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Who cares about sanctions?

Observations from annual reports of European firms

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Abstract

This paper uses textual analysis to examine how European corporations assess sanctions in their annual reports. Using observations from a panel of almost 11,500 corporate annual reports from 2014–2017, we document significant cross-country variation in how firms perceive Russia-related sanctions, even after controlling for many firm-level characteristics, sectoral differences, and time trends. The cross-country differences also remain for sentiments about sanctions and contexts in which sanctions are mentioned. We also examine the role of macroeconomic linkages in explaining these differences. We show that Russia's inward and outward FDI stocks and high levels of imports and exports with Russia explain about half of the cross-country variation, leaving a nontrivial share of variation unexplained.

1. Introduction

European countries differ markedly in their views on Russia-related sanctions imposed for the first time in 2014. In some countries, political leadership expresses strong opposition to the current sanctions regime, while in others there is wide support for the current restrictive measures. The persisting differences among the European Union (EU) member states are clearly documented e.g. in speeches of the members of the European Parliament. Decisions on renewing the Russia-related sanctions regime have, however, always been unanimous, resulting in a rare show of European consensus (Portela et al., 2021). Somewhat counterintuitively, representatives from countries where trade with Russia is most significant are among the most vocal proponents of economic sanctions against Russia (Silva and Selden, 2020). This finding contrasts with the traditional view of international relations that suggests that countries with extensive economic ties can be expected to refrain from disruptive behavior such as the imposition of sanctions out of their own self-interest (see e.g. Polachek, 1980). However, as standard gravity models of international trade suggest, the countries that have close trade links with Russia also tend to be in close geographical proximity to the Russian border. Therefore, in some of these countries security policy considerations are likely to greatly influence sanctions discussions. Moreover, the traditional trade-conflict literature may be more apt to examine economic exposure and armed conflicts, whereas economic sanctions and other conflictual interactions require a more detailed analysis (see e.g. Peterson and Zeng, 2021).

Given the sharp differences among European countries on Russia-related sanctions, there is surprisingly little systematic evidence on how European firms view Russia-related sanctions. Some industry lobbies survey their member organizations, but such survey results are typically unavailable to outside researchers. A rare exception is the study of Gröschl and Teti (2021), who identify roadblocks to German companies caused by Russia-related sanctions. Generalizing membership-based surveys across the entire population of European enterprises is, however, highly problematic. The only study we are aware of using cross-country data on firms' views on Russia-related sanctions is Weber and Stepien (2020). The limitation of their online survey data is its very low response rate (1.3%) and the resulting uncertainty about sample representativeness.

To better understand the cross-country variation in firm perceptions of Russia-related sanctions, a reasonably representative sample of European firms is needed. To this aim, we use Thomson Reuters Eikon database to collect almost 11,500 annual reports of European firms. As firms tend to find ways to adjust to various trade restrictions (Luo, Sun, and Wan, 2021;

Weber and Stepien, 2020) we restrict our search to the year when the Russia-related sanctions were initially imposed and the following three years (i.e. 2014 plus 2015–2017). Instead of concentrating on the reported numbers, we focus on the narrative sections of the annual reports, where firms typically discuss their business environment and future prospects. We expect firms to raise the topic of sanctions in their annual reports if sanctions affect their business environment either directly or indirectly.

Economic sanctions invariably inflict costs on both the target and the sender country. However, when it comes to the potential effects of Russia-related sanctions on the firm-level business environment, the distinction between sender and target gets blurred. As almost all European countries are simultaneously senders and targets for restrictive measures, it becomes nearly impossible to separate the effects of Western and Russian restrictive measures on firm business environment or growth prospects. We thus sample firms from over 35 European countries, including Russia, to achieve a broad perspective suitable for the analysis of cross-country variation. From a firm perspective, it is less relevant if a potential change in the business environment originates from Russian or Western sanctions measures.

