The 2014 Russia shock and its effects on Italian firms and banks*

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Abstract

We study how a demand shock in an export market propagates to the exporting country's banking system. Using the dual shocks of sanctions and falling oil prices suffered by Russia in 2014, we consider the effects on Italian firms and banks more exposed to the Russian market. This event implied a sharp decline in sales for firms with a significant share of sales to Russia, but it did not affect the overall amount of credit available to them. Banks relatively more exposed to Italian exporters to Russia cut their overall credit supply, especially *vis-à-vis* ex ante risky borrowers, but they continued to provide credit towards firms moderately hit by the trade shock, in an attempt to let them cope with the liquidity shortfall. Overall, our results suggest that trade shocks might propagate through the banking sector, even without global banks, because the loan portfolio adjustments triggered by heightened credit risk reach firms not directly affected by the shock.

Keywords: Russia shock, credit supply, bank capital, trade shocks.

JEL codes: G21, F10.

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1 Introduction

In 2014 Russia suffered from the dual shocks of sanctions and lower oil prices, leading to a sharp fall of its imports from the rest of the world. This large import contraction hit exporters from several countries, including Italy, whose sales to Russia (the third largest extra-EU market for Italy's exports) fell by 35 per cent over two years. This episode represents an interesting case study to trace out how a demand shock propagates to the exporting country's banking system. Specifically, we investigate how this negative shock to export market opportunities for Italian companies affected banks' credit supply and firms' credit demand.

Our analysis makes use of uniquely detailed data on the exposure of Italian firms and banks to the Russia shock. Specifically, we combine credit register data, customs data on the universe of exports and imports of goods, banks' and firms' balance sheet data. We identify Italian exporters for which sales to the Russian market accounted for a significant share of their turnover as those disproportionately hit by the shock, and compute a bank-level measure of exposure to the shock based on the credit share of these exporters over the total amount of credit granted to non-financial companies (NFCs). Our identification relies on a difference-in-difference strategy, covering the quarters immediately before and after the shock (which took place around mid-2014), and estimate the effect of the Russia shock on credit supply using an approach in the spirit of Khwaja and Mian (2008).

The 2014 Russia shock shares a few similarities with the Russia-Ukraine war in 2022, but there are significant differences. Both events represent reasonably exogenous unexpected shocks to the revenues of affected firms, generating a sudden liquidity shortfall and a likely increase in their risk of insolvency. However, they differ in terms of magnitude, as the scope of trade and financial sanctions implemented in 2014 was much more limited compared to those in 2022, and context, as the latter was accompanied by a steep surge in energy costs which affected the Italian economy in a more pervasive way. For both reasons, the 2014 Russia shock allows a more precise identification of the shock and its transmission over the credit market. The 2014 Russia shock also shares a few similarities with the Covid-19 shock, as both represent a negative shock to firms' revenues.

However, in contrast to the pandemic shock, the 2014 Russia shock was not accompanied by any exceptional public support measure (e.g. loan moratoria, public guarantees on new credit, grants, exceptional temporary lay-off schemes), and as such it provides some hints on how bank credit would have adjusted absent any policy support measure.

Our results provide several insights on how a trade shock affects both firms and banks. First, we explore the real effects of the shock on the performance of severely hit-firms, namely those in the top decile of the distribution of the share of total revenues coming from the Russian market (henceforth *hit-borrowers*). At end-2016 these firms suffered from a significant decline in revenues (-17 per cent) relative to pre-shock levels, hitting sales to Russia but also to other foreign destinations and, to a lower extent, domestically. The drop in revenues was accompanied by an increase in leverage, lower liquidity and a higher propensity to default on their loans (around 2 per cent more over a three-year horizon relative to other comparable firms before the shock).

Second, we study the implications of the Russia shock in terms of the availability of credit for more affected firms, further exploring whether banks changed their overall lending policies. We find that for *hit-borrowers* the total amount of available credit, as measured by the sum of outstanding credit and loan commitments, did not significantly change *vis-à-vis* firms that were not directly hit by the shock, although the former experienced an increase in drawn credit, mostly due to a more intense utilization of credit lines to cope with the increased liquidity needs. On banks' side, we find a spillover effect for banks more exposed to *hit-borrowers*: a standard deviation increase in this bank exposure (around 0.45 percentage points) is associated to a 0.8 percentage point decrease in credit supply with respect to the universe of their NFCs borrowers. Understandably, the magnitude of the effect is relatively small as for all banks the shock affected only a modest portion of their overall loan portfolio towards NFCs. We interpret the negative spillover effect of the Russia shock on the credit supply of more exposed banks as closely related to the bank capital channel (Bernanke and Lown, 1991; Peek and Rosengren, 1995; Thakor, 1996; den Heuvel, 2006), stressing the contractionary effects of negative shocks to capital on bank credit supply.[1] To the extent that the heightened credit risk of exporters to

[1]The capital channel rests on two main features that find real-world support: the imperfect substitutabil-

Russia implied higher future losses, our shock was equivalent to a negative shock to the prospective capital position of the bank.

Third, the Russia shock had an impact on the allocation of credit among more affected banks and firms. After the shock *hit-borrowers* were granted a disproportionate amount of credit from banks relatively more exposed to the Russia shock. At the same time, these banks cut their lending to *non hit-borrowers*, suggesting a negative spillover of the shock to non-affected borrowers. Importantly, we find that this re-allocation of credit supply operated by banks more exposed to the Russia shock mainly involved borrowers that were already risky before the trade shock. In turn, as *hit-borrowers* are a small share of NFCs (0.45 per cent), and on average less risky than the other firms, the estimated net effect of the credit reallocation is an overall reduction in the riskiness of the corporate loan portfolio of more exposed banks. Moreover, only *hit-borrowers* with a moderate level of exposure to Russia (i.e. firms for which exports to Russia were between 9 and 30 per cent of their total turnover) benefited from the credit support of more exposed banks, whereas these banks reduced credit supply to firms with higher levels of sales concentration in Russia, as the shock was likely to lead to a permanent impairment of their performance.

Overall, this credit reallocation enacted by more exposed banks across different borrowers suggests the implementation of a credit strategy aimed at supporting firms more affected by the Russia shock, while simultaneously implementing a de-risking strategy on the rest of their corporate loan portfolio. This lending pattern can be considered consistent with the bank capital channel. Indeed, exposed banks could have been relatively more affected by the default of *hit-borrowers*, and in turn had a higher incentive to limit future losses from firm insolvencies – that would end up worsening their capital position – through the continued provision of credit to still viable *hit-borrowers*, in an attempt to let them cope with the liquidity shortfall; at the same time, these lenders also tried to preserve their capital position by reducing exposures to other (non-affected) risky firms.

Our interpretation that lending strategies reflect the working of the bank capital chan-

ity among banks' liabilities, in particular between debt and equity, due to financial frictions (e.g. moral hazard or asymmetric information), and the existence of capital regulation. The weaker a bank's balance sheet, the greater an adverse shock to capital would reduce bank lending because of the capital requirement and the cost of issuing new equity.

nel is supported by the fact that our results are robust to the inclusion of variables capturing bank specialization in specific economic sectors or trade finance activities (Paravisini et al., 2015), as well as a dummy for the main lender that proxies the effect of relationship lending (Petersen and Rajan, 1994; Berger and Udell, 1995).[2] Lastly, we stress that higher lending to *hit-borrowers* from banks more exposed to the Russia shock should not be considered as a purely zombie lending phenomenon. Indeed, only *hit-borrowers* moderately affected by the shock received additional credit from more exposed banks, as these firms had more chances to promptly expand sales in other markets, and as such it justified banks' liquidity support as their business viability was presumably not fundamentally threatened by the shock.

Our work contributes to several lines of research. First, our result that banks more exposed to the Russia shock extended relatively more credit to *hit-borrowers* is related to the recent papers by Favara and Giannetti (2017), Giannetti and Saidi (2018) and Galaasen et al. (2020) on the credit effects of shocks to firms' performance. The former two papers point out that lenders with high market shares in distressed sectors of the economy have a higher incentive to internalize negative spillovers due to fire sales episodes on collateral assets, and in turn provide more liquidity in an attempt to attenuate insolvencies. Whereas the fire sales channel point out the importance of the *market* share of loans that each lender has in specific sectors, we instead highlight the role played by the share of loans to Italian exporters to Russia, a measure that is closely related to banks' exposure to the shock. Similarly, Galaasen et al. (2020) show how bank level negative shocks to larger firms, so called "granular credit risk", lead to a reduction in the interest rates charged on new loans to these affected borrowers but, crucially, to a tightening of credit supply conditions for smaller firms.

