110***		0.107***		0.092***
		(0.034)		(0.034)		(0.034)
log(*Assets*)			-0.045***	-0.045***	-0.046***	-0.046***
			(0.002)	(0.002)	(0.002)	(0.002)
Cash			0.022***	0.022***	0.026***	0.026***
			(0.005)	(0.005)	(0.005)	(0.005)
PPE			-0.048***	-0.048***	-0.047***	-0.047***
			(0.008)	(0.008)	(0.008)	(0.008)
Net Margin			-0.019***	-0.019***	-0.019***	-0.019***
			(0.002)	(0.002)	(0.002)	(0.002)
Liabilities			0.066***	0.066***	0.069***	0.069***
			(0.006)	(0.006)	(0.006)	(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

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Table 4 (continued)

Panel B: Share of Eligible Suppliers

	(1)	(2)	(3)	(4)	(5)	(6)
Eligible Suppliers Share × Post	0.069**		0.067**		0.051*	
	(0.030)		(0.029)		(0.029)	
Eligible Suppliers Share × 2014		0.051		0.043		0.040
		(0.045)		(0.045)		(0.045)
Eligible Suppliers Share × 2015		0.039		0.035		0.036
		(0.041)		(0.040)		(0.040)
Eligible Suppliers Share × 2016		0.050**		0.042*		0.027
		(0.025)		(0.025)		(0.025)
Eligible Suppliers Share × 2017		0.159***		0.155**		0.138**
		(0.062)		(0.060)		(0.060)
log(*Assets*)			-0.045***	-0.045***	-0.046***	-0.046***
			(0.002)	(0.002)	(0.002)	(0.002)
Cash			0.022***	0.022***	0.026***	0.026***
			(0.005)	(0.005)	(0.005)	(0.005)
PPE			-0.048***	-0.048***	-0.047***	-0.047***
			(0.008)	(0.008)	(0.008)	(0.008)
Net Margin			-0.019***	-0.019***	-0.019***	-0.019***
			(0.002)	(0.002)	(0.002)	(0.002)
Liabilities			0.066***	0.066***	0.069***	0.069***
			(0.006)	(0.006)	(0.006)	(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

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Table 5
Difference-in-Differences around the CSPP: Matched Sample

This table presents difference-in-differences estimates of firm-level panel regressions of the ratio of accounts receivable to sales and accounts payable to sales. 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(*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. *Eligible Suppliers Share* is 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 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 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	*t*-test (*p*-value)	Non-Treated	Treated	Control	Pearson χ^2 (*p*-value)
log(*Assets*)	15.335	22.862	22.856	0.974	15.028	23.093	23.181	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	*t*-test (*p*-value)	Non-Treated	Treated	Control	Pearson χ^2 (*p*-value)
log(*Assets*)	15.334	21.164	21.094	0.716	15.027	21.410	21.172	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

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Table 5 (continued)

Panel B: Difference-in-Differences Estimates

	Accounts Receivable		Accounts Payable			
	(1)	(2)	(3)	(4)	(5)	(6)
Eligible × Post	0.103**	0.109**				
	(0.047)	(0.050)				
Has Eligible Supplier × Post			0.079**	0.066**		
			(0.030)	(0.031)		
Eligible Suppliers Share × Post					0.083**	0.076*
					(0.039)	(0.043)
Controls	No	Yes	No	Yes	No	Yes
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry-year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	1,401	1,371	2,863	2,797	2,863	2,797
R-squared	0.81	0.81	0.62	0.64	0.62	0.64

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Table 6
Size Decile-by-Year Fixed Effects Regressions

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. 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 3 (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.

