

Global bank lending during political conflicts: Evidence from the agricultural industry

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Abstract

We examine global banks' lending during the annexation of Crimea by Russia in 2014. The conflict, resulting in a series of bilateral sanctions imposed by the European Union and Russia, had severe ramifications for the agricultural industry. Using syndicated loan data, we document that following the start of the conflict, financial institutions, particularly foreign banks, significantly increase lending to this sector in the European Union. Agricultural firms also benefit from lower risk premia and softer collateral requirements. Our findings suggest that global banks can play a vital role in supporting sectors adversely affected by economic sanctions.

Keywords: economic sanctions, syndicated loans, agriculture

JEL Codes: G21, G28

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"We will do everything to help them survive the Russian winter," Chief Financial Officer Bert Bruggink said at the presentation of the bank's earnings report. " (The Wall Street Journal, 22 August 2014)¹

"The Latvian government, which on Tuesday heard a report on measures to be taken to offset the impact of Russia's embargo, decided to call on banks to stop the aggressive treatment of farmers that are being affected by the embargo and to show more lenience when it comes to postponing their loan payments. " (Baltic News Service, 9 September 2014)²

"Boosting agri-food exports to China and other parts in Asia has become top priority for the EU as the block seeks new markets to offset the loss of sales to Russia. Chinese market alleviates EU agri-food crisis." (China Daily, 24 September 2016)³

1. Introduction

We investigate bank lending in the context of growing concerns about the pressure faced by the agricultural industry arising from the conflict between Russia and Ukraine. The war, which started in 2022, has caused surging food prices due to spiking energy prices and a significant decline of agricultural exports from Ukraine, one of the top exporters of grain and oilseeds worldwide.

Although this issue has been a key focus in the public debate, concerns regarding the survival and development of the agricultural sector already date back to 2014 when Russia annexed Crimea and became involved in the conflict in eastern Ukraine. In reaction to Russia's annexation of Crimea in 2014, the EU and other Western countries imposed sanctions against Russia and Russian individuals, such as asset freezes, travel bans, and trade restrictions. In response to these sanctions, Russia prohibited imports of certain agricultural products from the EU, including fruits, vegetables, dairy products, and meat. The ban, initially introduced for a year, was later extended, leading to a significant negative impact on the agricultural sector in the EU, particularly in countries heavily reliant on exports to Russia. Russian counter sanctions triggered negative effects for the financial performance of agricultural companies in Europe, raising liquidity and solvency concerns. It remains an open question if and how firm performance in the agricultural sector is affected by these geopolitical tensions, and how banks in their role as key providers of credit to these firms react to such a shock.

¹ Van Tartwijk, Maarten. (2014) "Dutch Farms Hit by Russian Ban," *The Wall Street Journal*, 22 August, pp. 17.

² Baltic News Service. (2014) "Latvian govt to urge banks to stop aggressive treatment of embargo-hit farmers," *Baltic News Service*, 9 September.

³ Xinhua. (2016) "Chinese market alleviates EU agri-food crisis: European commissioner," *China Daily*, 24 September.

Banks and other financial intermediations can react to the shock in two ways. On one hand, they may support the sanctioned sector by providing more loans to mitigate the effects of the evolving turmoil. Economic sanctions result in costs for both imposing countries (Hufbauer and Oegg, 2000; Besedes, Goldbach and Nitsch, 2021) and sanctioned countries and hamper economic growth (Evenett, 2002; Neuenkirch and Neumeier, 2015). Despite its ongoing evolution, agriculture remains a capital-intensive industry (Moss, Barry and Ellinger, 1997). The financing gap for the agricultural sector exists in most European countries, and varies from EUR 19.8 to EUR 46.6 billion, with restricted access to long-term loans being the main cause behind this financing gap (European Commission and European Investment Bank, 2020). Therefore, providing external capital to the agricultural industry during the shock would be even more critical. Banks may also lend more to the agricultural sector because of growing concerns about food security and the need to protect the agricultural industry.

On the other hand, banks may reduce lending to the agricultural sector because of the uncertainty arising from the sanctions. During a financial crisis, banks tend to adjust portfolios and reallocate lending towards safer and more transparent assets (Lang and Nakamura, 1995; De Haas and Van Horen, 2013). Russia's sanctions against the EU's agricultural sector resulted in a nearly 8 times larger decline in trade flow than EU's sanctions on Russia (Bělin and Hanousek, 2021). Sanctioned firms experience severe declines in revenue, asset value, and employment (Ahn and Ludema, 2020). Russia is one of the top five agricultural trading partners of the European Union. With bleak business prospects arising from Russia's sanctions on EU's agricultural products and lack of capital, the probability of default for agricultural loans may increase. Therefore, it is equally plausible to expect banks to reduce credit supply for the agricultural industry.

We first investigate whether agricultural borrowers in European countries (Russia and Ukraine excluded) experience negative performance effects after Russia imposed import restrictions on agricultural products from the EU. Next, we compare credit supply to the

agricultural sector with other capital-intensive sectors before and after Russia's agricultural product ban in 2014. The objective of our research is to test whether banks provide higher volumes of lending to the agricultural industry firms when the industry suffers from the negative shock caused by Russian sanctions. We measure lending behaviors via the volume of lending and the total number of loans provided to the agricultural sector. As part of this analysis, we also examine the sources of these variations (home banks or foreign banks, arrangers or participants, and relationship lending) and loan contract features.

Our analysis commences with tests that empirically document that the performance of agricultural borrowers declined during the period 2011-2017, reflected in deteriorating revenue, EBITDA, EBIT, return on assets, and return on capital. This finding supports the view that the unexpected market disturbance negatively affected the profitability of agricultural borrowers. It is also consistent with studies that highlight that economic sanctions cause firms to lose revenue and experience declines in asset values and employees, as well as studies showing that related economic entities suffer declines in trade (Crozet and Hinz, 2016; Ahn and Ludema, 2020). Indeed, the European agricultural sector lost the entire Russian market, one of the top export destinations back in 2014, due to the sanctions and the EU's agri-food export to the Russian Federation collapsed by 42.2% in value after the sanctions (European Commission Agriculture and Rural Development, 2015). Importantly, the results also underscore that bank loans may be needed to alleviate losses in cash flow and refinance loans for operating and investment activities.

Our main analyses exploit syndicated loan data from LPC DealScan and adopt differences-in-differences estimation to analyze banks' lending behavior in the agricultural sector (treatment) and other capital-intensive sectors (control group) before and after the sanctions in 2014 which imposed a negative shock on the agricultural sector. Our sample period spans from 2011 to 2017 which includes 3 years before and after the shock. Following De Haas and Van Horen (2013), we examine changes in each lender's credit supply to every sector through 2011 to 2017. Variations of other unobserved heterogeneities across different sectors are accounted

for by industry-fixed effects. Bank-fixed effects control for time-invariant bank characteristics in their lending activities. Unobserved time-variant factors are controlled for by year-fixed effects. We control for GDP per-capita, inflation rates and gross savings rate to account for the level of economic development.

Our results suggest that banks respond to the sanctions by increasing lending to the agricultural sector relative to other capital-intensive sectors after the sanctions. Specifically, the number of loans to the agricultural sector increased by 20.9% and loan volumes by 50.3%, respectively. It is possible that banks support the agricultural sector by alleviating firms' financial constraints, which may facilitate their search of other markets to sell products. Further evidence for a reallocation of lending towards the agricultural sector is shown in our results that split the sample by the median of agricultural importance, a variable measuring the share of the agricultural sector in the economy. Here, we find that it is those countries whose agricultural sector accounts for a small portion in the economy that requires more agricultural lending after the shock. In other words, the agricultural industry in these countries is likely to be more vulnerable to shocks, requiring higher level of protection.

We additionally investigate whether the increased credit supply comes from domestic or foreign lenders. Giannetti and Laeven (2012) show that lenders rebalance their loan portfolios in favor of domestic borrowers when facing financial crises. In line with this finding, foreign banks may reduce lending whereas domestic banks may increase lending during the negative shock. However, foreign lenders may also rebalance portfolios to alleviate capital shortages of domestic borrowers. In countries where banks have larger exposure to the agricultural sector, the shock is easier to transmit from agriculture to banking through loan losses. Therefore, it is possible that international banks provide more loans than home banks to prevent the transmission of economic shocks from sanctioned markets to the banking sector in the country of origin (Morgan, Rime and Strahan, 2004). Our results are consistent with the latter hypothesis: foreign banks provide more agricultural lending. Both the number and volume of loans from foreign banks increase 21.1% and 72.7%, respectively.

Next, we focus on the composition of loan syndicates by studying separately the roles of arrangers and participants. Typically, arrangers are responsible for screening the loan, negotiating loan contracts, and monitoring the loan, while participants purchase loan shares from arrangers and rely on their due diligence in monitoring the loan (De Haas and Van Horen, 2013). With the information advantages and industry uncertainty caused by the sanctions, home arrangers and foreign arrangers may exhibit different reactions towards agricultural lending. Arrangers may also attract and choose more participants to distribute the loan shares, which would trigger a moral hazard problem. Our evidence shows that, compared to other sectors, agricultural lending comes more frequently from foreign arrangers, indicating no moral hazard problem arising from arrangers' information advantages over participants and economic sanctions.