Our work is also related to the paper by Federico et al. (2019) analyzing the exposure of Italian banks to the China shock and the subsequent loan portfolio adjustments. Our paper provides a complementary perspective: whereas Federico et al. (2019) focus on an

[2]The relationship lending theory suggests that banks' credit support to firms with liquidity shortfalls is idiosyncratic and not linked to considerations related to the overall bank loan portfolio. In other words, if our results were spurious as simply reflecting the existence, before the shock, of a relationship lender, then after the inclusion of this variable our measure of bank exposure to the Russia shock should not be statistically significant. On the contrary, we find that our results continue to hold.

import competition shock, we look at an export demand shock. Moreover, the two shocks differ in terms of timing and propagation: in contrast to the gradual and cumulative nature of the China shock, the Russia shock was a much smaller shock, but severely hitting in a short window of time a specific group of firms that were particularly exposed to an export market.[3]

A third related line of research focuses on how banks and firms react to liquidity shortfalls, a literature that has seen a rapid development after the Covid-19 shock (Chodorow-Reich et al., 2021; Li et al., 2020; Kapan and Minoiu, 2020). Relative to these works, our episode provides insights on the credit dynamics for a smaller subset of firms, but without the presence of the generous public support programs implemented immediately after the pandemic broke out.

The rest of the paper is structured as follows. Section 2 provides a background of the two shocks hitting the Russian economy in 2014 and of the exposure of Italian exporters. Section 3 describes the data sources. Section 4 presents the econometric strategy. Section 5 reports the main results. Section 6 discusses the robustness of our findings. Finally, Section 7 concludes.

2 Background

After almost 15 years of largely uninterrupted growth, in 2014 the Russian economy was hit by two large shocks. The first is related to the international sanctions introduced by a large number of countries following the Russian annexation of Crimea in February-March 2014. The sanctions were imposed by the United States, the European Union (EU) and other countries between March and April 2014. The measures were then intensified during the early summer of 2014. Sanctions included: an embargo on arms, dual-use goods and specific mining equipment; restrictions on the issuance and trade of financial instruments with maturity of more than 30 days to selected Russian state-owned banks and

[3] A different strand of literature looks at the economic effects of sanctions (including Crozet and Hinz (2020) on international sanctions *vis-à-vis* Russia in 2014, and Crozet et al. (2021) for a broader set of sanctions). However, this literature has typically focused only on the effects on firms, neglecting spill-overs to the banking sector.

energy companies; travel bans, asset freezes and payments restrictions against a number of Russian individuals and entities.[4] In August 2014 Russia responded with sanctions against a number of countries, including a counter-embargo on certain food and agricultural imports from the United States, the European Union and other countries.

The second shock was the sharp decrease in oil prices, which fell by half between June and December 2014. A variety of factors played a part, including demand weakness and increased supply (especially in countries not belonging to the OPEC). Russia, as a major exporter of energy products, was hardly hit by the collapse in oil prices: the deterioration in terms of trade was equivalent to 30 per cent. Lower oil prices and sanctions put significant pressure on the ruble, which recorded a sharp depreciation towards the end of 2014. They also contributed to the recession in 2015, when GDP contracted by 4 per cent. The external adjustment was mainly driven by a deep import contraction: import volumes fell by 25 per cent in 2015.

The collapse in oil prices differentiates the 2014 Russia shock from the one following Ukraine's invasion in 2022; in the latter case energy prices accelerated an already increasing trend that started in 2021 as world economies gradually came out of the most intense phase of the Covid 19 pandemic. In this respect, the 2014 Russia shock considered in this paper combines two elements – heightened trade obstacles and the sharp decline in oil prices – that both unambiguously lower the Russian demand for imported products and hence it represents a negative demand shock from Italy's perspective. On the other hand, firms' input costs, especially those related to energy prices, were not negatively affected by the 2014 Russia shock, in contrast to what happened in 2022.

This negative demand shock to export market opportunities hit all the main countries selling to Russia, including Italy. Russia was an important destination market for Italian exports of goods. In 2013 it was the third largest extra-EU market in terms of export value. Italy's exports to Russia fell by 35 per cent in value terms between 2013 and 2015. The decrease was broad-based across sectors. Exports fell not only in products directly hit by the EU embargo and by the Russian counter-embargo (which accounted only for just a

[4]The sanctions by the European Union and United States continue to be in effect to this date; further extensions have been introduced over the subsequent years and they were further scaled up following the Ukraine invasion in 2022.

few percentage point share of Italy's exports to Russia), but also in the vast majority of remaining products.

We exploit the exogenous nature of the dual shocks (oil prices and sanctions) underlying the import contraction to investigate how a negative shock to export market opportunities propagates to firms and banks in the exporting country.

3 Data

Our data set comprises granular information derived from multiple sources. First, we draw data on credit relationships between banks and NFCs from the Bank of Italy Credit Register. It includes the universe of credit exposures exceeding the €30,000 threshold (differentiated by type of loan instrument) and reported on a monthly basis by all Italian banks and non-bank financial intermediaries. We aggregate loans to firms at the banking group level with a break-down by credit granted and credit outstanding, i.e. the amount agreed and the amount effectively drawn by the borrower; the two variables may substantially differ, especially for credit lines. Credit granted and outstanding are further broken down by instrument (credit lines and term loans), and for export purposes (trade finance). All the credit relationships are further characterized by additional attributes, named *Loan-level controls*, that include the share of collateral over total loan amount granted, the share of bad debts in total borrowing, the share of NPLs in total borrowing, and the share of trade finance in total borrowing. We exclude borrowers with non-performing loans (NPLs) in the pre-shock period as their credit relations are usually freezed and do not react to new shocks.

The second main source of data covers trade in goods and is provided by the Customs and Monopolies Agency. The dataset includes annual exports and imports by firm, product and counterpart country and covers almost the universe of Italian exporters and importers (with the exception of sole proprietorships).[5] Products are defined at the 8-digit level of the Combined Nomenclature (NC8) classification. Firms are reported with

[5]Sales to extra-EU countries are collected through the Extrastat system, which covers all transactions above EUR 10 thousands. Sales to intra-EU countries are instead collected through Intrastat surveys, on a monthly, quarterly or annual basis depending on the reporting thresholds.

a unique identifier (VAT code) that can be easily matched to the credit register and firm balance sheet data.

The data set is further enriched by details on firms' characteristics from the Cerved data base that provides on a yearly basis balance sheet information for the universe of Italian corporations. Our starting sample consists of 540,000 firms for which we have information on total assets, share of liquid assets, financial leverage and riskiness.

The last pillar of our data set are bank-level information obtained from supervisory statistics. Bank data are aggregated at the banking group level, if applicable, or at bank level in the case of stand-alone intermediaries, and include the universe of banks and non-bank financial intermediaries belonging to banking groups. In total our sample includes around 620 banks. The balance-sheet indicators include total assets, capital and reserves to total assets ratio, loan-to-deposit ratio, share of loans to households and non-financial firms on total assets, share of government debt securities over total assets, non-performing loans (NPLs) ratio.

Table 1 reports summary statistics for the variables. Table 2 provides a description of the variables and data sources.

4 Empirical strategy

Our empirical strategy starts from the identification of Italian firms that exported to Russia. In 2013 sales to Russia accounted for 2.8 per cent of Italy's overall exports of goods (0.7 percentage points in terms of GDP). Russia was the eighth market in terms of export value (the third extra-EU market for Italian exporters, after the United States and Switzerland). Exporters to Russia were mainly active in the industrial machinery, fashion industry, other transport equipment and furniture. They also showed a regional concentration, especially in the North-East and Centre-East regions of Italy (Veneto, Emilia Romagna, Marche). Products hit by the EU embargo and by the Russian counter-embargo accounted for a very small fraction of Italian firms' total exports to Russia (0.9 and 1.7 percentage points, respectively).[6] For this reason we focus not only on products hit by

[6] We follow the product list provided by Crozet and Hinz (2020).

sanctions but on the entire set of products traded with Russia.

Our sample includes around 22,000 firms exporting to Russia between 2011 and 2013. The share of exports to Russia over total sales varies significantly across firms. We identify a subset of 3,095 firms, exports to Russia account for at least 9 per cent of their total sales (including domestic sales) in at least one of the three years before the shock. We use this threshold – which roughly coincides with the last decile of the distribution of exporters to Russia – to define the subset of firms that were more severely hit by the Russia shock.[7] In our specifications we use the latter variable to improve the interpretation of the magnitude of the coefficients and to take into account possible non-linear effects. Given our focus on their credit relations, we label these firms as *hit-borrowers*. On average, for these firms the Russian market accounts for 18 percent of total sales in the years before the shock, compared to less than 0.01 percent for non-hit firms. Within the group of *hit-borrowers*, for a quarter of them at least 22 percent of their sales comes from Russia, whereas for one tenth of them the percentage rise to more than 38 percent.