	Accounts Receivable		Accounts Payable	
	(1)	(2)	(3)	(4)
Eligible × Post	0.095***	0.094***		
	(0.032)	(0.032)		
Has Eligible Supplier × Post			0.028*	0.028*
			(0.017)	(0.017)
Controls	No	Yes	No	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	0.71	0.71

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Table 7

Effect of CSPP on Accounts Payable of Eligible Firms' Customers: 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 3 (coefficients not shown). All explanatory variables are lagged by one year. The sample consists of Bureau Van Dijk's Orbis nonfinancial firms in the 2013-2017 period. 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 assets growth groups consist of those firms that are below or above the median of the distribution of assets 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. 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 × Post	-0.049	0.041**	-0.055	0.047**	0.023	0.082***	0.022**	0.039*
	(0.048)	(0.021)	(0.038)	(0.022)	(0.020)	(0.031)	(0.010)	(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

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Table 7 (continued)

Panel B

	High Sales	Low Sales	Low Sales Growth	High Sales Growth	Low Assets Growth	High Assets Growth	High EBITDA	Low EBITDA
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Has Eligible Supplier × Post	0.019	0.191	0.027	0.044**	0.014	0.052**	0.014**	0.066***
	(0.015)	(0.371)	(0.032)	(0.019)	(0.029)	(0.026)	(0.006)	(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	1,124,256	1,124,258	1,081,305	1,081,303	1,090,815	1,090,812	1,082,737	1,082,737
R-squared	0.68	0.72	0.76	0.75	0.75	0.73	0.71	0.72

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Table 8
Core versus Periphery Eurozone 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. *Eligible Suppliers Share* is the firm's share of eligible suppliers relative to the firm's total number of suppliers. *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 eurozone 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 eurozone 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 3 (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.

Panel A: Core versus Periphery Eurozone Countries

	Core Countries			Periphery Countries		
	Accounts Receivable	Accounts Payable	Accounts Payable	Accounts Receivable	Accounts Payable	Accounts Payable
	(1)	(2)	(3)	(4)	(5)	(6)
Eligible × Post	0.126***			0.018		
	(0.045)			(0.025)		
Has Eligible Supplier × Post		0.017			0.072**	
		(0.019)			(0.032)	
Eligible Suppliers Share × Post			0.003			0.109**
			(0.031)			(0.048)
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	650,691	650,691	650,691	1,597,823	1,597,823	1,597,823
R-squared	0.77	0.71	0.71	0.73	0.71	0.71

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Table 8 (continued)

	Eurozone	Core Countries	Periphery Countries
	Accounts Payable		
	(1)	(2)	(3)
Has Core Eligible Supplier × Post	0.044**	0.018	0.077
	(0.020)	(0.020)	(0.051)
Has Periphery Eligible Supplier × Post	0.024*	0.003	0.034*
	(0.013)	(0.023)	(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

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Table 9

Real Effects of CSPP: Investment, Operations, 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 assets growth, CAPEX (scale by lagged assets), change in inventories (scaled by lagged assets), change in receivable (scaled by lagged assets), labor growth, sales growth, and EBITDA (scaled by lagged assets). Panel B shows regressions for change in accounts payable, change in financial debt, change in long-term debt, change in short-term loans, 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 3 (coefficients not shown). All explanatory variables are lagged by one year. 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.

Panel A: Investment and Operating Activities

	Investment in Fixed Assets, Working Capital and Human Capital					Operational Activity	
	Assets Growth	CAPEX	ΔInventories	ΔAccounts Receivable	Labor Growth	Sales Growth	EBITDA
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Has Eligible Supplier × Post	0.025*	0.005*	0.004**	0.011**	0.034*	0.024	0.001
	(0.015)	(0.003)	(0.002)	(0.005)	-0.02	(0.048)	(0.003)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry-year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	2,248,512	2,116,731	2,246,443	2,247,599	1,779,908	2,248,514	2,161,872
R-squared	0.55	0.48	0.32	0.29	0.28	0.39	0.73

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Table 9 (continued)

Panel B: External and Internal Financing

	ΔAccounts Payable	ΔFinancial Debt	ΔLong-term Debt	ΔShort-term Loans	ΔCash
	(1)	(2)	(3)	(4)	(5)
Has Eligible Supplier × Post	0.009***	0.008	0.005	0.004	-0.007
	(0.003)	(0.007)	(0.007)	(0.004)	(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	2,238,452	2,081,233	2,090,098	2,236,327	2,231,250
R-squared	0.27	0.26	0.22	0.18	0.43

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

This table presents difference-in-differences estimates of firm-level panel regressions of the number of customer relationships maintained and number of new customers. 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 3 (coefficients not shown). All explanatory variables are lagged by one year. The sample consists of Factset Revere Supply Chain Relationship 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.