To examine European firms' perceptions on sanctions, we employ standard methods of text analysis. First, we search the annual reports for mentions of Russia-related sanctions. When Russia-related sanctions are mentioned in a published annual report, we assume that a corporation regards at least some sanctions measures as having a noticeable impact on its past or future business perspectives. As the sanctions measures implemented in 2014-2017 were targeted either at specified product categories or particular firms, only a relatively small number of firms were directly affected by sanctions measures. Our interest, therefore, is in understanding if an average (and therefore directly unaffected) European firm assesses Russia-related sanctions significant enough to be included in the text of a published annual report. Second, we examine the tone and context of those mentions. In essence, text analysis lets the firms speak for themselves.

We find that one in six firms considered Russia-related sanctions worth mentioning in their annual reports during the first year of sanctions. Further statistical analysis reveals that especially the large, leveraged firms which experience negative growth shocks and have high sensitivity to the Russian stock market are more likely to mention the sanctions. The frequency of mentions declines over time, but overall, Russia-related sanctions are mentioned in 11% of the sample annual reports. As the narrative sections of corporate annual reports tend to

primarily highlight positive news (see e.g. Li, 2010), this can be considered as a lower bound for firms that consider sanctions important for their past or future operations.

We also document high cross-country variation in the propensity of firms to mention sanctions in their annual reports. We use three standard methods of textual analysis (topic modeling, sentiment analysis, and text classification) to examine the tone and context where firms mention Russia-related sanctions. Even when controlling for firm-level variables, we document significant country-level variation in how firms perceive sanctions. Regardless of location, firms view restrictive measures in negative terms. But in a number of countries, the overall sentiment is extremely negative. Likewise, in some countries sanctions are mostly viewed as having a tangible impact on specific markets, whereas in other countries firms tend to view sanctions in terms of influencing the general business environment. Our analysis confirms that politicians and firms across Europe may view sanctions very differently from their neighbors.

Can standard macroeconomic factors explain these cross-country variations? To find out, we determine whether a firm's vigilance to sanctions correlates with country-level FDI or trade links with Russian partners. While traditional country-level macroeconomic factors explain close to one-half of country-level variation, we find that the attitudes of firms to sanctions in some countries remain unexplained.

Our contribution is twofold. First, we bring textual analysis into the literature on firm-level effects of economic sanctions. Sentiment analysis has been used to analyze the effects of Russia-related tweets by US president Donald Trump on the Russian ruble's exchange rate (Afanasyev, 2021), but this study is the first to rely on corporate annual reports in gauging firm perceptions of sanctions. We show that textual analysis can bring meaningful insights into how firms view economic sanctions. Second, we provide new insights on country-level variation into the rapidly growing literature on the effects of Russia-related sanctions on European firms.

The next section gives a short background on Russia-related sanctions since 2014 and outlines related literature. Section 3 explains the annual reports' data used in the analysis. Section 4 introduces the model used in analyzing country-level variation in sanctions mentions. In section 5, we use three alternative methods of textual analysis (topic modeling, sentiment analysis, and text classification) to examine the tone of sanctions mentions across Europe. Section 6 provides an analysis of the macroeconomic reasons for country-level variation in sanctions mentions. Section 7 concludes.

2. Economic sanctions against Russia and Russian countermeasures

2.1 Measures imposed in 2014

The EU, US, and their allies introduced comprehensive but targeted economic and political sanctions against Russia in 2014 in response to Russia's actions in Ukraine. Initially, the restrictive measures were relatively mild, mostly consisting of travel restrictions and asset freezes of individuals directly linked to the illegal referendum that led to the annexation of Crimea. Business contacts with entities located in Crimea were also sanctioned. With flaring battles in the Donetsk and Luhansk regions of Ukraine and the downing of Malaysian Airlines MH-17 flight, sanctions were tightened considerably. Since July 2014, Western countries have enforced a broad set of sectoral sanctions against Russia,[1] which included embargos on arms exports and exports of dual-use goods for military usage. Western countries have also banned exports of goods and services related to deep-sea, Arctic and shale oil exploration and production. As export restrictions only applied to new contracts and a narrowly defined set of goods, their effect only began to be felt gradually over time.[2]