As a preliminary step, we verify that the Russia shock was indeed a negative demand shock using the following cross-sectional first-differences regression:

$$\Delta Y_i = \beta HitBorrower_i + \gamma X_i + \alpha_j + \alpha_p + \epsilon_i \tag{1}$$

where ΔY_i is the change in an outcome variable for firm i such as firm revenues ($\Delta Sales$), financial leverage ($\Delta Leverage$), liquidity ($\Delta Liquidratio$), classification in bad debt status ($Bad\ debt$) or other non-performing loan status ($OtherNPL$). For the first three variables all changes are considered with respect to the end-2016 value relative to the two-year average pre-shock (i.e. 2012-13). The $Bad\ debt$ and $OtherNPL$ variables are instead dichotomous dummy variables and the regression model is effectively a linear probability model. The variable $HitBorrower_i$ is a dummy equal to one if the firm's exports to Russia before the shock amounted to 9 per cent or more of its total sales (including domestic sales) in at least one of the three years before the shock. The regression controls for firm-

[7] In unreported regressions we verify that all our results are qualitatively confirmed if we adopt a continuous measure of exposure to Russia (the ratio of exports to Russia on sales) rather than the discrete measure.

level control variables X_i, sector j (NACE 2-digits) and province p fixed effects.

Moving to the core of our empirical strategy, we then focus on credit dynamics. We start considering how credit changed for hit-borrowers relative to other firms after the Russia shock. For this purpose we use quarterly firm-level data on stocks of outstanding and granted credit and estimate the following regression:

$$lnC_{it} = \beta HitBorrower_i \times Post_t + \gamma X_{it} + \alpha_i + \alpha_{jt} + \alpha_{pt} + \epsilon_i \tag{2}$$

where α_i is a time-invariant firm fixed effect, $Post_t$ is a dummy variable equal to one from the third quarter of 2014 onwards and zero before, X_{it} firm time-varying controls, α_{jt} and α_{pt} are sector-time and province-time fixed effects.

Next, we focus on how banks that were relatively more affected by the Russia shock adjusted their credit supply. To this end, we compute the following measure of pre-shock bank exposure:

$$BankExposure_b = \frac{\sum_i C_{ib} \frac{ExpRussia_i}{Sales_i}}{\sum_i C_{ib}} \tag{3}$$

which corresponds for each bank b to a weighted average of the share of exports to Russia over total sales for all its borrowers, where weights C_{ib} account for the share that a given firm's credit has over total credit provided by the bank. This is a continuous measure of the weight of loans to exporters to Russia in a bank's overall loan portfolio to firms.

For the vast majority of lenders, exposure is low, given that banks usually tend to have a diversified portfolio. Nevertheless, banks in the upper part of the distribution of $BankExposure_b$ record more significant values (Figure 1). These are typically local or regional banks operating in areas specialized in products that are among the top exports to Russia. The degree of heterogeneity in bank exposure to exporters to Russia is relatively large. For instance, for the subset of banks in the upper quartile of the distribution, the weighted mean of ratio between exports to Russia and sales for the corporate borrowers amounts on average to about 0.6 percent, compared to 0.05 percent for banks between the first and the third quartile.

We estimate the effect of the Russia shock on banks' credit supply, following the

Khwaja and Mian (2008) approach:

$$lnC_{ibt} = \beta BankExposure_b \times Post_t + \gamma \mathbf{Z}_{ibt} + \alpha_{it} + \alpha_{ib} + \epsilon_{ibt} \tag{4}$$

where the dependent variable is the log stock of loans granted by a bank to a firm. The main explanatory variable is the interaction between $Bankexposure_b$[8] and the $Post_t$ dummy, which is equal to one from the third quarter of 2014 onward and zero before. We control for firm-time fixed effects, absorbing time-varying shocks to credit demand at the firm level, and for bank-firm fixed effects, taking into account time-invariant factors underlying the matching between firms and banks. The $\mathbf{Z}_{ibt}$ vector includes bank and loan controls. The former control for pre-shock bank characteristics, interacted with the $Post_t$ dummy (assets, loan-to-deposits ratio, share of loans to households and non-financial firms, capital ratio, share of government securities holdings, NPLs ratio). The latter control for time-varying loan-level characteristics (share of collateral, share of trade finance, share of bad debts, and share of other NPLs in total credit granted to the borrower).

Lastly, we explore the interaction between more affected firms (*hit-borrowers*) and bank exposure. Specifically, we estimate the regression model:

$$lnC_{ibt} = \beta BankExposure_b \times Post_t + \beta BankExposure_b \times Post_t \times HitBorrower_i + \gamma \mathbf{Z}_{ibt} + \alpha_{it} + \alpha_{ib} + \epsilon_{ibt} \tag{5}$$

where the triple interaction term $BankExposure_b \times HitBorrower_i \times Post_t$ captures potential differences in the lending response of more affected banks with respect to *hit* and *non hit-borrowers*. To explore the channels of the effects across firms with different risk profiles we perform an analogous regression adding an additional interaction to $BankExposure_b \times Post_t \times HitBorrower_i$ with a dummy for riskier firms. Similarly, in a robustness check we test whether our results are driven by relationship lending, and we add an additional interaction with a dummy identifying for each firm its main lender.

[8]Our main results are qualitatively unchanged when substituting the continuous variable $BankExposure_b$ with a dummy taking value of 1 for banks in the top decile or tercile of the distribution of $BankExposure_b$ (material available upon request).

5 Main results

We proceed to present our main results as follows. First, we provide an overall view of the impact that the shock had on firms more exposed to the Russian market by comparing the post-shock evolution of several firm outcome variables (sales, leverage, liquidity, loan default) relative to the one observed for other comparable firms. Second, we consider how the shock changed the dynamics of credit, both in terms of granted and outstanding amounts, for banks and firms that were more severely hit by the shock. Third, we investigate how lenders differently affected by the Russia shock adjusted their credit supply to firms that were more severely hit by the shock *vis-à-vis* other firms. This last analysis is crucial to understand how the concentration of credit, and the related loan default risk, gets redistributed across the banking system after a subset of firms suffers from a large negative shock on their business operations.

5.1 Russia shock and the real effects on hit firms

Although the aggregate impact of the Russia shock on the Italian economy was modest, its effect on exports to Russia has been large, with a 35 per cent reduction between 2013 and 2015. This large drop implies that the effect on firm sales was very heterogeneous across firms as they were differently exposed to the Russian market. In 2011-13 more than 22,000 firms exported to Russia and for around 3,100 of them the share of Russian exports was above 9 per cent of their yearly revenues in at least one of the three years. In what follows we refer to this group – coinciding with the last decile of the distribution of exporters to Russia – as *hit-borrowers*.

Table 3 provides an overview of the different performance of *hit-borrowers* after the Russia shock. We consider a cross-sectional regression model for the post-shock change of several outcome variables between the average of the two-year pre-shock period and the value in 2016: firm revenues ($\Delta Sales$), financial leverage ($\Delta Leverage$), liquidity ($\Delta Liquidratio$), classification in bad debt status ($Bad\ debt$) or other non-performing loans ($OtherNPL$); all regressions include several firm control variables at their pre-shock levels as well as province and sector fixed effects.

We find that *hit-borrowers* display a substantial worsening of their performance – the drop in firm sales relative to other comparable firms amounts to 17 per cent over a three-year period – and a heightened financial vulnerability as pointed out by the increase in financial leverage and by the decrease in liquidity. As a result, we also find a substantially higher likelihood of being insolvent on debt obligations: the estimated transition to either bad debt or other milder NPL statuses is on average almost 2 percentage points higher than for other comparable firms.

Table 4 further investigates the decline in firm sales. We first decompose total sales in domestic sales and exports (columns (2) and (3)). Given that this analysis focuses on exports, we restrict the sample to exporting firms (about 62,500 firms). The results show that the decline in sales was driven by exports, which fell by more than 40 percent in *hit-borrowers*, compared to other exporters. The coefficient on domestic sales is negative and slightly above conventional significance thresholds. Columns (4) and (5) further decompose export performance according to the destination of sales (Russia and the rest of the world, respectively). Interestingly, *hit-borrowers* recorded a statistically significant decline also in sales towards other foreign destinations (by more than 10 percent). This is consistent with the hypothesis that the negative liquidity shock arising from the sudden contraction of sales in the Russian market might have hindered the export performance in other markets, by reducing the cash flow available for investment and/or working capital. The results that export sales in foreign markets are affected by the liquidity shock more than domestic ones is consistent with the higher financial needs typically associated with export activities.[9]

Overall, this evidence points out that the Russia shock represented a severe challenge to the business of a subset of Italian firms. In this respect, the sudden drop in revenues due to the increasing difficulties in exporting has analogies with the Covid-19 crisis, even if the number of firms affected is much smaller. But differently from it, the firms affected by

[9]In unreported estimates we replicate the specifications in columns (4) and (5), exploiting the full detail by product and country available in customs data. We compute the dependent variable as the log change in exports for each product-country combination (as opposed to the log change in total exports). This specification allows us to control for demand shocks at the product-country level. The results are consistent with the more aggregate evidence reported in Table 4. We also decompose exports in the intensive and extensive margins, and find that both contribute to the decline in exports.

this trade shock did not have the chance to take advantage of the generous public support programs (e.g. legislative moratoria, public guarantees, grants) implemented in response to the pandemic crisis. Therefore, the 2014 Russia shock represents an interesting episode to analyse how credit supply and the structure of lending relations change in response to a demand shock that affects a non-negligible subset of Italian firms, without public support measures alleviating the adverse effects.