Panel A: Eurozone Countries

	Number of Customers Kept			Number of New Customers		
	(1)	(2)	(3)	(4)	(5)	(6)
Eligible × Post	9.514***	8.223***	7.624***	3.281***	2.767**	2.715**
	(1.935)	(2.073)	(2.043)	(1.234)	(1.231)	(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***	9.968***	9.729***	4.247***	3.429**	3.612**
	(2.334)	(2.510)	(2.481)	(1.482)	(1.501)	(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

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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	-0.359	-0.580	-0.419	0.275	-0.648
	(1.318)	(1.445)	(1.548)	(1.152)	(1.058)	(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

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Figure 1
New Issuance of Corporate Bonds around the CSPP: Core versus Periphery Countries
Panel A shows the that each country represents of the GDP in the euro area as of 2015 and the percentage each country represents of the total number of eligible firms in the euro area. Panels B and C show the amount of capital (scaled by GDP) raised by core and periphery eurozone firms in the euro-denominated corporate bond market. Bond issuance data are obtained from SDC New Issues and includes bonds issued by nonfinancial firms domiciled in the eurozone over the 2013-2017 period. Panel B shows new issuance of investment grade bonds. Panel C shows new issuance of non-investment grade bonds.

Panel A: Distribution of GDP and Eligible Bonds by Country

	%GDP	
Germany	28.8%	Core countries **66%**
France	20.9%	
Netherlands	6.6%	
Belgium	4.0%	
Austria	3.3%	
Finland	2.0%	
Luxembourg	0.5%	
Italy	15.7%	Periphery countries **34%**
Spain	10.2%	
Ireland	2.5%	
Portugal	1.7%	
Greece	1.7%	
Slovakia	0.8%	
Slovenia	0.4%	
Lithuania	0.4%	
Latvia	0.2%	
Estonia	0.2%	
Cyprus	0.2%	
Malta	0.0%	

	%CSPP	
France	28.5%	Core countries **70%**
Germany	19.2%	
Belgium	9.3%	
Austria	6.4%	
Luxembourg	3.5%	
Finland	2.3%	
Netherlands	1.2%	
Spain	10.5%	Periphery countries **30%**
Italy	9.9%	
Portugal	4.7%	
Slovenia	1.2%	
Estonia	1.2%	
Ireland	0.6%	
Slovakia	0.6%	
Latvia	0.6%	
Cyprus	0.6%	
Greece	0.0%	
Lithuania	0.0%	
Malta	0.0%	