We also investigate loan contract features. We choose the number of loans to public firms, the number of unsecured loans, risk premiums, and loan maturity to identify whether agricultural loans exhibit favorable loan terms relative to loans in other capital-intensive sectors. Public firms are less opaque since disclosure requirements are more stringent and they can generate positive information externalities to the industry. As a result, banks need less effort to screen and monitor the loan, meaning lending to public firms carries relatively lower risk. Another proxy for borrower's risk level is the requirement to pledge collateral (Berger, Frame and Ioannidou, 2011; Cerqueiro, Ongena and Roszbach, 2016). We examine the number of unsecured loans in the agricultural sector to shed light on the question of whether banks consider borrowers from the agricultural sector as riskier borrowers and treat them unfavorably after the sanction. We also examine the risk premium, defined as the interest rate the bank charges over the risk-free rate to capture whether banks charge a higher risk premium against agricultural loans as a result of the sanctions. Banks may also provide loans with short maturity to the agricultural sector because of the rising uncertainty after the sanction. Results of these tests suggest that agricultural lending tends to include more public firms, more unsecured loans, and lower risk premiums relative to the control group, therefore not necessarily burdens the

agricultural sector after the sanction.

The last part of our analysis focuses on the effect of lending relationship on the total number of loans and total volume of loans. Our results reveal that banks that have few lending relationships with the agricultural sector before the sanction enter the market and act in a supporting role by providing more loans to the agricultural sector after the sanction.

To ensure the robustness of our findings, we perform multiple tests using various sample periods and control groups. In the first set of robustness tests, we expand the sample period to 2010 and 2019. In the second set of tests, all sectors are included in the analysis for the period from 2011 to 2017. Our results remain unaffected. In addition, we also exclude confounding effect caused by agricultural subsidies by controlling for the volume of subsidies.

The sanctions from Russia on the agricultural sector in the EU provide a valid setting to study bank lending during political conflicts. We propose several channels for why lenders direct more credit to the agricultural sector. First, after sanctions are imposed, the sector was severely hit. To illustrate, market shares shrank, and business opportunities weakened companies' abilities to pay their bills. Thus, credit was needed to refinance loans to overcome potential financial distress. Second, due to market disturbances, small firms tended to be acquired by large firms. The loans could support these M&A transactions. In addition, loans could be used to explore alternative products and markets to improve the overall resilience of agricultural industry and long-term food security.

Our results matter because while the EU is a top agricultural producer worldwide, investment trends within the agricultural industry vary between its member states. In 2018, the EU produced a total of EUR 181.7 billion worth of agricultural products, making it the world's largest agricultural producer. However, investments in this sector are declining overall. In 2018, the agricultural sector in the EU 24 member states invested EUR 54.1 billion in fixed assets, which is 4% lower than the investment level in 2011. There are also significant differences in

investment growth rates between member states, with ten of them experiencing positive annual growth rates in agriculture investments between 2011 and 2017 (European Commission and European Investment Bank, 2020). Our study demonstrates the supportive role of banks for agricultural industry, including mitigating cash flow issues and supporting investment activities, during abnormal episodes such as market shocks and political conflicts.

Our research contributes to two strands of literatures. First, our paper relates to prior work about the effect of sanctions on economic growth (Hufbauer and Oegg, 2000; Evenett, 2002; Neuenkirch and Neumeier, 2015; Besedes et al., 2021). Evenett (2002) investigates the effect of eight economic sanctions on South Africa, finding that the sanctions exert significantly negative effects for South Africa's export. Hufbauer and Oegg (2000) point out that U.S. sanctions lead to export reductions to 26 target countries and contractions in employment in the export sector in the U.S. These results highlight that sanctions impose domestic cost in the sanctioning country, although other scholars argue that the domestic costs of sanctions are limited because firms doing business with sanctioned countries tend to be large enough to contain the negative effects and can simultaneously expand their business with non-sanctioned countries (Besedes et al., 2021). In addition, economic sanctions impede the target countries GDP growth, reduce the employment, and damage firms' value (Neuenkirch and Neumeier, 2015; Ahn and Ludema, 2020). Restrictive measures taken by the EU and Russia lead to huge loss of trade for related states and non-embargoed products (Moret, Biersteker, Giumelli, Portela, Veber, Bastiat-Jarosz and Bobocea, 2016; Crozet and Hinz, 2016). However, little is known about the role banks can play in supporting industries that are affected by exogenously imposed sanctions. Our study provides a complementary perspective to prior work by demonstrating that despite facing sanctions, the impacted sector continued to receive support from the banking sector.

Second, our paper complements the literature about bank capital flows and bank's behavior during crises, economic sanctions, and geopolitical tensions (Khwaja and Mian, 2008; Houston, Lin and Ma, 2011; Besedes et al., 2017; Li and Ngo, 2018; Efung, Goldbach and Nitsch, 2023;

Mamonov, Ongena and Pestova, 2021). Khwaja and Mian (2008) use loan level data in Pakistan to investigate bank liquidity shocks after Pakistan's test of nuclear weapons in 1998. The results show that borrowers' loan volumes decrease by 0.6% when bank liquidity suffers from a 1% reduction. Houston et al. (2011) estimate how differences in regulations influence international bank capital flows. They find banks transfer capital from more regulated markets to less regulated markets. This 'race to the bottom' restricts regulators' ability to limit bank risk-taking. Besedes et al. (2017) study the effect of financial sanctions on cross-border capital flows by examining sanctions imposed by Germany from 2005 to 2014. They show that financial activities and capital flows between Germany and target countries were reduced significantly when sanctions are in place. Li and Ngo (2018) examine whether political relations between countries determine cross-border capital (bank) flows. By tracking the footsteps of the Dalai Lama between 2000 through 2013, they show that bank capital flows from China to the host country decline by 12% to 17 % after the Dalai Lama visits this country and meets with the prime minister. They also state that poor political relations are negatively correlated with bank flows for a broader panel of countries. In contrast to bank's behavior and capital outflows documented in prior work, we find that banks (foreign arrangers) provide more credit to sanctioned sectors abroad.

Two studies that are closely related to our research are the works by De Haas and Van Horen (2013) and Giannetti and Laeven (2012). The former shows that international banks curtail lending during financial crises, highlighting heterogeneities in terms of geographical location, lending experience, and presence of subsidiaries and co-lender networks. The latter points out that lenders adjust loan portfolios towards more domestic lending, known as the home bias. Our study provides novel evidence indicating that foreign banks provide more loans to a sanctioned sector (agriculture) as concerns of the survival and development of the agricultural sector grow to prevent the further spreading of the crisis (flight to safety).

The rest of the paper proceeds as follows. Section 2 describes the background of sanctions imposed by the EU and Russia. Section 3 describes the data and the empirical strategy. Section

4 presents our results. Section 5 reports on robustness tests. Section 6 concludes.

2. Evolution of sanctions and countersanctions

In early 2014, Russia invaded and annexed Crimea. In response to Russia's annexation of Crimea, the EU, along with other Western countries (U.S. and its allies), imposed various sanctions in July 2014.

There are two categories of restrictive measures against Russia. The first category are sanctions against individuals and entities that are associated with the annexation of Crimea. The sanctions include asset freezes and travel bans imposed on Russian officials, and embargoes of products from related entities. Another category imposes restrictions on specific economic sectors, mainly on finance, energy, transport, defense, and raw materials. For example, Russian banks' newly issued bonds, equity, and other financial instruments with a maturity exceeding 90 days cannot be bought or sold by EU nations and companies. Related financial services are prohibited as well. For the energy sector, the EU restricted exports to Russia of goods and technologies in the oil refining industry. The above sanctions have been renewed every 6 months and are expected to continue to be renewed in future.

In reaction to the economic sanctions imposed by the EU, Russia itself enacted a one-year import ban for agricultural products originating from the EU and other Western countries in August 2014. The targeted categories were meat, dairy products, and fruits and vegetables. Following this import ban, the overall EU agri-food export to Russia decreased by 42.2% (European Commission Agriculture and Rural Development, 2015). For specific categories, dairy products, meat, fruits and vegetables exported to Russia decreased by 97.6%, 86.3% and 86.4%, respectively. The embargo has been renewed multiple times and remains in place until to now (see Appendix 1).

The EU took immediate measures against Russia's food embargo following Regulation (EU)

No 1306/2013 and No 1308/2013.⁴ To tackle market imbalances caused by Russia's countersanctions, the EU adopted actions to stabilize the affected sector. Specifically, the EU started promotion policies, market withdrawal with subsidies and free distribution of fruits and vegetables, and storage support for dairy products by private operators. In addition, the EU commission also tapped into the reserve for crises in the agricultural sector, intending to provide additional support for the sector in case of major crises affecting agricultural production or distribution. According to Regulation (EU) No 1306/2013, the total amount of the reserve is 2,800 million Euros from 2014 to 2020, with equal annual instalments of 400 million Euros, paid by the Commission to member states.⁵

In addition to the emergency assistance, the sector actively seeks alternative export destinations to compensate the loss on the Russian market. For example, the export to countries within and outside of Europe increased after the Russian import restrictions (European Commission Agriculture and Rural Development, 2015). Therefore, providing financing to the agricultural industry would have two main points of significance: 1) provide immediate support for the negatively affected sector to overcome short-term austerity, 2) provide support for the agricultural sector in the region to build long-term viability.