5.2 Credit effects on *hit-borrowers* and banks

We now turn to consider how the worsened business performance of *hit-borrowers* influenced the amount of credit available to them, as measured by the amount of granted loans, as well as their actual draw-down of credit, as measured by the outstanding loan amount. Initially, we rely on a firm level analysis to capture the overall change in credit, i.e. irrespective of any change in the distribution of loan amounts across lenders, an important issue that we explore later.

Notwithstanding the severity of the shock, *hit-borrowers* did not suffer, on average, from a contraction in the overall amount of credit available in the post-shock period (Table 5, panel a). Yet, the drop in revenues substantially increased their credit demand (Table 5, panel b): on average, the growth in outstanding credit was 7.4 percentage points higher than that observed for other comparable firms. The increase was especially marked for credit lines, the most suitable loan instrument to cope with liquidity needs; no such increase is instead observed for trade finance loans, presumably reflecting the difficulties to find new business opportunities abroad so as to substitute for the lost export sales to Russia. Importantly, we do not find any statistically significant differential effect on granted and outstanding loans (Table 6) for firms that relied more on credit granted by banks that had lent a disproportionate amount towards firms exporting to Russia.

Next, we consider whether the Russia shock had effects on the credit supply of the banks more (indirectly) exposed to Russia through bank-firm links. Specifically, we test whether higher bank exposure had an effect on their overall credit supply in the four quarters since the start of the Russia shock, relative to the four quarters before the shock

(Table 7). We gradually add controls to the specification. Column 1 only includes firm-time and bank-firm fixed effects. Loan-level controls are included in column 2, while loan-level and bank-level controls are included in column 3 (our baseline specification).

We find that in the post-shock period between the third quarter of 2014 and the last quarter of 2015 banks relatively more exposed to the Russia shock cut lending relative to less exposed banks. A one standard deviation increase in bank exposure is associated to a 0.8 percentage-point decrease in credit supply after the shock.

Columns 4-6 explore the effect of the Russia shock on the supply of various forms of credit. Specifically, we separately consider credit lines, term loans and export loans as the dependent variable instead of total loans. The coefficients on bank exposure are always negative and particularly large for revocable credit lines and export loans.

To provide a better understanding of the underlying dynamics, Figure 2 reports the results of a specification in which $BankExposure_b$ is interacted with dummies for each quarter. The two red vertical lines highlight the period in which the dual external shock hit the Russian economy, i.e. between 2014Q2 and 2014Q4 (trade sanctions were introduced between April and August and the sharp decrease in oil prices took place in the second half of 2014).

The credit supply of more exposed banks starts to decline three quarters after 2014Q2, reaching a plateau around 6 quarters after the beginning of the shock. The figure also suggests that there was no significant difference in the credit supply of more exposed banks, relative to that of less exposed banks, before the shock. This provides support to the parallel trend assumption.

5.3 Heterogeneity among *hit* and *non-hit borrowers*

We now turn to consider how banks adjusted their loan portfolio allocation in the aftermath of the Russia shock with respect to *hit* vs. *non-hit borrowers*. To do so we initially consider the triple interaction among $BankExposure_b$, a dummy $Post_t$ for the period after the shock and another dummy $HitBorrower_i$ to identify *hit-borrowers*. The results are reported in Table 8 (column 1). Relative to other lenders, banks more exposed to the Rus-

sia shock reduced their credit supply to *non-hit borrowers* – in line with the results above and the fact that *non hit-borrowers* are the vast majority of firms. The interaction with the hit-borrower dummy is instead positive and significant, suggesting that they increased their granted credit to *hit-borrowers* relative to other lenders. A one standard deviation in bank exposure is associated with a 2.1 percentage-points increase in credit to *hit-borrowers* and a decrease of 0.9 percentage-point towards other NFCs borrowers.

Figure 3 provides further evidence on the dynamics of the credit reallocation between *hit* and *non-hit borrowers* undertaken by these banks: before the shock their lending strategies were broadly similar to the ones of other lenders, for both categories of borrowers; afterwards, instead, their credit supply increased for *hit-borrowers* (although remaining below the statistical significance threshold relative to the base quarter), whereas it gradually decreased for *non hit-borrowers*. The timing of more exposed banks' reaction also differs between *hit* and *non hit-borrowers*. Credit supply to the former reacts earlier, already in the third quarter of 2014, consistently with the fact that these firms are those directly hit by the trade shock; in contrast, the credit supply tightening to the latter occurs later, as banks adjust their loan portfolio to the shock through their lending policy.

We then investigate the extent of the heterogeneity within *hit-borrowers*, dividing them in two groups based on their exposure to the Russian market: *medium-hit borrowers* with a moderate exposure to Russia (exports to Russia between 9 and 30 per cent of total sales) and *high-hit borrowers* with a high or very high exposure to Russia (exports to Russia between 30 and 100 per cent of total sales). Table 8 (column 2) shows that the positive credit supply shock only involved *medium-hit borrowers*, whereas the coefficient on the interaction with *high-hit borrowers* is not statistically different from zero, thus indicating that the latter firms suffered a negative credit supply shock similar to that of *non-hit borrowers* (the reference category). This is consistent with the interpretation that exposed banks were more willing to financially support (relative to other lenders) only the subset of *hit-borrowers* with reasonable prospects of diversification and recovery (i.e. those whose exposure to the Russian market was not at extremely high levels of concentration). Column 3 of Table 8 instead investigates the heterogeneity within *non-hit borrowers*, by diving them in the four sectors of the economy (manufacturing, construction, services, and other

sectors). The results suggest that the credit contraction with respect to *non hit-borrowers* occurred across all the main sectors of the economy, with the construction sector being more strongly affected by the negative credit supply shock.

The last result on the construction sector is related to the manner in which more exposed banks carried out credit adjustments, namely mainly through changes in the credit supply to ex ante more financially vulnerable firms. Indeed, in Italy firms in the construction sector are on average relatively more financially fragile than others, and we find that banks more exposed to the Russia shock predominantly reduced credit towards borrowers with a low credit rating ($Riskierfirm$)[10] already before the shock (Table 9, column 1). The more pronounced credit tightening with respect to riskier borrowers is robust to an alternative specification that takes into account the potential non-linear effects of $BankExposure$ across banks. Indeed, we consider the interaction of $Post$ and $Riskierfirm$ with bank-level dummies identifying for each bank its quartile in the $BankExposure$ distribution, and we find that the credit restriction towards riskier firms relative to others is more intense for banks in the third and, especially, in the fourth quartile (Table 9, column 2). Moreover, although banks with a weaker balance sheet, as measured by the NPL ratio, reduced credit with respect to risky borrowers similarly to less fragile banks, their credit tightening also comprised more solid borrowers (Table 9, column 3), suggesting a more broad based deleveraging strategy. Importantly, although banks more exposed to the Russia shock cut relatively more credit towards risky borrowers, this lending strategy did not apply towards ex ante riskier *hit-borrowers*, as we find that these firms are actually the ones driving the results in Table 8 on the relative expansion of credit supply towards *hit-borrowers* (Table 9, column 4). In other words, those firms that were already ex ante vulnerable, and presumably also with less chances to obtain credit (from other lenders) after the shock, were also the ones receiving relatively greater credit support by banks more exposed to the Russia shock.

We interpret this last piece of evidence as consistent with credit adjustments driven

[10]Riskiness is based on the Cerved score, which is in turn derived on the basis of the Altman (1968) methodology resulting in the classification of firms into 9 increasing risk classes from 1 to 9. In particular, we generated a $RISKIER$ variable which is equal to one if the firm is classified in the vulnerable categories, i.e. the risk classes between 7 and 9.

by a bank capital channel. Indeed, banks more exposed to the Russia shock might find more convenient, relative to other lenders, to provide credit to *hit-borrowers* so as to avoid, at least in the short-term, their default. Indeed, this boils down to which banks have higher incentives to provide credit to firms facing a temporary liquidity shock: the higher the bank exposure to these firms the higher the cost – absent their liquidity support – of their (simultaneous) default in terms of profits and, ultimately, capital. At the same time, more exposed banks implemented a de-risking strategy by reducing credit to all borrowers that were already risky before the shock. This loan portfolio adjustment across NFCs borrowers aimed at reducing the impact of the heightened credit risk due to the increased exposure towards *hit-borrowers*. Overall, the estimated coefficients imply that on average the net effect for more exposed banks is an overall de-risking of their NFCs' loan portfolio, as for all banks *hit-borrowers* represented a small share of their NFCs' loans.

6 Robustness checks

In this section we present a series of robustness tests to rule out that our results are driven by alternative mechanisms.