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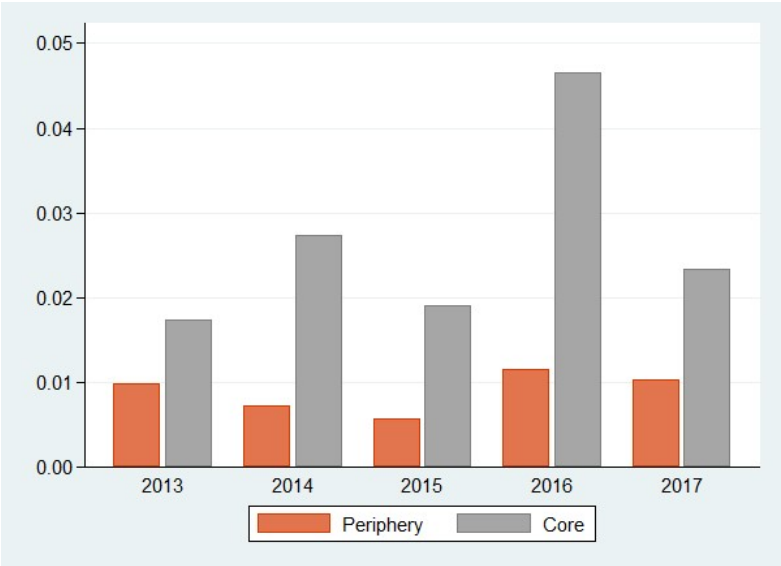
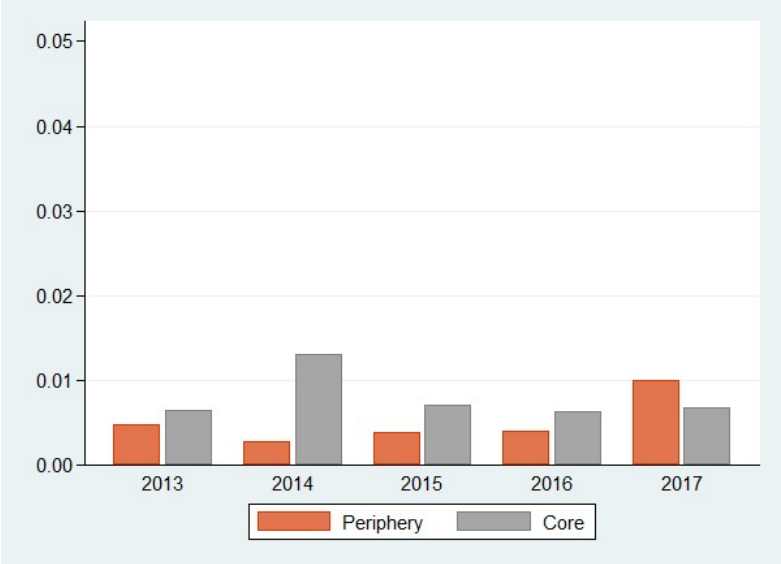
Panel B: New Issuance of Investment Grade Bonds (% of GDP)



Panel C: New Issuance of Non-Investment Grade Bonds (% of GDP)



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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 in the 2013-2017 period. Panel A reports the number of observations by country. Panel B reports the distribution of eligible firms and customers of eligible firms by country.

Panel A: Frequency Distribution of the Sample by Country

	Baseline Sample		Sample (Assets > €10 million)	
	Number of Observations	%	Number of Observations	%
Austria	7,749	0.3	6,025	1.3
Belgium	76,449	3.4	31,812	6.7
Cyprus	1,783	0.1	721	0.2
Estonia	16,763	0.8	2,642	0.6
Finland	49,511	2.2	9,477	2.0
France	453,503	20.2	89,549	18.7
Germany	53,214	2.4	39,714	8.3
Greece	45,561	2.0	10,659	2.2
Ireland	9,787	0.4	5,547	1.2
Italy	831,072	37.0	149,283	31.2
Latvia	17,432	0.8	2,518	0.5
Lithuania	10,092	0.5	2,791	0.6
Luxembourg	5,657	0.3	3,591	0.8
Malta	1,616	0.1	684	0.1
Netherlands	4,608	0.2	3,503	0.7
Portugal	122,214	5.4	20,278	4.2
Slovakia	45,735	2.0	7,608	1.6
Slovenia	23,613	1.1	3,577	0.8
Spain	472,155	21.0	88,286	18.5
Total	2,248,514	100	478,265	100

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Panel B: Distribution of Eligible Firms and Customers of Eligible Firms by Country

	Eligible Firms		Customers of Eligible Firms	
	Number of Firms	%	Number of Firms	%
Austria	8	5.3	6	1.9
Belgium	16	10.6	13	4.1
Cyprus	1	0.7	0	0.0
Estonia	2	1.3	2	0.6
Finland	4	2.6	15	4.7
France	44	29.1	89	28.0
Germany	28	18.5	80	25.2
Greece	0	0.0	6	1.9
Ireland	1	0.7	9	2.8
Italy	16	10.6	42	13.2
Latvia	1	0.7	0	0.0
Lithuania	0	0.0	0	0.0
Luxembourg	1	0.7	4	1.3
Malta	0	0.0	0	0.0
Netherlands	1	0.7	2	0.6
Portugal	8	5.3	8	2.5
Slovakia	1	0.7	1	0.3
Slovenia	2	1.3	0	0.0
Spain	17	11.3	41	12.9
Total	151	100	318	100

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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 domiciled in the euro area as reported by Factset Revere before the CSPP announcement.