The most significant set of sectoral sanctions focused on financial market activities. These measures were adopted in July 2014 and effectively curtailed the largest Russian banks and energy companies from access to the EU and the US financial markets. Investors in the EU and the US were barred from providing funding with maturities longer than 90 days to Russia's largest state-owned banks, i.e. Sberbank, VTB, Gazprombank, Rosselkhozbank (Russian Agricultural Bank), and VEB (the state-owned development bank). The US also sanctioned several privately-owned financial institutions (Bank Rossiya, Sobinbank, Investkapitalbank, and SMP bank) for involvement in sanctioned businesses or political connections. This was a drastic measure as the four sanctioned state-owned commercial banks cumulatively hold over half of the assets of the Russian banking sector. As documented by Andermo and Kragh (2021), the financial sector sanctions imposed a visible effect on the Russian interbank and the sovereign debt markets. These measures also had an effect on the rest of the Russian banking sector as non-sanctioned Russian banks exhibited a change in their behavior after the sanctions were imposed (Mamonov et al., 2021).

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[1] From the legal point of view, the EU sanctions only prohibit entities based in the EU to engage in specified economic activities with Russian counterparts. The US measures, in contrast, are extra-territorial in nature.
[2] For analysis of sanction effects on the Russian oil sector, see Mitrova et al. (2018), for the gas sector, see Sun (2020) and for Russia's defense sector, see Juola et al. (2019).

The long-term financing ban was eventually extended to oil giant Rosneft, oil pipeline company Transneft, oil exploration and refiner Gazpromneft, as well as several companies operating in the military sector. The US also sanctioned Novatek, by far Russia's largest producer of liquified natural gas. Even if the net foreign indebtedness of Russian banks and corporates was generally moderate, the large Russian companies affected by sanctions had become reliant on access to long-term funding from international capital markets. When the funding option vanished, it caused a forced deleveraging of foreign debt (Korhonen, 2019). The restrictive measures imposed by the EU must be renewed every six months by unanimous vote. Remarkably, the member states have consistently shown solidarity in extending sanction measures (Portela et al., 2021).

Russia reacted to the sanctions regime in August 2014 by imposing travel bans on almost 90 EU politicians and military leaders and by restricting imports of selected food products from the US, the EU, Canada, Australia, and Norway. Labeled as "counter-sanctions" in Russian discussions, these measures were intended to punish countries that imposed sanctions against Russia. More specifically, the economic part of the Russian countermeasures consists of import bans on fruits, vegetables, fish, meat and dairy products. Products falling under the import ban accounted for less than 1% of total goods exports for the EU countries. The sole outlier was Lithuania, where the embargoed goods comprised 3.7% of total goods exports in 2013 (Simola, 2014). The impact of Russian import bans on individual companies has, however, been substantial in some EU member countries. In the Baltic counties and Finland, for example, Russia's share in extra-EU exports of the banned agricultural and food products exceeded 50% (Korhonen et al., 2018). Russian import bans were initially imposed for a period of two years, but since August 2016 Russia has used government decrees to extend the import restrictions by 12 or 18 months at a time.

Following the coordinated Western sanctions and the Russian import bans imposed in 2014, no radical changes occurred in the sanction regimes during 2015-2017. The existing measures were renewed and slightly tightened over time. For example, the maturity limit on lending to sanctioned banks and corporates was cut to just 30 days. The overall sanctions regime was relatively stable up to April 2018, when the US unilaterally placed seven major oligarchs and their companies, as well as seventeen senior government officials, on the sanctions list. Given the extraterritorial nature of US sanctions and the notoriously opaque ownership structures of Russian corporates, these measures caused great uncertainty and forced

all European companies to double-check their due diligence in all their contacts with Russian customers.