Relationship lending. We consider whether our main results may depend on the fact that more exposed banks are also on average more likely to be the main relationship lender (Petersen and Rajan, 1994; Berger and Udell, 1995) of *hit-borrowers*, and as such be more likely to accommodate firms' idiosyncratic credit demand shocks. We include in our baseline specification the interaction of a dummy for the main lender – defined as the bank holding the higher share of borrower's bank credit pre-shock – with the *hit-borrower* and *post* variables. Table 10 (column 1) shows that the main lender grants more credit to the borrower after the shock; however, the coefficients related to both $BankExposure_b$ and its interaction with *hit-borrowers* remain roughly unchanged relative to our baseline specification. This evidence suggests that relationship lending is not a plausible explanation for the divergence in lending behaviour by banks differently affected by the Russia shock.

Bank sectoral and trade finance specialization. We consider as a robustness whether

bank specialization in trade finance activities (Crozet and Hinz, 2020) or some economic sectors (Paravisini et al., 2015) alternatively explain the lending patterns observed and in particular the credit reallocation between hit and non-hit borrowers undertaken by the banks more exposed to the Russia shock. Table 10 (columns 2 and 3 respectively) show that both the magnitude and statistical significance of coefficients related to $BankExposure_b$ and its interaction with the *hit-borrower* dummy are roughly unchanged once inserting in the regression model proxies for either type of specialization.

Direct bank exposures to Russia. Our main variable of interest, $BankExposure_b$, only takes into account the indirect exposure of each bank to the Russia shock through their lending to Italian exporters to Russia. However, banks may also hold direct exposures to Russian branches and subsidiaries. These exposures may also potentially affect their lending policies towards Italian firms via the bank capital channel. To rule out the possibility that our results only depend on such direct exposures, rather than from the indirect exposures through hit-borrowers, we run our main specifications excluding from the sample the Italian banks with branches or subsidiaries in Russia.[11] Table 11 (column 1) shows that the results are in line with our earlier results: banks more exposed to the Russia shock cut lending relatively more to non-hit borrowers, while the opposite credit pattern takes place towards *hit-borrowers*.

Import linkages. The large rouble depreciation in 2014 might have benefited firms and sectors importing inputs from Russia (although only a small share of imports is invoiced in the Russian currency, as a large majority of imports is settled in U.S. dollars and euro). Italy's imports from Russia are highly concentrated in a small number of sectors (mainly natural gas, oil, metals and metal products). We run the baseline specification on credit supply after dropping these sectors and find that our results are confirmed (Table 11, column 2).

Oil price shock. The steep fall in oil price might affect the activity of Italian firms and sectors not only via the decrease in Russia's import demand but also through other channels; for instance, sectors with a high energy intensity might benefit from cheaper oil

[11] The two largest Italian banking groups, Intesa Sanpaolo and UniCredit, are the only ones with Russian subsidiaries.

prices. We compute a measure of bank exposure to energy-intensive sectors (defined on the basis of energy use per unit of value added). We find that the inclusion of this control does not change our coefficients related to $BankExposure_b$ (Table 11, column 3).

Trade in services. The sharp decline in Russian import demand affected not only goods but also services. Specifically, travel expenditures by Russian visitors in Italy (the main component in Italy's exports of services to Russia) fell by about 35 per cent in value terms between 2013 and 2015. Exposure to Russian travellers was heterogeneous across provinces: the share of Russian travellers' expenditure on total foreign traveller's expenditure before the shock was negligible in most provinces, but it was as high as 40 per cent in selected destinations that were very popular among Russian tourists. We compute a measure of bank exposure to services sectors hit by the Russia shock as a weighted average of loans to hotels and restaurants, with weights corresponding to the share of Russian travellers' expenditure on total foreign travellers' expenditure in each province. We find that the coefficients related to $BankExposure_b$ are roughly unaffected (Table 11, column 4).

7 Conclusions

This paper uses the dual shocks of sanctions and falling oil prices suffered by Russia in 2014 as an exogenous event that sharply reduced sales opportunities for Italian firms previously exporting in the Russian market. This allows us to investigate how a trade shock in an export market propagates to the exporting country's banking system, specifically through banks with a NFCs loan portfolio disproportionately oriented toward firms exporting to Russia.

We first confirm that firms heavily exporting to Russia displayed a substantial worsening of their performance after the shock, in terms of lower revenues and higher financial vulnerability. Credit demand increased, especially for loan instruments such as credit lines that are better suited to cope with liquidity needs. Banks that were relatively more exposed to Italian exporters to Russia cut their overall credit supply, in particular *vis-à-vis* borrowers that were not directly hit by the Russia shock (especially ex ante risky firms).

At the same time, exposed banks expanded credit towards firms moderately hit by the Russia shock, in an attempt to accommodate their liquidity needs and prevent a generalized solvency crisis that may have a non-negligible impact on their capital position. The empirical evidence is consistent with the bank capital channel: banks more exposed to the surge in credit risk due to the Russia shock attempted to reduce their loans towards risky firms; at the same time, these banks had higher incentives to avoid the default of firms severely hit by the Russia shock, thus they provided, relative to other lenders, more liquidity support to these exporters.

Overall, our findings suggest that events that lead to a sudden drop in firm revenues, such as the Russia shock, might not only have an impact on firms that are directly hit by the shock, but they may also propagate to the rest of the economy through the financial sector, as more exposed banks adjust their loan portfolio including *vis-à-vis* non-hit firms. The evidence is to a large extent consistent with the results reported by Federico et al. (2019), who analyze banks' reaction to an import competition shock rather than an export demand shock.

A relevant implication of our work is that the transmission of trade shocks through the financial sector does not necessarily have to pass through global banks. Local or regional banks that are specialized in lending to export companies – as often occurs because of agglomeration economies, geographical advantages or specialization in bank lending – might act as a propagation channel for the rest of the economy. The overall magnitude of these effects obviously depend on the size of the trade shock, and in our case study it was relatively moderate thanks to the widely diversified structure of Italian exports. Nevertheless, our findings suggest that a trade shock of a much larger magnitude might lead to more disruptive effects for the economy also through the propagation operated by the banking system towards borrowers not directly hit by the shock.

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8 Tables and figures

Table 1: **Summary statistics**

This table reports summary statistics on the main variables used in the econometric analysis. All the variables are further described in Table 2.

	Count	Mean	Percentiles 25th	50th	75th	Standard deviation
Bank-firm level						
Log credit granted	7169789	12.2729	11.2252	12.1402	13.1224	1.4136
Log credit lines granted	6057137	11.8482	10.8198	11.7753	12.6792	1.3932
Log term loans granted	4084343	11.8508	10.7329	11.7452	12.9012	1.7179
Log credit granted for exports	462790	11.6803	10.8198	11.8845	12.8866	2.0516
Log credit outstanding	7317345	11.6271	10.6793	11.6315	12.7194	1.8560
Log credit lines outstanding	4949024	10.8457	10.1205	11.1075	12.1187	2.1298
Log term loans outstanding	3693711	11.7313	10.6439	11.6274	12.7954	1.7378
Log credit granted for exports	340650	11.6221	10.5815	11.6228	12.6849	1.6359
Share of collateralized loans	7169789	0.1369	0.0000	0.0000	0.0000	0.3161
Share of trade finance	7169789	0.0386	0.0000	0.0000	0.0000	0.1417
Share of bad debts in total borrowing	7317345	0.1312	0.0000	0.0000	0.0000	0.3375
Share of other NPL in total borrowing	7317345	0.0445	0.0000	0.0000	0.0000	0.2043
Bank level						
Bank Exposure	618	0.1779	0.0017	0.0664	0.2149	0.4497
Log assets	594	6.3026	5.1580	6.1601	7.0787	1.6249
Capital / Assets	594	0.1157	0.0817	0.1106	0.1411	0.0644
Share of govt securities	594	0.1925	0.1219	0.1975	0.2628	0.1170
Share of loans to households and NFC	594	0.5725	0.5073	0.6001	0.6627	0.1563
Loans-to-deposits ratio	594	1.1541	0.9412	1.0866	1.2981	0.4078
NPL ratio	594	0.1175	0.0587	0.1065	0.1656	0.0811
Firm level (all firms)						
Hit borrower (0/1)	684956	0.0045	0.0000	0.0000	0.0000	0.0671
Exports to Russia / Sales	22521	0.0325	0.0007	0.0049	0.0241	0.0841
Log sales	538033	6.3553	5.3119	6.3324	7.3909	1.7397
Log exports	90817	4.3893	2.1644	4.7074	6.8429	3.2849
Log assets	558339	6.6866	5.6559	6.5694	7.5984	1.5335
Riskier firm (0/1)	684956	0.2083	0.0000	0.0000	0.3529	0.3299
Leverage	555743	14.9075	2.2647	5.1000	12.6287	197.1987
Liquid ratio	539481	0.0968	0.0138	0.0450	0.1248	0.1321
Firm level (hit borrowers)						
Hit borrower (0/1)	3095	1.0000	1.0000	1.0000	1.0000	0.0000
Exports to Russia / Sales	3095	0.1775	0.0748	0.1187	0.2224	0.1609
Log sales	3012	7.5783	6.5331	7.6535	8.6572	1.7092
Log exports	2719	6.8889	5.7548	7.0806	8.2603	2.1207
Log assets	3027	7.7249	6.6744	7.6677	8.6546	1.528
Riskier firm (0/1)	3095	0.2416	0.0000	0.0000	0.4505	0.3372
Leverage	3051	7.8640	2.3935	4.4956	10.1310	44.5467
Liquid ratio	3023	0.1137	0.0191	0.0588	0.1555	0.1363

Table 2: **Description of the variables**

This table reports the description of the variables used in the econometric analysis and their sources. Summary statistics on all the variables are provided in Table 1.