Supplier	Customer country																				
country	AT	BE	CY	DE	EE	ES	FI	FR	GR	IE	IT	LT	LU	LV	MT	NL	PT	SI	SK	Other	Total
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

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Table IA.3
Real Effects of CSPP: Investment, Operations, and Financing of Eligible Firms
This table presents difference-in-differences estimates of firm-level panel regressions of corporate investment (assets growth, CAPEX, change in inventories, change in accounts receivable, and labor growth) and operating outcomes (sales growth, and EBITDA). *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 3 (coefficients not shown). All explanatory variables are lagged by one year. 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.

	Investment in Fixed Assets, Working Capital and Human Capital					Operational Activity	
	Assets Growth	CAPEX	ΔInventories	ΔAccounts Receivable	Labor Growth	Sales Growth	EBITDA
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Eligible × Post	0.023*	0.002	0.005	0.009**	0.018	-0.018	0.003
	(0.014)	(0.005)	(0.004)	(0.004)	(0.024)	(0.076)	(0.004)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry-year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of observations	2,248,512	2,116,731	2,246,443	2,247,599	1,779,908	2,248,514	2,161,872
R-squared	0.55	0.48	0.32	0.29	0.28	0.39	0.73

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Table IA.4
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 3 (coefficients not shown). All explanatory variables are lagged by one year. Columns (1) and (2) show the results for a sample of U.S. publicly listed firms drawn from Compustat. Columns (3) and (4) show the results for a sample of publicly listed firms domiciled in European Union countries that are not part of the eurozone. Columns (5) and (6) show the results for a sample of public and private firms domiciled in European Union countries that are not part of the eurozone. The sample in columns (3)-(6) 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.

	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		-0.014		0.013*	
	(0.005)		(0.013)		(0.007)	
Investment Grade × 2014		0.001		0.019		0.011**
		(0.004)		(0.015)		(0.005)
Investment Grade × 2015		0.005		-0.017		0.018**
		(0.006)		(0.018)		(0.008)
Investment Grade × 2016		0.004		-0.021		0.031***
		(0.007)		(0.020)		(0.009)
Investment Grade × 2017		0.007		-0.008		0.017
		(0.007)		(0.021)		(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

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Table IA.5
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 Bonds* 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 3 (coefficients not shown). All explanatory variables are lagged by one year. 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.

	(1)	(2)	(3)
Eligible × Post	0.103***	0.102***	0.090***
	(0.032)	(0.032)	(0.032)
Non-Eligible Bonds × Post	0.020	0.021	0.016
	(0.015)	(0.015)	(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

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Table IA.6
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 3 (coefficients not shown). The sample consists of Bureau Van Dijk's Orbis nonfinancial firms in the 2013-2017 period. The sample is restricted to firms from European Union countries that are not members of the euro area. 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	0.027**	0.023**	0.024**
	(0.012)	(0.012)	(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

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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 3 (coefficients not shown). All explanatory variables are lagged by one year. The sample consists of Bureau Van Dijk's Orbis nonfinancial firms 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**	0.097**	0.088**			
	(0.041)	(0.041)	(0.041)			
Has Eligible Supplier × Post				0.043**	0.041**	0.037*
				(0.021)	(0.020)	(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

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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 3 (coefficients not shown). All explanatory variables are lagged by one year. The sample consists of Bureau Van Dijk's Orbis nonfinancial firms 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***	0.124***	0.112***			
	(0.040)	(0.040)	(0.040)			
Has Eligible Supplier × Post				0.055**	0.053**	0.041*
				(0.022)	(0.022)	(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

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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 3 (coefficients not shown). All explanatory variables are lagged by one year. 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.

	Accounts Receivable		Accounts Payable	
	(1)	(2)	(3)	(4)
Eligible × Post	0.090***	0.089***		
	(0.032)	(0.032)		
Has Eligible Supplier × Post			0.033*	0.031*
			(0.017)	(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

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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 3 (coefficients not shown). All explanatory variables are lagged by one year. 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.