Banks as financial intermediaries, play a pivotal role in mitigating firms' financial distress and supporting firms' investment activities through lending. In the context of export bans, agricultural companies in Europe suffered negative performance effects. Therefore, it is possible that bank loans were needed to alleviate immediate these cash flow issues. On the other hand, agricultural companies had to explore geographic diversification of exports to ameliorate losses from banned sales to Russia. The United States, China, and other Asian markets including Hong Kong and the Republic of Korea were the primary alternative

⁴ Regulation (EU) No 1306/2013, available at <https://eur-lex.europa.eu/eli/reg/2013/1306/oj>. Regulation (EU) No 1308/2013, available at <https://eur-lex.europa.eu/eli/reg/2013/1308/oj>.

⁵ Note that Russian counter sanctions encompass a wide range. Russia imposed its sanctions at the 4-digit level of the Harmonised System for goods classification, whereas the EU imposed their sanction at the 8-digit level (Bélin and Hanousek, 2021).

destinations (European Commission Agriculture and Rural Development, 2015). Hence, bank credit would support agricultural borrowers' financial needs to explore alternative markets.

3. Data and empirical strategy

3.1 Data

The financial data used for estimating the performance of public and private agricultural borrowers is extracted from S&P Capital IQ. The database provides detailed financial information for firms worldwide. We collect total revenue, EBITDA, EBIT, return on asset, return on equity, and return on capital for firms in European countries. Income related variables (total revenue, EBITDA, EBIT) are scaled by total assets. All variables are calculated as the log value.

The source of our loan data is the Loan Pricing Corporation DealScan database, which contains information on syndicated loans. It provides details about loan breakdown, borrower, lender, and loan contract terms (e.g., collateral, spread, and volume). Using syndicated loan data allows investigating how large international lenders react to economic sanctions.

We define as agricultural loans whose borrower's major industry group is agriculture. We collect syndicated loan data for the period 2011-2017. Our syndicated loan data contain nearly 11,829 loan tranches across all European countries, covering 15 major industry groups, of which 301 are classified as agricultural loans. We exclude Russia and Ukraine from the sample.⁶

Due to missing information in the database, a fraction of our loan sample does not have information of the loan breakdown on volume by lender. For such loans, we follow De Haas and Van Horen (2013) and split the loan amount equally among all syndicate members. Figure 1 shows the total number and total volume of loans in the agricultural sector through 2011 to 2017.

⁶ The results are unaffected if Russia and Ukraine are included. The results are available upon request.

[Figure 1]

We obtain data for the control variables such as GDP per-capita, inflation, gross savings rate, proportion and relevance of the agricultural sector for a country from World Bank Development Indicators and the risk-free rate from the European Central Bank's Statistical Data Warehouse.

The data for agricultural subsidies is retrieved from FarmSubsidy.org, a database that collects comprehensive information regarding the beneficiaries and amounts of farm subsidies in all EU member countries. We aggregate the subsidy data at the country-year level and introduce subsidies as a control variable to control for the potential influence of agricultural subsidies on bank loans for agriculture.

Analogous to De Haas and Van Horen (2013), we reaggregate the data at the bank-industry level. Specifically, for a lender, we calculate the number and the volume this lender provides to the agricultural sector and other capital-intensive industries from 2011 to 2017. By doing this, we quantify a bank's lending to diverse sectors as a response to economic sanctions. We take the log of the total number and total volume of loans as dependent variables as well as our other dependent variables.

We determine whether a bank is domestic or foreign by comparing the lender's country of origin with the borrower's country. If the lender's parent operating country matches the borrower's country, we consider it a domestic lender, otherwise we classify the bank to be a foreign lender. Arrangers and participants are identified based on the 'primary role' information provided by DealScan. Our sample period contains 3 pre- and post-shock years. We use an expanded sample period (2010 to 2019) for robustness tests. The results remain consistent. Table 1 presents summary statistics.

[Table 1]

3.2 Empirical strategy

The performance of agricultural borrowers after the sanctions is estimated using the following pre-post analysis model:

$$Performance\ Variable_{k,t} = \beta * Sanction + Control + f_k + c_k + \varepsilon_{k,t}$$

where performance variable includes the log value of total revenue, EBITDA, EBIT, return on assets, return on equity, and return on capital of borrower k in year t . *Sanction* is a dummy equal to 1 if the year is 2014 onwards, and 0 otherwise. *Control* represents the log of GDP per-capita, inflation, and gross savings rate. f_k stands for firm-fixed effects and controls for firm-level unobservable time-invariant factors. c_k accounts for unobserved time-invariant heterogeneities across different countries. The coefficient β indicates the extent to which borrower performance is affected after 2014.

We use difference-in-differences estimation to examine the causal effect of sanctions on agricultural lending. The treatment group is the agricultural sector, and the control group is the aggregation of all other capital-intensive sectors, i.e., manufacturing, automotive, and construction. It is plausible to compare the agricultural sector with other capital-intensive sectors as the agricultural sector is a typical capital-intensive sector (Moss et al. (1997)). The model is as follows:

$$Dependent\ Variable_{i,t} = \beta Treat_{i,t} * Sanction + Control + \alpha_i + \gamma_\tau + \delta_j + \varepsilon_{i,t}$$

where the dependent variable is the log of the total number or the total volume a lender provides to an industry in a given year, respectively. *Treat* equals 1 if the major industry group is agriculture and 0 otherwise. *Treat*Sanction* is our key interaction term. It takes on the value of 1 to identify agricultural lending after the shock and 0 otherwise.

We include industry-fixed effects δ_j to control for time-invariant unobservable industry-level differences. We also include bank-fixed effects α_i to control for time-invariant bank characteristics that might affect lending. The year-fixed effects γ_τ control for unobservable time-variant factors in the corporate lending market. Standard errors are heteroscedasticity robust and clustered at the bank-industry level.

Figure 2 shows the trend of the total number and total volume of loans for treatment and control group before and after the sanctions. The pre-shock movement of treatment and control groups generally follows similar patterns. After the sanctions in 2014, both the total number and total volume of agricultural loans significantly increased. Figure 2 also illustrates parallel trends prior to the shock. To verify econometrically that our setting satisfies the parallel trends assumption, we regress the log of the total number and total volume of loans on treatment-time dummies and plot the coefficients in Figure 3. The pre-shock coefficients of both dependent variables remain insignificant, indicating the plausible exogeneity of the treatment.

[Figure 2]

[Figure 3]

4. Empirical results

We first explore the performance of agricultural companies in our sample by regressing performance measurement variables on the sanction dummy. Country- and firm-fixed effects are included to remove confounding effects that arise from time-invariant unobservable heterogeneities across countries and firms, respectively. Compared to non-sanctioned firms, sanctioned firms suffer significant declines in revenue, value of assets, and employees (Ahn and Ludema, 2020). Hence, we propose and empirically test a mechanism that firms in the agricultural sector are negatively affected by Russian import restrictions, reflecting a need for loans to cover losses in cash flows, to sustain the payment ability and future investments.

Table 2 illustrates that the performance of agricultural borrowers weakened after 2014, signified by statistically significantly negative coefficients of almost all performance variables. Total revenue declined significantly, demonstrating that after the sanctions, total revenue of agricultural companies decreased 6.3%, or \$11 million relative to the mean. Analogously, other variables such as *EBITDA*, *EBIT*, *ROA*, and *ROC* also declined significantly. The empirical results show that sanctions indeed trigger negative effects on agricultural borrowers' financial performance. The loan purpose information from our dataset also suggests that most of the loans are used for refinancing previous loan facilities suggesting that borrowers encountered higher needs to rollover their loan financing potentially due to cash flow problems.

This claim is further substantiated by anecdotal evidence. For example, Rabobank Group in the Netherlands claimed that many of its agricultural clients experienced liquidity shortage due to significant decline in income after the sanctions were imposed (The Wall Street Journal, 22 August 2014). As stated in the first headline mentioned above, it is imperative for banks to intervene and to alleviate the situation faced in the agricultural sector. On the other hand, policymakers in the EU encourage the agricultural industry to seek alternative destinations to compensate the loss of the Russian market after the import restrictions. Therefore, banks may treat this as new lending opportunities to help agricultural borrowers to find other markets. These two aspects provide a motivation to empirically test how banks react to the situation.

[Table 2]

4.1 The effect the sanction on total lending

Table 3 shows the effect of sanctions on the total number and volume of loans to the agricultural industry. *Total Number* is defined as the total number of syndicated loans a bank lends to an industry in a given year. *Total Volume* is defined as the total tranche size of syndicated loans a bank lends to an industry in a given year. Control variables or fixed effects are not included in Columns 1 and 2. We include bank-, year-, and industry-fixed effects in Columns 3 to 6. *GDP per-capita* of lenders' countries, *Inflation*, and *Gross savings rate* enter in Columns 5 and 6.