Variable	Description	Source
Bank-firm level		
Credit granted	Credit granted by banks to non-financial corporations	Credit register
Credit outstanding	Credit outstanding, i.e. the amount effectively drawn by the borrower	
Share of collateralized loans	Share of collateralized loans in total loans granted by the bank to the firm	
Share of trade finance	Share of trade finance loans in total loans granted by the bank to the firm	
Share of bad debts in total borrowing	Share of bad debts in total loans granted by the bank to the firm	
Share of other NPLs in total borrowing	Share of other non performing loans in total loans granted by the bank to the firm	
Bank level		
Bank exposure	Weighted average of the share of exports to Russia in total sales of firms borrowing from the bank in the three years preceding the Russia shock (2011-2013; weights are based on the share of the borrowing firm in bank loan portfolio	Credit register and CMA
Log assets	Logarithm of bank assets	Bank supervision statistics
Capital / Assets	Ratio of capital and reserves to (unweighted) assets	
Share of govt securities	Share of government debt securities holdings in total assets	
Share of loans to households and NFC	Share of loans to households and non-financial corporations and households in total assets	
Loan-to-deposits ratio	Ratio of loans to deposits	
NPL ratio	Ratio of non-performing loans to total loans	
Firm level		
Hit borrower	Indicator variable equal to one if the share of exports to Russia in total sales is 9 percent or more in at least one of the three years preceding the Russia shock (2011-2013)	Customs and Monopolies Agency (CMA)
Log exports	Logarithm of firm exports	
Log sales	Logarithm of firm sales	Cerved
Log assets	Logarithm of firm assets	
Riskier firm	Indicator variable equal to one if the firm is classified at least as vulnerable according to the Cerved score based on the Altman methodology	
Leverage	Assets-to-equity ratio	
Liquid ratio	Share of deposits and other liquid assets in total assets of firms	
Lenders exposure	Average exposure of banks lending to the firm, which is calculated as the average bank exposure weighted for the share of the lending bank in firm's total borrowing.	Credit register and CMA

Figure 1: **Banks' Exposure to the Russia Shock**

This figure depicts the kernel density estimation of the distribution of the exposure of Italian banks to the Russia shock of 2014. The method of calculation of the variable is illustrated in Table 2.

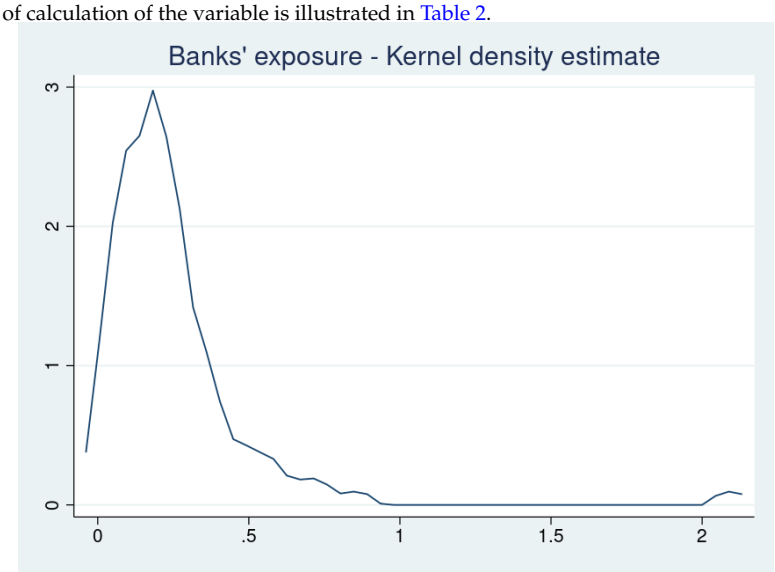


Table 3: **Firms' post-shock outcomes**

This table reports the estimation results of a linear fixed effects model on a cross-section of firms. In the first three models the outcome variables are the change in log sales, leverage and liquid ratio between the average of the two-year pre-shock period and the value in 2016. The last two models are linear probability models with a dichotomous outcome variable equal to one if the firm is reported as having bad debts or other non performing loans in the Credit Register at the end of 2016. The main explanatory variable is $HITBORROWER$, an indicator variable which is equal to one if the share of exports to Russia in total sales is 9 percent or more in at least one of the three years preceding the Russia shock (2011-2013). All the specifications include fixed effects at province and sector level and a set of firm controls. Standard errors are clustered at the sector-province level. *, ** and *** denote respectively 10 per cent, 5 per cent and 1 per cent significance levels.

	(1)	(2)	(3)	(4)	(5)
	Δ Sales	Δ Leverage	Δ Liquid ratio	Bad debt	Other NPL
HITBORROWER	-0.1667***	3.5221***	-0.0119***	0.0190***	0.0176***
	(0.0445)	(1.1099)	(0.0035)	(0.0047)	(0.0066)
Firm controls	Yes	Yes	Yes	Yes	Yes
Province FE	Yes	Yes	Yes	Yes	Yes
Sector FE	Yes	Yes	Yes	Yes	Yes
N	305312	316971	299810	346335	346335
adj. R^2	0.063	0.087	0.019	0.046	0.069

Table 4: **Firms' post-shock domestic sales and exports**

This table reports the estimation results of a linear fixed effects model on a cross-section of firms. The outcome variables in columns (1)-(5) are the change in total sales, domestic sales, exports, exports to Russia and exports to the rest of the world (ROW), respectively. The outcome variables are defined as the change between the average of the two-year pre-shock period and the value in 2016. The main explanatory variable is $HITBORROWER$, an indicator variable which is equal to one if the share of exports to Russia in total sales of the firm is 9 percent or more in at least one of the pre-shock years. All the specifications include fixed effects at province and sector level and a set of firm controls. Columns (3)-(5) also include product-country fixed effects. Standard errors are clustered at the sector-province level. *, ** and *** denote respectively 10 per cent, 5 per cent and 1 per cent significance levels.

	(1) Δ Total sales	(2) Δ Domestic sales	(3) Δ Exports	(4) Δ Exports to Russia	(5) Δ Exports to ROW
HITBORROWER	-0.1726***	-0.0834*	-0.4071***	-0.7483***	-0.1110***
	(0.0360)	(0.0445)	(0.0562)	(0.0704)	(0.0316)
Firm controls	Yes	Yes	Yes	Yes	Yes
Province FE	Yes	Yes	Yes	Yes	Yes
Sector FE	Yes	Yes	Yes	Yes	Yes
N	62524	62009	62519	9867	62117
adj. R^2	0.021	0.009	0.124	0.099	0.124

Table 5: **Firms' Borrowing**

This table reports the estimation results of a panel linear fixed effects model where the outcome variable is the logarithm of the overall stock of credit granted (panel a) and credit outstanding (panel b) by all banks to each non-financial corporation in a time window of one year before and after the Russia shock occuring in the third quarter of 2014. Results are also reported for the loan break down, i.e. credit lines, term loans and loans granted for export purposes (trade finance). The main explanatory variable is the interaction between $HITBORROWER$ (an indicator variable which is equal to one if the share of exports to Russia in total sales is 9 percent or more in at least one of the three years preceding the Russia shock (2011-2013)) and $POST$ (equal to one in the third quarter of 2014 and in the following quarters and zero before). All the specifications include firm, sector x time and province x time fixed effects. Standard errors are clustered at the sector-time and province-time level. *, ** and *** denote respectively 10 per cent, 5 per cent and 1 per cent significance levels.