	Accounts Receivable			Accounts Payable		
	(1)	(2)	(2)	(4)	(5)	(6)
Eligible × Post	0.099***	0.098***	0.087***			
	(0.032)	(0.032)	(0.032)			
Has Eligible Supplier × Post				0.041**	0.039**	0.028*
				(0.017)	(0.017)	(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

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Table IA.11
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 3 (coefficients not shown). All explanatory variables are lagged by one year. 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.

	Log(Accounts Receivable)			Log(Accounts Payable)		
	(1)	(2)	(3)	(4)	(5)	(6)
Eligible × Post	0.239**	0.244***	0.222**			
	(0.094)	(0.094)	(0.094)			
Has Eligible Supplier × Post				0.080*	0.073*	0.060
				(0.043)	(0.043)	(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

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Table IA.12
Sample of Public versus Private Firms

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 3 (coefficients not shown). All explanatory variables are lagged by one year. Panel A shows regressions for the sample of publicly listed firms. Panel B shows regressions for the sample of privately held firms. 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.

Panel A: Public Firms

	Accounts Receivable			Accounts Payable		
	(1)	(2)	(3)	(4)	(5)	(6)
Eligible × Post	0.130**	0.131**	0.119**			
	(0.053)	(0.053)	(0.053)			
Has Eligible Supplier × Post				0.014	0.010	0.012
				(0.024)	(0.023)	(0.025)
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
Obs.	10,051	10,051	10,051	10,051	10,051	10,051
R-squared	0.67	0.67	0.68	0.69	0.69	0.69

Panel B: Private Firms

	Accounts Receivable			Accounts Payable		
	(1)	(2)	(3)	(4)	(5)	(6)
Eligible × Post	0.060*	0.059*	0.045			
	(0.034)	(0.034)	(0.034)			
Has Eligible Supplier × Post				0.076**	0.073**	0.065*
				(0.037)	(0.035)	(0.036)
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	2,238,463	2,238,463	2,238,463	2,238,463	2,238,463	2,238,463
R-squared	0.74	0.74	0.74	0.71	0.71	0.71

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Table IA.13
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 customers. 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 3 (coefficients not shown). All explanatory variables are lagged by one year. The sample consists of Factset Revere Supply Chain Relationship nonfinancial firms in the 2013-2017 period. The control group includes the competitors of eligible firms, domiciled in the Eurozone, 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: Eurozone Countries

	Number of Customers Kept			Number of New Customers		
	(1)	(2)	(3)	(4)	(5)	(6)
Eligible × Post	7.573***	6.377***	5.297**	2.972**	2.444*	2.278
	(2.233)	(2.412)	(2.451)	(1.412)	(1.462)	(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 Eurozone Countries

	Number of Customers Kept			Number of New Customers		
	(1)	(2)	(3)	(4)	(5)	(6)
Eligible × Post	8.983***	7.520**	7.146**	3.981**	3.359*	3.417*
	(2.754)	(2.998)	(3.021)	(1.729)	(1.848)	(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

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Table IA.13 (continued)

Panel C: Periphery Countries

	Number of Customers Kept			Number of New Customers		
	(1)	(2)	(3)	(4)	(5)	(6)
Eligible × Post	-0.228	-1.147	-1.839	-1.329	-0.582	-1.303
	(1.896)	(2.015)	(2.172)	(1.544)	(1.470)	(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

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Table IA.14
The Role of Product Market Competition

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 3 (coefficients not shown). All explanatory variables are lagged by one year. In Panel A, the low and high Lerner index (EBITDA/Sales) groups consist of those firms that are below and above the yearly median at the two-digit SIC level. In Panel B, the low and high Herfindahl Index groups consist of those firms that are below and above the yearly median at the two-digit SIC level. 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.