[Table 3]

The results are consistent through all columns and indicate a positive and significant relationship between sanctions and credit supply. Based on Columns 5 and 6, compared with other sectors, the number of loans to the agricultural sector increased by 20.9% and the volume of loans to the agricultural sector increased by 50.3% after the sanctions in 2014.

In other words, lending to the agricultural sector increased by 209 million US dollars after the sanctions relative to the mean, or 72.4 million US dollars relative to the median. The results

support the idea that banks play a supportive role by providing more credit to the agricultural sector to address liquidity problems and offer funds for market exploration. Banks play an essential role in funding the agricultural industry and are the main liquidity providers to the sector (European Commission and European Investment Bank, 2020). The importance can be further emphasized given that agriculture is a crucial industry for a country and disruptions to credit supply to the sector have broad implications, affecting people, economy, and national security.

4.2 Importance of agriculture in different countries

The importance of the agricultural sector for the economy varies across different countries in Europe. For example, in the UK, the agricultural sector accounts on average for 0.9%. In contrast, for Greece this figure rises to 5%. Therefore, we expect the sanctions to have heterogeneous effects on agricultural sectors as well as credit supply across different economies.

Table 4 presents our analysis of the effect on lending conditional on the importance of agriculture in an economy. The importance of agriculture is defined as the proportion of the agricultural industry relative to a country's GDP. The sample is split based on whether a country's agricultural importance is high, i.e., above the median of all European countries, or, alternatively below the median (low importance).

Lending increased in both categories of countries, with a greater statistically significant increases of loan volumes in countries where agriculture accounts for a small proportion in the economy. The results illustrate that the effect of sanctions on agricultural lending comes from both types of countries, but the effect is stronger for countries where agriculture is less important. To examine whether the coefficients are statistically different between the two groups, we perform a Chow-test based on the triple interaction among *Treat*, *Sanction*, and *Low importance*. The *F*-statistics and *P*-values state that the coefficients of number of loans are different between the two groups while the coefficients for the volume of loans are not.

[Table 4]

Table 4 highlights that, although the total number of loans increased in both groups, such increase in volume of loans for the agricultural industry mainly come from countries where the economic portion of agricultural sector is below the median. The volume of credit supply to agriculture in these countries increased by 39.6% after the sanctions. In countries where the agricultural sector exhibits limited scale and inadequate resilience, it becomes more susceptible to external shocks. Consequently, immediate support and protection from banking sector can mitigate the negative impact on the sector and bolster the endurance against economic sanctions.

4.3 The effect of the sanction on structure of syndicates

4.3.1 Structure of syndicates: Home banks and foreign banks

Economic sanctions hinder the development of target economies and related sectors, causing lower growth of GDP, reductions in export, declines in business activities, and shrinking of employment (Hufbauer and Oegg, 2000; Evenett, 2002; Neuenkirch and Neumeier, 2015; Besedes et al., 2021). These changes are likely to result in demand for credit to avoid a recession in the sector. Therefore, it is reasonable to expect credit supply to increase in the agricultural sector following Russia's import restrictions for agricultural products.

However, whether financing is provided by home or foreign banks is not clear. On one hand, home banks may adjust their loan portfolios in favour of domestic borrowers to prioritize mitigating economic shocks in the domestic market (Giannetti and Laeven, 2012). On the other hand, international lenders also have incentives to rebalance their portfolios to alleviate capital shortages, potentially leading to outcomes with varying consequences in host markets.

[Table 5]

We define home/foreign banks based on whether a bank's parent operating country matches with the borrower's country. Table 5 highlights that the number and the volume of loans from foreign banks increased by 21.1% and 72.7%, respectively, in the agricultural sector after the sanctions, consistent with foreign banks being the primary supporters. The import restrictions

caused market disturbances in Europe and countries are heterogeneously affected because of concentrations on certain types of products (European Commission Agriculture and Rural Development, 2015). For example, Finland and the Baltic countries were severely hit by the export ban relating to cheese and butter while Belgium and the Netherlands suffered the highest losses in fruits. Therefore, foreign banks have incentives to support the agricultural sector in other countries to prevent the spread of the shock on the domestic agricultural market.

In addition, in some countries, banks' exposure to the agricultural sector is relatively higher than that in other countries. For example, in Denmark, many banks have large exposures to the agricultural industry (Reuters, 5 November 2014)⁷. The loan losses from agricultural lending may transmit the shock from the agricultural sector to the banking sector. Hence, foreign banks assistance would reduce the transmission of shocks from agriculture to banking and in turn increase the resilience of the European banking sector more broadly.

4.3.2 Structure of syndicates: Arrangers and participants

In syndicated loans, information asymmetries between lenders and borrowers influence the syndicate structure (Sufi, 2007). Arrangers take the senior role and are responsible for negotiation, monitoring, and syndication allocation. Hence, arrangers are less exposed to problems arising from information asymmetries than participants. Compared to foreign arrangers, home arrangers have better knowledge about the local market and have better access to information. In addition, home arrangers and foreign arrangers may be exposed heterogeneously to the agricultural sector for different countries. Hence, it is expected that home and foreign arrangers have different risk appetite and behaviour in response to the shock.

Table 6 examines the effects on home and foreign arrangers, and home and foreign participants. If a bank's parent operating country is the same as the borrower's country and the bank takes the role of an/a arranger/participant in a syndicated loan, it is categorized as a home arranger/participant (analogous definition for foreign arrangers/participants). In the

⁷ Reuters News. (2014) "Danish farmers, hit by Russian ban, are a thorn in banks' side," *Reuters*, 5 November.

agricultural industry, both the number and volume of foreign arranger loans increased by 17.4% and 69.0%, respectively after the sanctions while the statistics for home arranger loans are not significant. The volume of home participant loans significantly decreased by 20.4% and no significant increase in foreign participant loans is captured. It is possible that home arrangers have larger exposure to the local agricultural sector before the sanction and become more risk averse after the shock. Along with their information advantages, home arrangers exit the market while foreign arrangers fill in the gap. As the loans from foreign arrangers comprise changes in agricultural lending, there are no greater moral hazard problems between arrangers and participants due to the sanctions.

[Table 6 Panel A]

[Table 6 Panel B]

4.4 The effect of sanctions on loan characteristics

In this section, we test whether sanctions have an effect on loan features. Although uncertainty in the agricultural sector increased after the sanctions, banks played a supportive role. It is however unclear whether banks offer agricultural borrowers favourable or unfavourable loan contract terms in the aftermath of the shock. Therefore, we investigate whether the assistance of banks to the agricultural sector is also reflected in loan contract features including collateral requirements, risk premiums, loans to public firms, and loan maturity. The results are reported in Table 7.

Table 7 Panel A shows that the sanctions affect collateral requirements, risk premiums, and more loans are channelled towards public firms. Column 1 shows that the number of unsecured loans in the agricultural sector increases by 14.3% compared to other sectors. Riskier borrowers are more likely to be required to pledge collateral (Berger et al., 2011; Cerqueiro et al., 2016). However, Column 1 indicates that borrowers in the agricultural sectors are less likely to be required to do so than borrowers in other sectors under the sanctions.

Column 2 presents the change of the risk premium of loans in the agricultural sector

compared with other sectors. The risk premium is defined as the interest rate of the loan minus the risk-free rate. The negative and significant coefficient suggests that banks charge 25.9% less risk premium for borrowers in the agricultural sector after the sanction. In other words, on average, lenders charge 42.6 less basis points for borrowers from the agricultural sector relative to the mean, or 43.1 less relative to the median after the sanction.

Column 3 states that there is a 7.5% increase in loans to public firms in the agricultural sector when sanctions are in place. Public firms are required to disclose more information than private firms. The results indicate that there are reallocation effects from private firms to public firms. The result in column 4 shows no effect of the sanction on maturity of loans.

[Table 7 Panel A]

To verify whether banks offer favourable loan terms to agricultural borrowers, we further test the effect on the number of unsecured loans by splitting the sample based on percentiles of the risk premium. As shown in Table 7 Panel B, the number of unsecured loans is concentrated among loans whose risk premiums are below the median.

[Table 7 Panel B]

Table 7 illustrates that loans in the agricultural sector attract lower loan rates, have better information environment, and are associated with lower collateral requirements. This is in line with the claim that banks help the agricultural industry and they do not treat agricultural borrowers unfavourably as a result of the Russian import restrictions. Banks' lending behaviour with favourable loan terms can mitigate the pressure faced by the sector, reduce possibly negative spill over effects, and increase the resilience of the economy.