The EU unilaterally imposed further travel bans and asset freezes on nine individuals and one entity in early 2019 in response to the use of a military-grade nerve agent in Salisbury. Additional travel bans and asset freezes were introduced in late 2020 in reaction to the alleged use of a nerve agent in a separate assassination attempt. As teasing out the effects of subsequent unilateral actions from the coordinated sectoral sanctions is nearly impossible, we limit our analysis of how firms perceive Russia-related sanctions to the years 2014–2017.

2.2 Macroeconomic effects

Both Western and Russian measures were crafted to inflict specific injury on the target country or a set of countries while having only a minor impact on the domestic economy. No sanction measures seek to cause widespread economic misery for a general population. As highlighted by e.g. Gould-Davis (2018), Western sanctions are geared to deterring Russian military action, reaffirming principles of international order, and encouraging Russia to reach a political settlement. The sanctions policy has been vitally important in achieving these first two goals, while the more ambitious goal of political resolution of conflict in Ukraine has so far not been achieved. Russian import bans, in turn, aimed to send a clear political signal to European capitals and to bolster import-substitution policies in Russia's agriculture and food industries (Korhonen et al., 2018; Wegren and Elvestad, 2018).

Even these narrowly designed sanctions have caused sizable economic harm. Given the sheer size of the US and the EU economies and a much broader scope of Western economic sanctions against Russia, it is natural that macroeconomic effects on Western countries are on average negligible. The existing literature on effects on the EU economies focuses on estimating losses in bilateral goods trade. Belin and Hanousek (2021), using data for 2014–2017, assert that Western export restrictions had led to lost exports worth USD 1.5 billion, while Russian bans decreased imports by USD 12.6 billion. The real costs of trade sanctions, however, entail both enforcement costs and adjustment costs for actors both in the sender and target countries (Hufbauer and Jung, 2020; Weber and Stepien, 2020). Moreover, modern targeted sanctions also tend to affect trade in non-sanctioned goods (Crozet and Hinz, 2020). However, the variation in observed sanction effects in Europe, especially among sectors within countries, has been large.

Estimating the effect of import bans on the Russian economy is not straightforward, as the restrictions coincided with a fall in oil price and a change in exchange rate policy. The best available estimates suggest a small but persistent deadweight loss on the Russian economy (Volchkova and Kuznetsova, 2019). Trade restrictions, however, represent a minor part of all economic sanctions against Russia. Restricted access to global financial markets and increased uncertainty have restrained Russian economic development since 2014. Initially, sanctions had a negligible impact on the ruble's exchange rate, but the unanticipated restrictions have increased the currency's volatility (Dreger et al., 2016). Thus, while quantifying macroeconomic effects is difficult, most recent studies conclude that Western sanctions have had a clear negative effect on Russian GDP growth. The IMF's (2019) estimates suggest that sanctions reduced Russian economic growth by 0.2 percentage points annually between 2014 and 2018. Some other recent studies point to significantly larger effects, especially in the early years of the sanctions period (Korhonen, 2019). Given these tangible macroeconomic effects, it is plausible that the Russia-related sanctions measures have shaped business expectations and county risk assessments also for firms not directly affected by any of the restrictive measures.

2.3 Firm-level effects

Even though the literature on economic sanctions continues to expand rapidly, variation in firm-level effects remains poorly understood. In analyzing sanctions effects, firm-level studies typically use data from a single country. Ahn and Ludema (2020), for example, examine whether sanctions had any implications for sanctions-targeted Russian firms and whether these firms performed differently than their peers not directly targeted by sanctions. Based on firm balance sheet data, they argue that the sanctions regime had an explicit negative effect on firm performance. Their findings further suggest that firms defined as "strategic" by the government systemically outperform "non-strategic" peers under sanctions. This result implies sizable additional costs in the form of shielding strategically important firms.