Panel A: Lerner Index

	Low Lerner Index		High Lerner Index	
	Accounts Receivable	Accounts Payable	Accounts Receivable	Accounts Payable
	(1)	(2)	(3)	(4)
Eligible × Post	0.102		0.117***	
	(0.067)		(0.041)	
Has Eligible Supplier × Post		-0.007		0.041*
		(0.019)		(0.021)
Controls	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
Number of observations	1,161,440	1,161,440	1,087,074	1,087,074
R-squared	0.76	0.73	0.73	0.70

Panel B: Herfindahl Index

	Low Herfindahl Index		High Herfindahl Index	
	Accounts Receivable	Accounts Payable	Accounts Receivable	Accounts Payable
	(1)	(2)	(3)	(4)
Eligible × Post	0.109		0.086**	
	(0.073)		(0.037)	
Has Eligible Supplier × Post		-0.022		0.045**
		(0.043)		(0.018)
Controls	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes
Number of observations	1,186,108	1,186,108	1,062,406	1,062,406
R-squared	0.74	0.71	0.77	0.73

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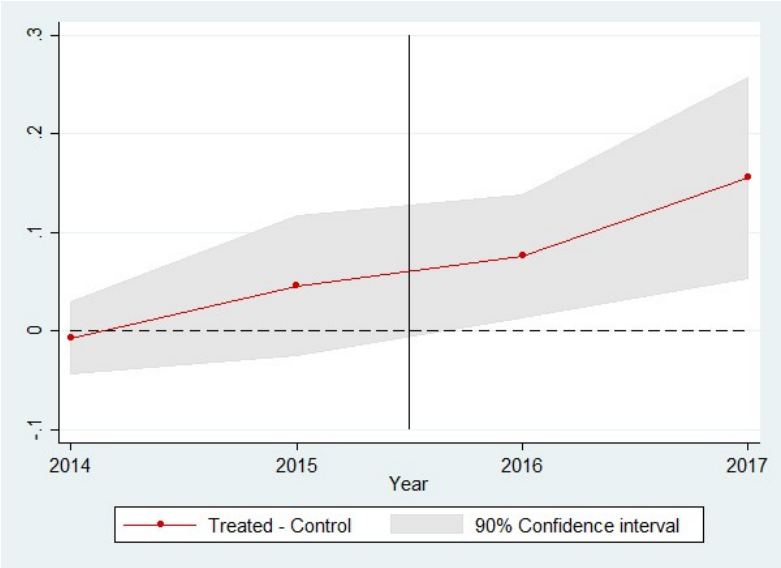
Figure IA.1
Accounts Receivable of Eligible Firms around the CSPP
This figure shows point estimates and 90% confidence interval of the differences in the ratio of accounts receivable to sales between treated firms (eligible firms) and control firms around the CSPP announcement. The results in Panel A are based on the estimates in column (4) of Table 2. The sample in Panel A consists of Bureau Van Dijk's Orbis nonfinancial firms in the 2013-2017 period. The results in Panel B are based on the estimates in column (2) of Table IA.4 of the Internet Appendix. The sample in Panel B consists of Compustat U.S. publicly listed firms.