4.5 The effect of lending relationship on total lending

In this section we present our analysis on relationship lending. Specifically, we investigate whether the supportive effect comes from banks that have more or less lending experience in the agricultural sector. Banks build up relationships with borrowers through repeated lending,

which alleviates information asymmetries (Boot, 2000) and causes adverse-selection problems for rival lenders (Agarwal and Hauswald, 2010; De Haas and Van Horen, 2013). During economic sanctions, more experienced banks may exit the market because the agricultural sector suffers great uncertainties. On the other hand, less experienced banks may consider this as an opportunity to establish lending relationship with agricultural borrowers.

Following De Haas and Van Horen (2013), we define experience as the number of loans a bank provides to an industry. We calculate the total number of syndicated loans a bank lends to the agricultural sector from 2002 to 2013. Then, we create a dummy variable *Low Relationship* taking the value of 1 if a bank has zero or only one loan in the agricultural sector before 2014 otherwise taking the value of 0. To understand whether lending experience affects our main results, we include a triple interaction among *Treat*, *Sanction*, and *Low Relationship*. The results are shown in Table 8.

[Table 8]

The results in Table 8 are consistent with our expectation. The coefficients of interest are positive and significant indicating that relationship lending has a 51.9% greater effect on the total number of loans and a 70.3% greater effect on the total volume of loans. The results reveal that banks that have no or very little lending experience prior to the sanctions enter the market after the sanctions are imposed. These banks provide more loans to help the agricultural sector.

5. Robustness tests

5.1 Alternative sample periods and control groups

We conduct our first robustness tests using different combinations of sample periods and alternative control groups.

For Table 9 and Table 11, we replicate our regressions of the baseline effect and home/foreign bank effect, except for the fact that the control group now includes not only capital-intensive sector borrowers, but all sectors except for the financial sector. For Table 10 and Table 12, we

rerun the regressions of the baseline effect and home/foreign bank effect with the sample period from 2010 to 2019. All results remain consistent with the main results, and our inferences are unaffected. It indicates that our results are not driven by the selection of industries and sample periods.

[Table 9]

[Table 10]

[Table 11]

[Table 12]

5.2 Confounding effects arising from subsidy payments

In a further sensitivity check, we incorporate farm subsidy payments as a control variable to account for their potential effect on bank lending. Government subsidies may reduce the risk of borrowers needing further financing by banks or, alternatively, it may reduce borrowers' need for external financing. The European Commission promptly implemented measures to assist the agricultural sector in overcoming the market disturbances after the import restrictions were imposed. Apart from the emergency aid, EU Regulation No 1306/2013 and No 1308/2013 allow enacting promotion policies, market withdrawal, and storage support, and the EU can grant farm subsidies to recipients of member states. Therefore, we incorporate subsidy payments as a control variable to account for the confounding effects of subsidies on bank lending to agricultural borrowers. The subsidy data is aggregated on the country-year level. We take the natural log of the value of the subsidy payments and fill the missing data with the natural log of a value that is extremely close to zero (0.00001). Country-, industry-, bank-, and year-fixed effects are included to control for time-invariant and time-varying unobservable factors, respectively. The results in Table 13 underscore that our results remain unaffected after accounting for subsidy payments.

[Table 13]

6. Conclusion

We investigate how Western banks' syndicated lending activities respond to import

restrictions imposed by Russia on agricultural products from Europe as a countermeasure against Western sanctions following the annexation of Crimea in 2014. Using difference-in-differences estimation and controlling for bank-, industry-, and year-fixed effects, we show that banks lend more to the agricultural sector. Both the number and volume of loans increase after Russia imposed an import ban on agricultural products from the EU. However, the effect is heterogeneous among countries with different importance of the agricultural sector. Borrowers in countries with low agricultural importance before the shock tend to obtain more credit after the shock. Banks tend to alleviate the situation caused by the sanctions. A possible mechanism is that the agricultural companies' performance suffered adverse effects following the sanctions, necessitating the need for loans to mitigate the impact on capital and cash flow.

Further, we show that it is foreign banks that increase lending to the agricultural sector and foreign arrangers are the main source of changes in agricultural lending. This indicates bank's awareness of the pressure faced by the sector and incentive to prevent the spread of the outcome of economic sanctions. Banks that have little lending experience prior to the sanctions enter the market after the sanctions are imposed. Compared to other sectors, agricultural loans have favourable loan terms including lower risk premiums, less collateral requirements, and borrowers are more concentrated among publicly listed firms, suggesting these borrowers are less opaque.

Our paper has implications for the ongoing debate about the survival and development of the agricultural sector as well as food security in the context of potential political tensions. Banks can play an important supportive role by providing credit to the agricultural sector, which can help alleviate the situation in the sector caused by international conflicts.

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Figures and tables

Figure 1
Total number and volume of syndicated loans in the agricultural sector

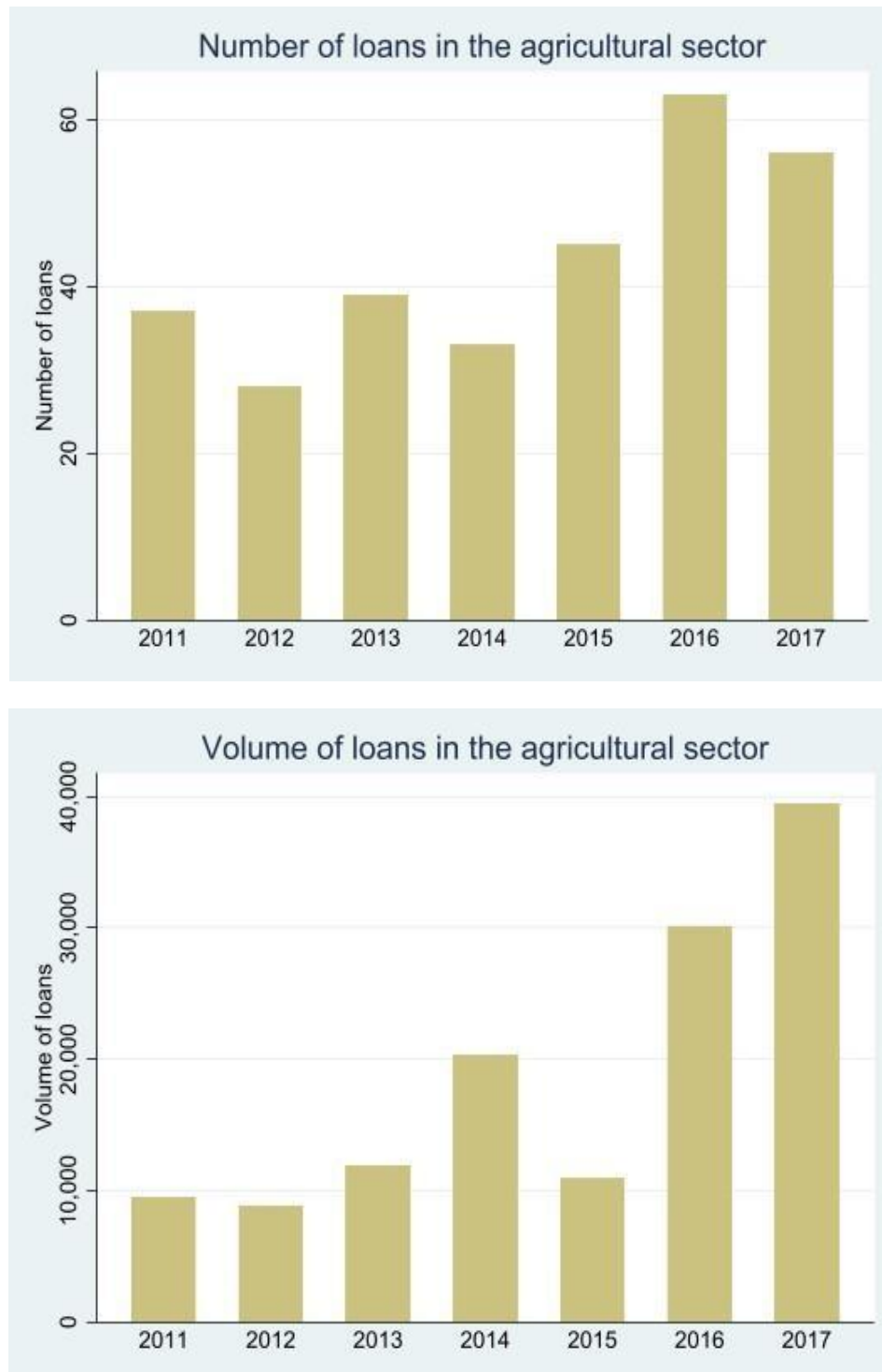


Figure 1 displays the total number and total volume of agricultural lending in Europe from 2011 to 2017. Source: DealScan, aggregated on industry-year level.

Figure 2
Parallel trends of total number of loans and volume of loans between the agricultural sector and other capital-intensive sectors.