Stone (2016) and Naidenova and Novikova (2018) show that announcements of imposition and prolongation of sanctions had an adverse impact on Russia's listed companies (both targeted and non-targeted). These firms on average lost 0.17 percentage points of their daily returns around sanctions announcements. Moreover, announcements of sanctions by the US caused the most economically significant decline in stock prices, highlighting the central

role of US financial institutions in global financial markets. Golikova and Kuznetsov (2017) use survey responses of large Russian manufacturing firms to gauge firms' perceptions on economic sanctions and argue that sanctions could prove to be harmful also for non-targeted firms.

The studies on EU firms typically do not single out targeted and non-targeted firms. Using a rich dataset of French firms, Crozet and Hinz (2020), for example, show that the drop in Western exports to Russia has been driven by increasing country risk for Russia. Using data on Swedish firms, Gullstrand (2020) shows that the total short-run cost of sanctions was rather limited but highly asymmetric. For a small number of companies and industries, the sanctions led to significant loss of firm value and ultimately financial distress. Gröschl and Teti (2021) use a survey of 862 German companies to analyze obstacles caused by Russia-related sanctions on firm operations. They find that around half of the surveyed companies felt they would benefit from a lifting of current restrictive measures. Weber and Stepien (2020) use an online survey conducted in 2017 in five EU countries and find that many firms had found ways to mitigate the impact of sanctions on their operations.

Existing firm-level studies suffer from their focus on a single economy. Given the large variation in economic structures within the EU, generalizing results from a single country to the entire population of European enterprises makes little sense. We still understand precariously little about how European companies assess sanctions or why otherwise similar companies in different countries have different views on sanctions. We aim to contribute to this literature by examining heterogeneity in information and assessments of sanctions that European firms publicly provide to the stakeholders in the narrative sections of their annual reports.

3. Data and sanctions measures

Our analysis is based on a large set of publicly available corporate annual reports. Published annual reports are the main official channel for conveying information on the financial standing of firms and their prospects. As the financial statement sections of such reports are standardized, our interest turns to the narrative sections such as the foreword by the CEO or president, highlights of the past year, and discussion of risks and uncertainties confronting the firm. These sections in the document are designed to give shareholders an overview of the business environment and future developments relevant to the firm. If Russia-related sanctions

are mentioned in these sections, we deem sanctions to be a potentially important issue for the firm. The subsequent sentiment analysis will help to determine if firms regard sanctions as positive or negative, and the topic modelling reveals if firms assess sanctions mainly as having an effect on the macroeconomic environment or as affecting a specific market segment. Due to the nature of our data, we focus on firm perceptions on Russia-related sanctions and do not assess the relative importance of sanctions and other operational or business risks firms face.

Our sample on annual reports of European corporations for fiscal years 2014–2017 is derived from the Thomson Reuters Eikon database. We do not limit the geographic coverage of the sample to EU firms but include all firms in the Eikon database that are headquartered in Europe. As we endeavor to generate as large a dataset as possible, the initial data query was restricted to annual reports dated December 31 of a given year that include the words "annual" together with "report" or "review" in order to exclude scanned documents. As textual analysis tools for many European languages are still underdeveloped, we restrict our analysis to documents in English. Our initial sample consists of 18,586 annual reports from 3,888 organizations having an individual Thomson Reuters PermID. The majority (84%) of the annual reports in our sample are reports by public corporations.

We apply three criteria to clean up this initial sample. First, non-corporate organizations are excluded. This restriction excludes e.g. central banks, stock exchanges, and property funds in the final sample. Next, we exclude corporations with mean total assets of less than EUR 1 million. Third, we require that a corporation must have published at least three annual reports between 2014 and 2017, each at least 5,000 words in length. Reports that meet the minimum annual report frequency and length requirement equal the first percentile of the initial sample. Applying these three criteria reduces our final sample to 3,064 corporations and 11,485 firm-year observations. Table 1 below reports the number of observations in the initial and final samples.

[Table 1 here]

For the corporates in our final sample, we extract data on firm identifier, sector, country, region, and various financials from the Thomson Reuters Eikon database. Details on data and the exact data identifiers are reported in the Appendix A.