Panel A: Effect of CSPP on Accounts Receivable of Eligible Firms



Panel B: Placebo Effect on Accounts Receivable of U.S. Investment Grade Firms

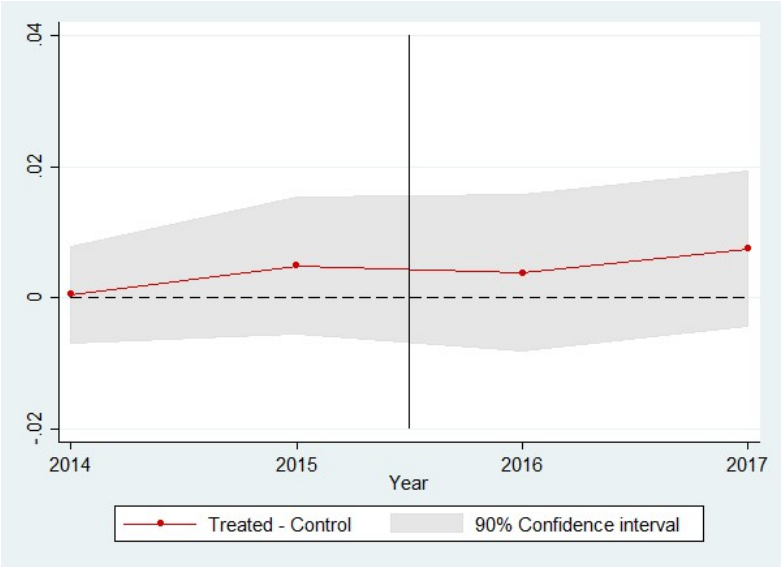


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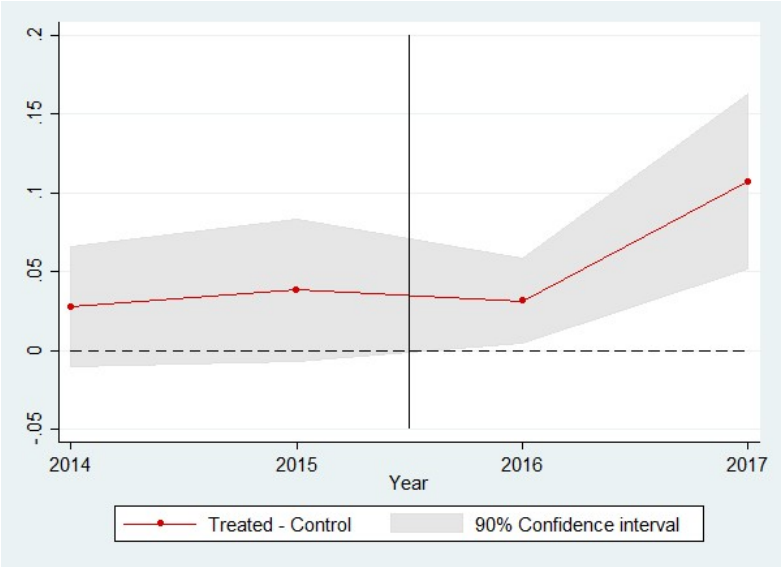
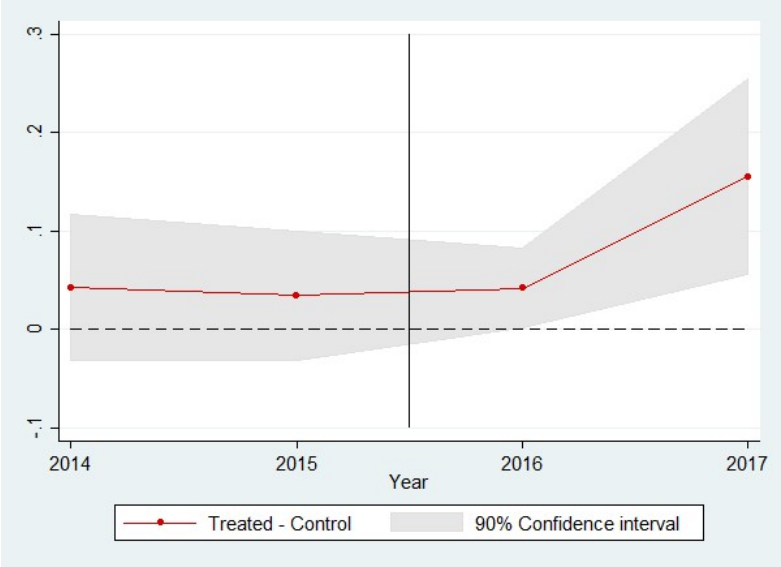
Figure IA.2
Accounts Payable of Eligible Firms' Customers around the CSPP
This figure shows point estimates and 90% confidence interval of the differences in the ratio of accounts payable to sales between treated firms (firms with a supplier with CSPP-eligible bonds) and control firms around the CSPP announcement using a sample of Bureau Van Dijk's Orbis nonfinancial firms in the 2013-2017 period. The results in Panel A are based on the estimates in column (4) of Panel A of Table 3. The results in Panel B are based on the estimates in column (4) of Panel B of Table 3. The sample consists of Bureau Van Dijk's Orbis nonfinancial firms in the 2013-2017 period.

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



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



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