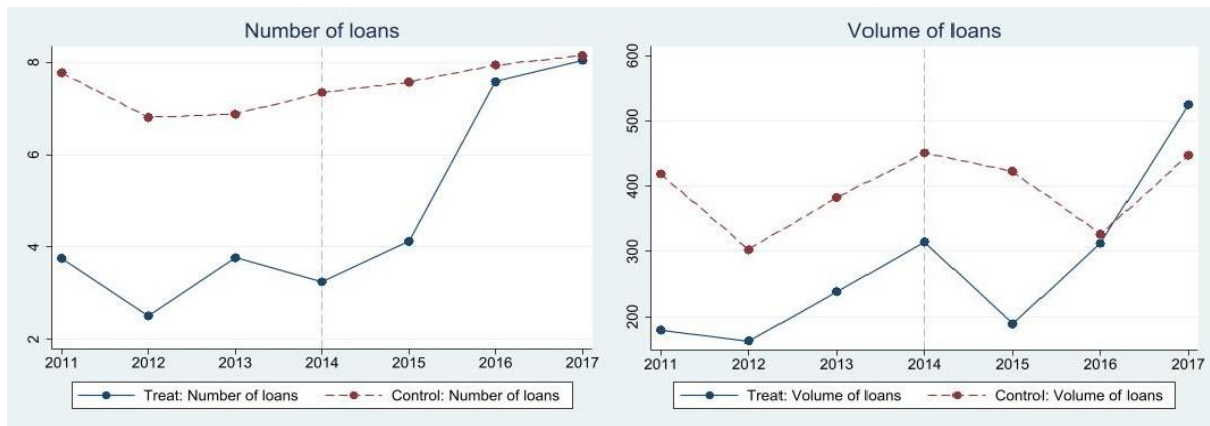


Figure 2 presents the pre and post trend of the total number and total volume of loans banks lend to the agricultural sector (treatment) and other capital-intensive sectors (control group).

Figure 3
Plots of coefficients of dynamic effects for $\ln(\text{Total number of loans})$ and $\ln(\text{Total volume of loans})$

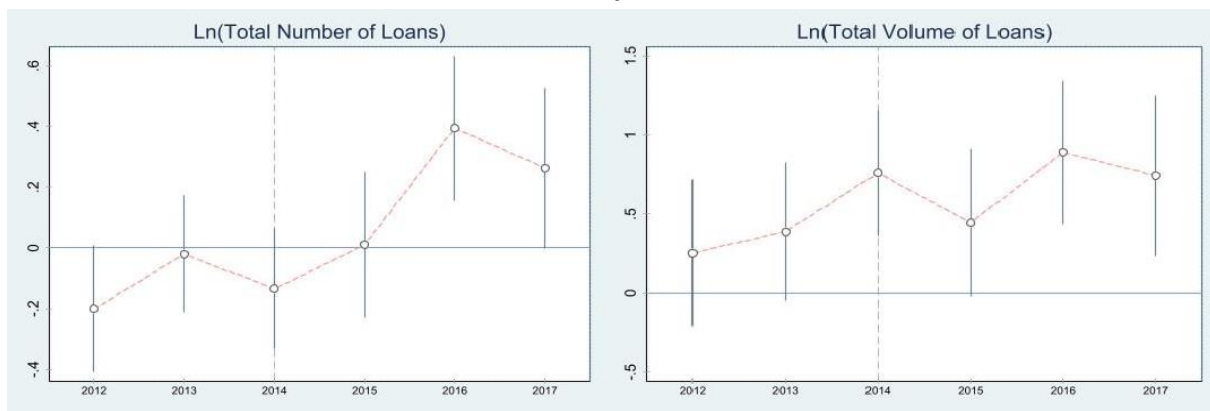


Figure 3 presents the plots of coefficients of the empirical tests of dynamic effects. The reference year is 2011. The pre shock coefficients are not significantly different from 0, indicating parallel trends between treatment and control groups.

Table 1
Summary Statistics

Variable	N	Mean	p50	SD	Min	Max
Ln(Total Revenue)	277	0.740	0.740	0.430	0	1.810
Ln(EBITDA)	260	0.080	0.080	0.090	-0.350	0.360
Ln(EBIT)	284	0.040	0.040	0.100	-0.550	0.360
Ln(Return on asset)	277	0.0300	0.030	0.070	-0.510	0.190
Ln(Return on equity)	265	0.110	0.110	0.340	-2.320	1.670
Ln(Return on capital)	271	0.110	0.0500	0.310	-1.580	1.800
Total number of loans						
Total number of loans	8960	7.850	4	11.75	1	149
Ln(Total number of loans)	8960	1.710	1.610	0.890	0.690	5.010
Total volume of loans						
Total volume of loans	8960	416.4	143.9	707.3	0	9313
Ln(Total volume of loans)	8960	4.960	4.980	1.580	0	9.140
Treat	8960	0.0400	0	0.200	0	1
Sanction	8960	0.580	1	0.490	0	1
GDP per capita (ln)	8960	10.54	10.69	0.630	6.430	11.73
Inflation	8960	0.770	0.900	0.640	-3.930	3.420
Gross savings rate	8960	3.140	3.100	0.300	1.540	4.100
Importance of Agriculture						
Total number of loans	19439	3.620	2	5.060	1	119
Ln(Total number of loans)	19439	1.280	1.100	0.620	0.690	4.790
Total volume of loans	19439	192.0	99.03	314	0	8142
Ln(Total volume of loans)	19439	4.580	4.610	1.190	0	9
Home/Foreign						
Ln(Number of Foreign Loans)	8960	1.160	1.100	1.010	0	4.620
Ln(Number of Home Loans)	8960	0.850	0.690	0.970	0	4.790
Ln(Volume of Foreign Loans)	8960	3.650	4.360	2.610	0	9.140
Ln(Volume of Home Loans)	8960	2.450	2.390	2.500	0	8.640
Arrangers/Participants						
Ln(Number of Home Arranger Loans)	8960	0.730	0	0.940	0	4.650
Ln(Volume of Home Arranger Loans)	8960	2.150	0	2.520	0	8.640
Ln(Number of Home Participant Loans)	8960	0.220	0	0.510	0	3.760
Ln(Volume of Home Participant Loans)	8960	0.620	0	1.410	0	7.820
Ln(Number of Foreign Arranger Loans)	8960	1.020	0.690	1.020	0	4.490
Ln(Volume of Foreign Arranger Loans)	8960	3.230	4.020	2.760	0	9.130
Ln(Number of Foreign Participant Loans)	8960	0.250	0	0.500	0	2.890
Ln(Volume of Foreign Participant Loans)	8960	0.970	0	1.830	0	8.220
Loan characteristics						
Ln(Number of unsecured Loans)	8968	1.270	1.100	0.940	0	4.790
Ln(Risk premium)	4626	5.060	5.270	0.910	-1.650	6.820
Ln(Share of loans to public firms)	8960	0.210	0.0500	0.260	0	0.690
Ln(Maturity)	8768	7.370	7.470	0.510	4.060	9.400

Table 1 shows summary statistics of variables used in the empirical tests.

Table 2
Performance of agricultural borrowers before and after the sanction

	(1)	(2)	(3)	(4)	(5)	(6)
	Ln(Total Revenue)	Ln(EBITDA)	Ln(EBIT)	Ln(Return on asset)	Ln(Return on equity)	Ln(Return on capital)
Sanction	-0.0628*** (-2.77)	-0.0213* (-1.93)	-0.0252* (-1.85)	-0.0259** (-2.14)	-0.0294 (-0.50)	-0.0411* (-1.93)
GDP per capita (ln)	0.128 (1.25)	-0.0142 (-0.24)	-0.0797 (-1.16)	-0.0833 (-1.34)	-0.392 (-1.55)	0.0775 (0.71)
Inflation	-0.0161 (-0.71)	0.00301 (0.28)	0.00336 (0.28)	-0.00269 (-0.34)	-0.0470 (-0.93)	-0.0311 (-1.20)
Gross savings rate	0.00238 (0.02)	0.0390 (0.70)	0.0724 (1.17)	0.0944* (1.71)	0.288 (0.95)	-0.0410 (-0.46)
R-squared	0.944	0.686	0.614	0.603	0.376	0.799
Observations	277	260	284	277	265	271
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes	Yes	Yes

Table 2 investigates the performance of agricultural borrowers before and after sanctions. Firm-, and country-fixed effects are included. Standard errors are clustered at the firm level and *t*-statistics are reported in parentheses. *, ** and *** indicate statistical significance at the 10%, 5% and 1% levels, respectively.

Table 3
The effect of the sanction on total lending

	(1)	(2)	(3)	(4)	(5)	(6)
	Ln(Total Number of Loans)	Ln(Total Volume of Loans)	Ln(Total Number of Loans)	Ln(Total Volume of Loans)	Ln(Total Number of Loans)	Ln(Total Volume of Loans)
Treat*Sanction	0.251*** (4.19)	0.562*** (4.18)	0.212*** (3.21)	0.507*** (3.56)	0.209*** (3.17)	0.503*** (3.54)
GDP per capita (ln)					-0.117 -0.00350	0.0397 0.0243
Inflation					(-0.22) (-0.22)	(0.83) (0.83)
Gross savings rate					0.305*** (3.37)	0.556*** (3.56)
R-squared	0.0068	0.0094	0.604	0.647	0.605	0.647
Observations	8960	8960	8960	8960	8960	8960
Bank FE	No	No	Yes	Yes	Yes	Yes
Year FE	No	No	Yes	Yes	Yes	Yes
Industry FE	No	No	Yes	Yes	Yes	Yes

Table 3 reports the baseline effect of the shock on total lending where the dependent variables are log of total number and total volume of loans a bank lends to an industry for each year from 2011 to 2017. Control variables and fixed effects are not included in columns (1) and (2). Bank-, year-, and industry-fixed effects are added in columns (3) to (6). Columns (5) and (6) also incorporate *GDP per capita (ln)*, *Inflation* and *Gross savings rate* as control variables. Standard errors are clustered at the bank-industry level and *t*-statistics are reported in parentheses. *, ** and *** indicate statistical significance at the 10%, 5% and 1% levels, respectively.