(a) Credit granted				
	(1) Total loans	(2) Credit Lines	(3) Term Loans	(4) Trade finance
POST x HITBORROWER	0.0160	0.0082	0.0252	0.0027
	(0.0104)	(0.0119)	(0.0153)	(0.0295)
Firm time-varying controls	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Sector x Time FE	Yes	Yes	Yes	Yes
Province x Time FE	Yes	Yes	Yes	Yes
N	2746613	2391331	1987308	208464
adj. R^2	0.963	0.958	0.930	0.880
(b) Credit outstanding				
POST x HITBORROWER	0.0744**	0.1255**	0.0547**	0.0133
	(0.0284)	(0.0487)	(0.0183)	(0.0293)
Firm time-varying controls	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Sector x Time FE	Yes	Yes	Yes	Yes
Province x Time FE	Yes	Yes	Yes	Yes
N	2601962	1995077	1887544	149586
adj. R^2	0.902	0.835	0.923	0.885

Table 6: **Firms' Borrowing and Banks' Exposure**

This table reports the estimation results of a panel linear fixed effects model where the outcome variable is the logarithm of the overall stock of credit granted (panel a) and outstanding (panel b) by all banks to each non-financial corporation in a time window of one year before and after the Russia shock of the third quarter of 2014. Results are also reported for the loan break down, i.e. credit lines and term loan, and for those granted for export purposes (trade finance). The main explanatory variables are: the interaction between $HITBORROWER$ (an indicator variable which is equal to one if the share of exports to Russia in total sales is 9 percent or more in at least one of the three years preceding the Russia shock (2011-2013)) and $POST$ (equal to one in the third quarter of 2014 and in the following quarters and zero before); the interaction between $LENDERS_EXPOSURE$ (average exposure to $HITBORROWER$ of each bank lending to the firm, which is calculated as the average $BANK_EXPOSURE$ (Table 2) weighted for the share of the lending bank in firm's total borrowing) and $POST$; the triple interaction between $LENDERS_EXPOSURE$, $POST$ and $HITBORROWER$. All the specifications include firm, sector x time and province x time fixed effects. Standard errors are clustered at the sector-time and province-time level. *, ** and *** denote respectively 10 per cent, 5 per cent and 1 per cent significance levels.

(a) Credit granted

	(1) Total loans	(2) Credit Lines	(3) Term Loans	(4) Trade finance
POST x HITBORROWER	0.0066	0.0098	0.0059	0.0306
	(0.0131)	(0.0149)	(0.0232)	(0.0383)
LENDERS EXPOSURE x POST	-0.0143	-0.0278**	0.0052	-0.0340
	(0.0086)	(0.0099)	(0.0179)	(0.0582)
LENDERS EXPOSURE x POST x HITBORROWER	0.0337	-0.0041	0.0670	-0.0939
	(0.0338)	(0.0345)	(0.0693)	(0.0935)
Firm time-varying controls	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Sector x Time FE	Yes	Yes	Yes	Yes
Province x Time FE	Yes	Yes	Yes	Yes
N	2730500	2380287	1976784	208254
adj. R^2	0.963	0.957	0.930	0.880

(b) Credit outstanding

	(1) Total loans	(2) Credit Lines	(3) Term Loans	(4) Trade finance
POST x HITBORROWER	0.0615*	0.1082*	0.0588**	0.0490
	(0.0281)	(0.0478)	(0.0235)	(0.0415)
LENDERS EXPOSURE x POST	-0.0117	-0.0217	0.0107	0.1086
	(0.0137)	(0.0209)	(0.0196)	(0.0766)
LENDERS EXPOSURE x POST x HITBORROWER	0.0470	0.0620	-0.0148	-0.1317
	(0.0606)	(0.0973)	(0.0608)	(0.0910)
Firm time-varying controls	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes
Sector x Time FE	Yes	Yes	Yes	Yes
Province x Time FE	Yes	Yes	Yes	Yes
N	2587470	1987395	1877973	149458
adj. R^2	0.902	0.835	0.923	0.885

Table 7: **Credit supply - Baseline**

This table reports the estimation results of a linear fixed effects model where the outcome variable is the logarithm of the stock of loans granted by banks to non-financial corporations. Columns (1)-(3) gradually introduce controls to the specification where the dependent variable refers to total loans. Columns (4)-(6) report the results for the loan breakdown, i.e. credit lines, term loans, and loans granted for export purposes (trade finance). Standard errors are clustered at the bank-firm and firm-time level. *, ** and *** denote respectively 10 per cent, 5 per cent and 1 per cent significance levels.

	(1))	(2)	(3)	(4)	(5)	(6)
	Total loans	Total loans	Total loans	Credit Lines	Term Loans	Trade finance
BANKEXPOSURE x POST	-0.0438***	-0.0431***	-0.0184***	-0.0311***	-0.0120	-0.0735***
	(0.0043)	(0.0042)	(0.0042)	(0.0048)	(0.0107)	(0.0284)
Bank x firm	Yes	Yes	Yes	Yes	Yes	Yes
Firm x time	Yes	Yes	Yes	Yes	Yes	Yes
Loan-level controls		Yes	Yes	Yes	Yes	Yes
Bank-level controls			Yes	Yes	Yes	Yes
N	5424360	5424360	5424360	4511316	2873813	360555
adj. R^2	0.9482	0.9486	0.9486	0.9280	0.8918	0.8260

Standard errors in parentheses
* $p < .10$, ** $p < .05$, *** $p < .01$

Figure 2: **Effects of the shock on credit supply over time**

This figure depicts the point estimate and the 95 per cent confidence interval of the coefficients of the linear regression of the logarithm of credit granted by banks to non-financial corporations on the interaction between $BANKEXPOSURE$ and the time dummies for the four quarters before the start of the Russia shock in the second quarter of 2014 and the six quarters after. The two vertical red lines identify the time interval in which the dual external shock hit Russia (between the end of the second and the fourth quarters of 2014). Such specification corresponds to the one whose results are reported in Table 7 with the $POST$ variable being replaced by a vector of time dummies.

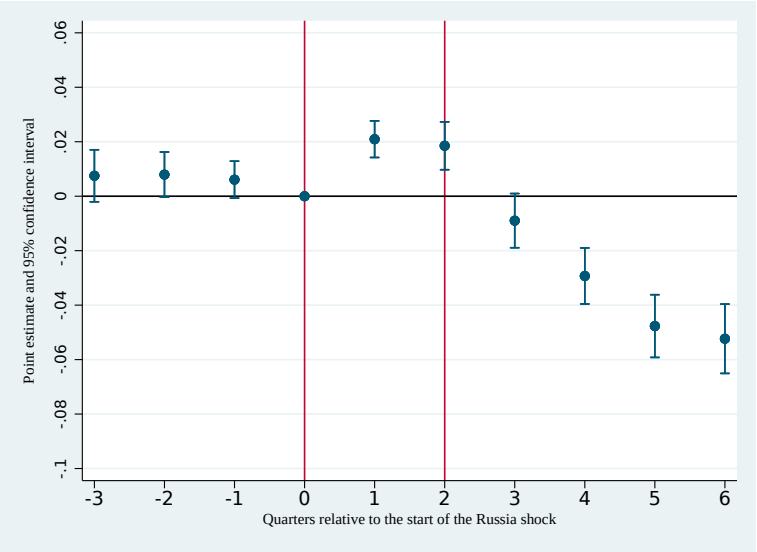


Table 8: **Credit supply - Heterogeneity among hit and non-hit firms**

This table reports the estimation results of a linear fixed effects model where the outcome variable is the logarithm of the stock of loans granted by banks to non-financial corporations. Column (1) considers the triple interaction between $BANKEXPOSURE$, $HITBORROWER$ and $POST$ (equal to one in the third quarter of 2014 and in the following quarters and zero before). Column (2) further differentiates $HITBORROWER$ between $MEDIUMHITBORROWER$ (export to Russia between 9 and 30 per cent of total sales) and $HIGHHITBORROWER$ (export to Russia above 30 per cent). Column (3) distinguishes non-hit borrowers based on their economic sector (manufacturing, construction, services and others) . Standard errors are clustered at the bank-firm and firm-time level. *, ** and *** denote respectively 10 per cent, 5 per cent and 1 per cent significance levels.

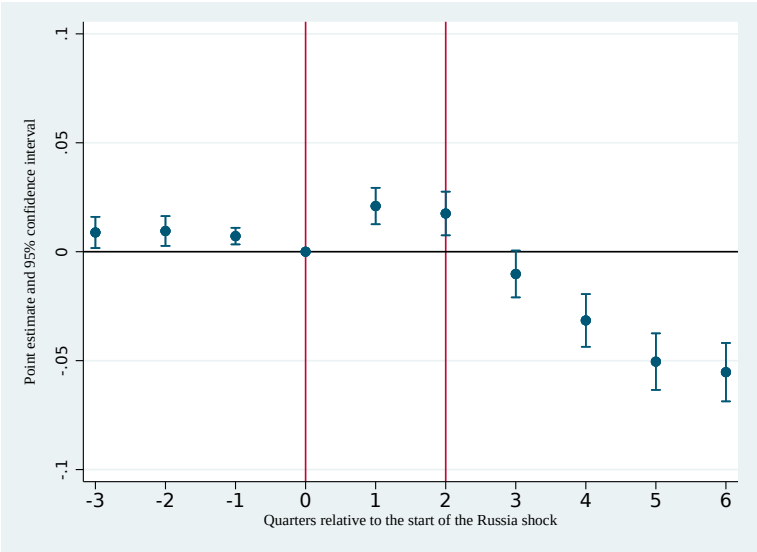
	(1) Hit borrowers	(2) Medium and high-hit borrowers	(3) Non-hit borrowers
BANKEXPOSURE x POST	-0.0209***	-0.0208***	
	(0.0043)	(0.0043)	
BANKEXPOSURE x POST x HITBORROWER	0.0678***		0.0469**
	(0.0204)		(0.0200)
BANKEXPOSURE x POST x MEDIUMHITBORROWER		0.1071***	
		(0.0314)	
BANKEXPOSURE x POST x HIGHHITBORROWER		-0.0247	
		(0.0341)	
BANKEXPOSURE x POST x MANUFNONHIT			-0.0629***
			(0.0210)
BANKEXPOSURE x POST x CONSTRUCTIONNONHIT			-0.1187***
			(0.0235)
BANKEXPOSURE x POST x SERVICESNONHIT			-0.0615***
			(0.0210)
BANKEXPOSURE x POST x OTHERNONHIT			-0.0233
			(0.0286)
Bank x firm	Yes	Yes	Yes
Firm x time	Yes	Yes	Yes
Loan-level controls	Yes	Yes	Yes
Bank-level controls	Yes	Yes	Yes
N	5424360	5402199	5424360
adj. R^2	0.9486	0.9486	0.9486

Standard errors in parentheses
* $p < .10$, ** $p < .05$, *** $p < .01$

Figure 3: **Effects of the Russia shock on credit supply over time**

This figure depicts the point estimate and the 95 per cent confidence interval of the coefficients of the linear regression of the logarithm of credit granted by banks to non-financial corporations on the interaction between $BANKEXPOSURE$, the time dummies for the four quarters before the start of the Russia shock in the second quarter of 2014 and the six quarters after, and the non-hit borrowers dummy (upper panel) / hit-borrowers dummy (lower panel). The two vertical red lines identify the time interval in which the dual external shock hit Russia (between the end of the second and the fourth quarters of 2014).

Nonhit-borrowers



Hit-borrowers

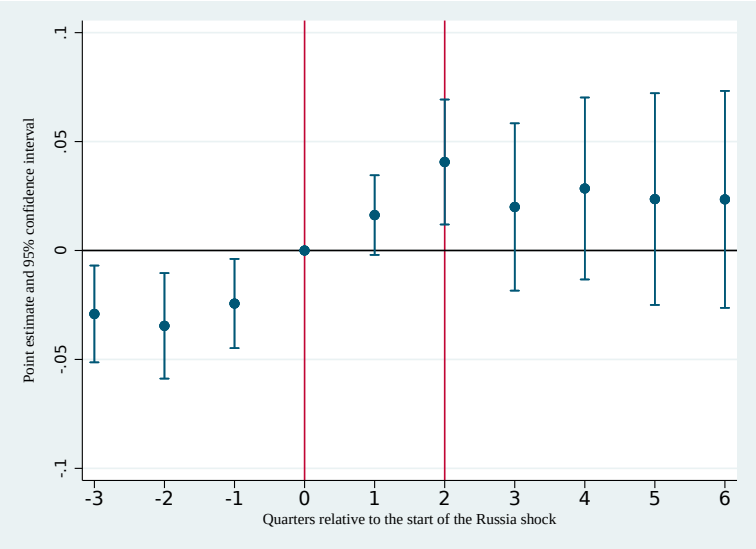


Table 9: **Credit supply - Riskier firms**

This table reports the estimation results of a linear fixed effects model where the outcome variable is the logarithm of the stock of loans granted by banks to non-financial corporations. $RISKIER$ is equal to one if the firm is classified in the vulnerable categories of the CERVED score (risk class between 7 and 9). In column (2) the dummy variables $Q2$, $Q3$, $Q4$ are equal to 1 for banks in the second, third or fourth quartile of $BANKEXPOSURE$ distribution, respectively; the associated coefficients consider as reference category banks in the first quartile. Columns (3) and (4) consider interactions with $NPLRATIO$ and $HITBORROWER$ (see Table 2 for definitions). Standard errors are clustered at the bank-firm and firm-time level. Standard errors are clustered at the bank-firm and firm-time level. *, ** and *** denote respectively 10 per cent, 5 per cent and 1 per cent significance levels.

	(1)	(2)	(3)	(4)
BANKEXPOSURE x POST	-0.0071		0.0008	-0.0078
	(0.0053)		(0.0057)	(0.0054)
BANKEXPOSURE x POST x RISKIER FIRM	-0.0180**		-0.0271***	-0.0327***
	(0.0089)		(0.0443)	(0.0092)
BANKEXPOSURE Q2 x POST		-0.0279***		
		(0.0089)		
BANKEXPOSURE Q3 x POST		-0.0571***		
		(0.0086)		
BANKEXPOSURE Q4 x POST		-0.0108		
		(0.0086)		
BANKEXPOSURE Q2 x POST x RISKIER FIRM		-0.0040		
		(0.0130)		
BANKEXPOSURE Q3 x POST x RISKIER FIRM		-0.0295***		
		(0.0123)		
BANKEXPOSURE Q4 x POST x RISKIER FIRM		-0.0683***		
		(0.0121)		
BANKEXPOSURE x POST x NPL RATIO			-0.0420***	
			(0.0144	
BANKEXPOSURE x POST x NPL RATIO X RISKIER FIRM			0.0406*	
			(0.0219)	
BANKEXPOSURE x POST X HITBORROWER				0.0212
				(0.0283)
BANKEXPOSURE x POST x RISKIER FIRM X HITBORROWER				0.0988**
				(0.0453)
Bank x firm	Yes	Yes	Yes	Yes
Firm x time	Yes	Yes	Yes	Yes
Loan-level controls	Yes	Yes	Yes	Yes
Bank-level controls	Yes	Yes	Yes	Yes
N	5147793	5147793	5147793	5147793
adj. R^2	0.9486	0.9486	0.9486	0.9486

Standard errors in parentheses
* $p < .10$, ** $p < .05$, *** $p < .01$

Table 10: **Credit supply - Relationship lending and specialization**

This table reports the estimation results of a linear fixed effects model where the outcome variable is the logarithm of the stock of loans granted by banks to non-financial corporations. Column (1) includes controls for main lender. Column (2) includes controls for bank specialization in trade finance. Column (3) includes controls for bank specialization in the firm's sector of activity. Standard errors are clustered at the bank-firm and firm-time level. *, ** and *** denote respectively 10 per cent, 5 per cent and 1 per cent significance levels.

	(1) Main lender	(2) Trade finance special.	(3) Sector special.
BANKEXPOSURE x POST	-0.0205***	-0.0207***	-0.0229***
	(0.0043)	(0.0043)	(0.0043)
BANKEXPOSURE x POST x HITBORROWER	0.0736***	0.0712***	0.0678***
	(0.0259)	(0.0215)	(0.0202)
MAINLENDER x POST	0.0530***		
	(0.0081)		
MAINLENDER x POST x HITBORROWER	-0.0618		
	(0.0448)		
TRADE FINANCE SPEC. x POST		-0.0012	
		(0.0036)	
TRADE FINANCE SPEC. x POST x HITBORROWER		0.0048	
		(0.0253)	
SECTOR SPEC. x POST			0.0068***
			(0.0013)
SECTOR SPEC. x POST x HITBORROWER			0.0106
			(0.0114)
Bank x firm	Yes	Yes	Yes
Firm x time	Yes	Yes	Yes
Loan-level controls	Yes	Yes	Yes
Bank-level controls	Yes	Yes	Yes
N	5424360	5424360	5424360
adj. R^2	0.9487	0.9486	0.9486

Standard errors in parentheses
* $p < .10$, ** $p < .05$, *** $p < .01$

Table 11: **Credit supply - Further robustness checks**

This table reports the estimation results of a linear fixed effects model where the outcome variable is the logarithm of the stock of loans granted by banks to non-financial corporations. Column (1) drops banks with subsidiaries in Russia. Column (2) drops the main sectors importing from Russia. Column (3) adds a control for bank exposure to energy-intensive sectors. Column (4) adds a control for bank exposure to Russian tourism. Standard errors are clustered at the bank-firm and firm-time level. *, ** and *** denote respectively 10 per cent, 5 per cent and 1 per cent significance levels.

	(1) Subsidiaries in Russia	(2) Imports from Russia	(3) Bank exposure to energy	(4) Bank exposure to Russian tourism
BANKEXPOSURE x POST	-0.0222**	-0.0197***	-0.0258***	-0.0210***
	(0.0047)	(0.0043)	(0.0042)	(0.0043)
BANKEXPOSURE x POST x HITBORROWER	0.0574***	0.0688***	0.0789***	0.0677**
	(0.0185)	(0.0199)	(0.0252)	(0.0198)
Bank x firm	Yes	Yes	Yes	Yes
Firm x time	Yes	Yes	Yes	Yes
Loan-level controls	Yes	Yes	Yes	Yes
Bank-level controls	Yes	Yes	Yes	Yes
Energy intensive controls	No	No	Yes	No
Russian tourism controls	No	No	No	Yes
N	3569878	5361957	5417842	5424360
adj. R^2	0.9481	0.9480	0.9486	0.9486

Standard errors in parentheses
* $p < .10$, ** $p < .05$, *** $p < .01$