Table 4
Importance of Agriculture in different countries

	(1)	(2)	(3)	(4)
	Ln(Total Number of Loans)	Ln(Total Number of Loans)	Ln(Total Volume of Loans)	Ln(Total Volume of Loans)
Importance of agriculture	High	Low	High	Low
Treat*Sanction	0.382*** (3.88)	0.109** (2.30)	0.679** (2.49)	0.396*** (3.96)
GDP per capita (ln)	-0.0934 (-0.49)	-0.150** (-2.34)	0.163 (0.41)	-0.122 (-1.00)
Inflation	-0.00101 (-0.04)	0.00441 (0.36)	0.0953* (1.96)	0.00714 (0.32)
Gross savings rate	0.273 (1.51)	0.0475 (0.73)	0.564 (1.56)	0.203* (1.69)
R-squared	0.430	0.198	0.402	0.309
Observations	3056	16382	3056	16382
Bank FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes
Country FE	Yes	Yes	Yes	Yes
	Number of loans		Volume of loans	
Chow test F-statistics	7.89		1.00	
Chow test P-value	0.0050		0.3180	

Table 4 reports the results when the sample is split based on the importance of agriculture in each country. High and low importance are countries whose economic proportion of agriculture relative to GDP is either above or below the median before 2014. The data is aggregated at the bank-country-industry level. Standard errors are clustered at the bank-industry level and *t*-statistics are reported in parentheses. *, ** and *** indicate statistical significance at the 10%, 5% and 1% levels, respectively.

Table 5
Structure of syndicates: Home banks and foreign banks

	(1)	(2)	(3)	(4)
	Ln(Number of Foreign Loans)	Ln(Number of Home Loans)	Ln(Volume of Foreign Loans)	Ln(Volume of Home Loans)
Treat*Sanction	0.211*** (2.74)	0.0774 (0.95)	0.727*** (3.32)	0.0344 (0.14)
GDP per capita (ln)	0.0873 (0.86)	-0.371*** (-4.82)	-0.0370 (-0.17)	-0.0862 (-0.41)
Inflation	0.00542 (0.34)	-0.0291** (-1.99)	-0.0310 (-0.79)	0.000356 (0.01)
Gross savings rate	0.0225 (0.23)	0.528*** (5.62)	0.188 (0.76)	1.230*** (4.73)
R-squared	0.647	0.628	0.694	0.644
Observations	8960	8960	8960	8960
Bank FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes

Table 5 reports the results of tests for the structure of syndicates regarding home and foreign banks. A bank is defined as a home bank if its parent country is the same as the borrower's country. Standard errors are clustered at the bank-industry level and *t*-statistics are reported in parentheses. *, ** and *** indicate statistical significance at the 10%, 5% and 1% levels, respectively.

Table 6
Structure of syndicates: Arrangers and participants

Panel A Home arrangers and foreign arrangers				
	(1)	(2)	(3)	(4)
	Ln(Number of Home Arranger Loans)	Ln(Number of Foreign Arranger Loans)	Ln(Volume of Home Arranger Loans)	Ln(Volume of Foreign Arranger Loans)
Treat*Sanction	0.0988 (1.27)	0.174** (2.26)	0.180 (0.77)	0.690*** (3.02)
GDP per capita (ln)	-0.312*** (-4.08)	0.187 (1.62)	-0.0396 (-0.19)	0.703** (2.22)
Inflation	-0.0480*** (-3.18)	0.00501 (0.30)	-0.0652 (-1.50)	-0.0288 (-0.63)
Gross savings rate	0.402*** (4.57)	0.0431 (0.38)	0.995*** (3.94)	0.110 (0.33)
R-squared	0.590	0.627	0.601	0.642
Observations	8960	8960	8960	8960
Bank FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes

Panel B Home participants and foreign participants				
	(1)	(2)	(3)	(4)
	Ln(Number of Home Participant Loans)	Ln(Number of Foreign Participant Loans)	Ln(Volume of Home Participant Loans)	Ln(Volume of Foreign Participant Loans)
Treat*Sanction	-0.00102 (-0.03)	0.0649* (1.95)	-0.204** (-2.15)	0.179 (1.52)
GDP per capita (ln)	-0.175*** (-3.75)	-0.0228 (-0.25)	-0.273* (-1.87)	-0.517 (-1.46)
Inflation	0.0234** (2.00)	0.000926 (0.06)	0.0794** (2.29)	-0.0139 (-0.26)
Gross savings rate	0.336*** (6.10)	0.00183 (0.02)	0.788*** (4.92)	0.308 (0.90)
R-squared	0.323	0.229	0.292	0.232
Observations	8960	8960	8960	8960
Bank FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes

Table 6 shows the analysis of the effect of sanctions on the structure of syndicates regarding loans from home/foreign arrangers/participants. Standard errors are clustered at the bank-industry level and *t*-statistics are reported in parentheses. *, ** and *** indicate statistical significance at the 10%, 5% and 1% levels, respectively.

Table 7
The effect of the sanction on loan characteristics

Panel A Loan characteristics				
	(1)	(2)	(3)	(4)
	Ln(Number of Unsecured Loans)	Ln(Risk Premium)	Ln(Share of Loans to Public Firms)	Ln(Loan Maturity)
Treat*Sanction	0.143** (2.02)	-0.259** (-2.02)	0.0745*** (3.83)	-0.0279 (-0.44)
GDP per capita (ln)	-0.380*** (-3.52)	0.639** (2.57)	0.00864 (0.20)	-0.155* (-1.96)
Inflation	-0.0228 (-1.28)	0.0161 (0.45)	0.0160** (2.31)	-0.0270* (-1.90)
Gross savings rate	0.389*** (3.75)	-1.767*** (-7.85)	0.0139 (0.35)	0.210*** (2.72)
R-squared	0.569	0.333	0.301	0.379
Observations	8968	4528	8960	8759
Bank FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes

Panel B Number of Unsecured loans (sample split based on percentile of risk premium)						
	(>75th)	(25th-75th)	(<25th)	(>50th)	(<50th)	(all)
	Ln(Number of unsecured Loans)	Ln(Number of unsecured Loans)	Ln(Number of unsecured Loans)	Ln(Number of unsecured Loans)	Ln(Number of unsecured Loans)	Ln(Number of unsecured Loans)
Treat*Sanction	-0.481 (-1.54)	0.500** (2.47)	-0.461 (-1.13)	-0.207 (-0.96)	0.584*** (2.80)	0.321** (2.17)
GDP per capita (ln)	0.259 (0.70)	-0.399 (-1.57)	-0.432 (-1.20)	-0.0904 (-0.35)	-0.274 (-1.17)	-0.335** (-2.24)
Inflation	0.170** (2.26)	0.0567 (1.19)	-0.0320 (-0.58)	0.0936* (1.91)	0.0409 (0.92)	0.0394 (1.36)
Gross savings rate	0.611** (2.03)	0.415 (1.28)	0.601** (2.02)	0.503** (2.14)	0.750*** (3.27)	0.683*** (4.52)
R-squared	0.669	0.634	0.609	0.655	0.604	0.611
Observations	1070	2244	1066	2220	2228	4528
Bank FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes

Table 7 panel A reports the effect of sanctions on loan features including the number of unsecured loans, loans to public firms, loan risk premiums, and loan maturity. Panel B investigates the effect of import restrictions on the number of unsecured loans on different subsamples divided by various percentiles of risk premium. Standard errors are clustered at the bank-industry level and *t*-statistics are reported in parentheses. *, ** and *** indicate statistical significance at the 10%, 5% and 1% levels, respectively.

Table 8
The effect of lending relationship on total lending

	(1)	(2)
	Ln(Total Number of Loans)	Ln(Total Volume of Loans)
Treat*Sanction*Low Relationship	0.519*** (2.93)	0.703** (2.00)
Treat*Sanction	0.163** (2.47)	0.463*** (3.25)
GDP per capita (ln)	-0.133 (-1.27)	0.00633 (0.04)
Inflation	-0.00545 (-0.33)	0.0159 (0.53)
Gross savings rate	0.315*** (3.45)	0.560*** (3.57)
R-squared	0.599	0.639
Observations	8673	8673
Bank FE	Yes	Yes
Year FE	Yes	Yes
Industry FE	Yes	Yes

Table 8 reports the effect of lending relationship intensity on total number and total volume of loans. *Low Relationship* is a dummy variable equals 1 if a bank provides either 0 or 1 loans to the agricultural sector before 2014 and 0 otherwise. Standard errors are clustered at the bank-industry level and *t*-statistics are reported in parentheses. *, ** and *** indicate statistical significance at the 10%, 5% and 1% levels, respectively.

Table 9
Baseline results with control group including all sectors

	(1)	(2)	(3)	(4)	(5)	(6)
	Ln(Total Number of Loans)	Ln(Total Volume of Loans)	Ln(Total Number of Loans)	Ln(Total Volume of Loans)	Ln(Total Number of Loans)	Ln(Total Volume of Loans)
Treat*Sanction	0.234*** (3.93)	0.559*** (4.18)	0.174*** (2.71)	0.464*** (3.34)	0.173*** (2.69)	0.464*** (3.34)
GDP per capita (ln)					-0.227*** (-3.06)	0.147 (1.16)
Inflation					-0.00564 (-0.47)	0.0144 (0.67)
Gross savings rate					0.304*** (4.71)	0.316*** (2.80)
R-squared	0.0035	0.0048	0.585	0.639	0.585	0.639
Observations	16801	16801	16801	16801	16801	16801
Bank FE	No	No	Yes	Yes	Yes	Yes
Year FE	No	No	Yes	Yes	Yes	Yes
Industry FE	No	No	Yes	Yes	Yes	Yes

Table 9 reports the robustness checks for the baseline analysis where the control group includes all sectors. Control variables and fixed effects are not included in columns (1) and (2). Bank-, year-, and industry-fixed effects are added in columns (3) to (6). Columns (5) and (6) also incorporate *GDP per capita (ln)*, *Inflation* and *Gross savings rate* as control variables. Standard errors are clustered at the bank-industry level and *t*-statistics are reported in parentheses. *, ** and *** indicate statistical significance at the 10%, 5% and 1% levels, respectively.

Table 10
Baseline results with sample period from 2010 to 2019

	(1)	(2)	(3)	(4)	(5)	(6)
	Ln(Total Number of Loans)	Ln(Total Volume of Loans)	Ln(Total Number of Loans)	Ln(Total Volume of Loans)	Ln(Total Number of Loans)	Ln(Total Volume of Loans)
Treat*Sanction	0.226*** (4.13)	0.468*** (3.96)	0.109* (1.82)	0.343*** (2.79)	0.107* (1.80)	0.344*** (2.81)
GDP per capita (ln)					-0.0224 (-0.26)	0.246* (1.74)
Inflation					-0.000568 (-0.04)	0.0423* (1.76)
Gross savings rate					0.158** (2.11)	0.129 (0.99)
R-squared	0.0048	0.0053	0.597	0.654	0.597	0.655
Observations	12917	12917	12917	12917	12917	12917
Bank FE	No	No	Yes	Yes	Yes	Yes
Year FE	No	No	Yes	Yes	Yes	Yes
Industry FE	No	No	Yes	Yes	Yes	Yes

Table 10 reports robustness checks for the baseline analysis with a sample period from 2010 to 2019. Control variables and fixed effects are not included in columns (1) and (2). Bank-, year-, and Industry-fixed effects are included in columns (3) to (6). Columns (5) and (6) also incorporate *GDP per capita (ln)*, *Inflation* and *Gross savings rate* as control variables. Standard errors are clustered at the bank-industry level and *t*-statistics are reported in parentheses. *, ** and *** indicate statistical significance at the 10%, 5% and 1% levels, respectively.

Table 11
Structure of syndicates: Home and foreign banks with control group including all sectors

	(1)	(2)	(3)	(4)
	Ln(Number of Foreign Loans)	Ln(Number of Home Loans)	Ln(Volume of Foreign Loans)	Ln(Volume of Home Loans)
Treat*Sanction	0.188** (2.51)	0.0668 (0.85)	0.709*** (3.31)	0.0288 (0.12)
GDP per capita (ln)	-0.0420 (-0.56)	-0.332*** (-6.15)	0.0583 (0.36)	0.0613 (0.41)
Inflation	0.0117 (1.02)	-0.0409*** (-3.73)	-0.00490 (-0.17)	-0.0356 (-1.18)
Gross savings rate	0.0855 (1.20)	0.399*** (6.62)	0.147 (0.81)	0.791*** (4.40)
R-squared	0.630	0.623	0.681	0.626
Observations	16801	16801	16801	16801
Bank FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes

Table 11 reports the robustness checks of the effect of the sanction on structure of syndicates regarding home/foreign bank where the control group includes all sectors. Standard errors are clustered at the bank-industry level and *t*-statistics are reported in parentheses. *, ** and *** indicate statistical significance at the 10%, 5% and 1% levels, respectively.

Table 12
Structure of syndicates: Home and foreign banks with the sample period from 2010 to 2019

	(1)	(2)	(3)	(4)
	Ln(Number of Foreign Loans)	Ln(Number of Home Loans)	Ln(Volume of Foreign Loans)	Ln(Volume of Home Loans)
Treat*Sanction	0.133** (2.00)	-0.0136 (-0.19)	0.492*** (2.77)	-0.109 (-0.56)
GDP per capita (ln)	0.218*** (2.60)	-0.393*** (-6.62)	0.427** (2.42)	-0.425*** (-2.73)
Inflation	0.0178 (1.22)	-0.0360*** (-3.12)	0.0270 (0.77)	-0.0370 (-1.15)
Gross savings rate	0.00443 (0.05)	0.310*** (4.34)	-0.0407 (-0.20)	0.665*** (3.34)
R-squared	0.644	0.620	0.694	0.636
Observations	12917	12917	12917	12917
Bank FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes

Table 12 reports robustness checks of the effect of sanctions on structure of syndicates regarding home/foreign bank where the sample period is 2010 to 2019. Standard errors are clustered at the bank-industry level and *t*-statistics are reported in parentheses. *, ** and *** indicate statistical significance at the 10%, 5% and 1% levels, respectively.

Table 13
Confounding effects from subsidy payments

	(1)	(2)
	Ln(Total Number of Loans)	Ln(Total Volume of Loans)
Treat*Sanction	0.149*** (3.43)	0.433*** (4.60)
GDP per capita (ln)	-0.155*** (-2.62)	-0.0516 (-0.45)
Inflation	0.00899 (0.83)	0.0278 (1.37)
Gross savings rate	0.0817 (1.33)	0.230** (2.03)
Subsidy	0.00205*** (4.78)	0.00190** (2.46)
R-squared	0.197	0.328
Observations	19439	19439
Bank FE	Yes	Yes
Year FE	Yes	Yes
Industry FE	Yes	Yes
Country FE	Yes	Yes

Table 13 shows whether subsidy payments area confounding factor to influence the effect of sanctions on agricultural lending. Country-, industry-, bank-, and year-fixed effects are included. Standard errors are clustered at the firm-level and *t*-statistics are reported in parentheses. *, ** and *** indicate statistical significance at the 10%, 5% and 1% levels, respectively.

Appendix

1. Examples of bilateral sanctions.

The EU has adopted a series of restrictive measures against Russia over the Ukraine crisis since 2014. Sanctions are devised to erode Russia's economic foundation, depriving it of critical technologies and markets and dramatically limiting its ability to wage war. They include individual restrictive measures, economic sanctions, restrictions on media (from 2022), and diplomatic measures:

***Individual restrictive measures:** Restrictive measures against Russian officials, including asset freezes and travel bans.*

***Economic Sanctions:** Limit Russia's access to EU capital market; Impose embargo on trade of arms and related material with Russia; Prohibit exports of dual use goods and technology for military use in Russia or to Russian military end-users; exports of certain energy-related equipment and technology to Russia are subject to prior authorisation by EU Member States.*

***Restrictions on media:** The broadcasting activities of 5 Russian state-owned outlets have been suspended.*

***Diplomatic measures:** Regular EU-Russia summits were cancelled; G8 summit has been substituted with G7 summit.*

On 6 August 2014, the Russian Federation decreed a ban on agricultural products from the EU, Norway, and other Western countries in response to economic sanctions against Russia over Ukraine crisis. The responsive sanction covered specific products over multiple sectors including fruit and vegetables, dairy products, fishing, and meat. Russia's counter sanction caused severe reduction of EU's agri-food export to Russia from 2014 to 2017.

2. The timeline of the bilateral sanctions (main events).



3. Examples of borrowers

Name	Country	Year	Volume	SIC	Purpose
RAMAFRUT SL	Spain	2013	12.41M	179: Fruits and tree nuts, nec	Refinancing
SalMar ASA	Norway	2014	242.42M	273: Animal aquaculture	Extend and restructure the company's existing credit facilities.
Agrifirm Holding BV	Netherlands	2015	225.66M	211: Beef cattle feedlots	Refinancing
Scandi Standard publ AB	Sweden	2016	157.21M	251: Broiler/fryer/ roaster chickens	Facility will be used to refinance Co's improved terms.
DMK Deutsches Milchkontor GmbH	Germany	2017	106.86M	241: Dairy farms	Capital expenditure