The number of annual reports in our final sample is relatively evenly distributed across years varying between 2,733 reports in 2017 (24% of total) and 2,997 reports in 2015 (26% of total). Median size, measured as total assets of a sample firm, is slightly above EUR 1 billion. The size distribution of firms follows logarithmic normal distribution relatively closely. The single largest sector represented in the sample is banking & investment services (13.8%), while the vast majority of firms are non-financial companies in manufacturing and services. Table 2 below describes the sectoral distribution of the sample firms.

The majority of the sample firms are headquartered in Northern and Western Europe, with about 700 firms located in Southern and Eastern Europe. Overall, our data includes firms from over 35 European countries. Table 2 presents details of the sample distribution across countries.

[Table 2 here]

To detect mentions of Russia-related sanctions in corporate annual reports, we search for the words "*russia**" and "*sanction**" in the narrative sections of the reports. The search includes characters in upper case and lower case letters, as well as variations in form. Our baseline measure is a binary variable *Mention*, which takes a value of one if both "*russia**" and "*sanction**" are mentioned on the same page at least once, and zero otherwise. Since the variation in actual page lengths, as well as page breaks, may cause unnecessary false negatives, we use a rolling search window of 413 words, which corresponds to the median page length in our annual reports sample.[3] The benefit of this approach is that it also captures indirect references to Russia-related sanctions. As an example, the text extract below would generate a *Mention* variable with the value of one:

> *"Russia is one of Honkarakenne's major business areas. Sanctions associated with the Ukrainian crisis, coupled with strong exchange rate fluctuations, are currently causing instability in the Russian market."*

The *Mention* variable is well suited for comparisons between firms located in various geographic regions or different sectors of the economy. Since *Mention* may, at least in theory,

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[3] Correspondingly, a search window too long may cause false positives. However, our results are not sensitive to the choice of 413-word search window for *Mention*. As a robustness check, we replicated our main results using a narrower 100-word window, which corresponds tothe length of a median text paragraph in our sample. The results remain quantitively unchanged, although the narrower search window resulted in increased false negatives.

depend on the length of the annual report (Loughran et al., 2009), we control for report length in the subsequent analysis.

In addition, we also examine three alternative measures to gauge sanctions mentions in the annual reports. Variable *First* measures how early Russia-related sanctions are mentioned in the annual report. It varies between 100 and 0, inclusive, depending on the position of the first sanctions mention. For example, *First* obtains a very high (low) value if Russia-related sanctions are mentioned very early (in the end) of the annual report. The minimum value, zero, is assigned if Russia-related sanctions are not mentioned at all in the document. Variable *Pages* reports the number of pages (normalized by the total number of pages) where sanctions are mentioned. The fourth measure *TFIDF* is based on the Term Frequency–Inverse Document Frequency methodology (Loughran and McDonald, 2011). The weight functions are used to generate a continuous variable with values increasing with the frequency of "*russia**" and "*sanction**" in the report.

Overall, "*russia**" and "*sanction**" are mentioned on the same page at least once in 11% of the sampled annual reports. About half of these mentions take place in the first quarter of the report, and on average are mentioned only once. However, in some annual reports, like Transatlantica for 2014, Russia-related sanctions are mentioned more than ten times. Panel B in Table 1 provides summary statistics for all four mentions indicators. Statistics for *Mention* are based on the full final sample, whereas the statistics for other indicators are based on the sub-sample where *Mention* = 1.

Sectoral distribution of firms mentioning Russia-related sanctions provides some interesting insights. Figure 2 below shows that about one-third of firms in automobiles, banking, and mineral resources sectors mention sanctions at least once during 2014-2017, whereas in many sectors such as IT and telecom services this number corresponds to less than 10%. While the automobiles sector is not subject to any direct sanctions, we observe that relatively many firms in this sector find the sanctions factor important enough to be mentioned in their annual reports. However, as we show in the following analysis and as also depicted in Figure 2, the inclusion of country effects (i.e., conditional likelihood of mentioning sanctions) makes the automobiles sector unaffected beyond what can be expected at the country level. Nevertheless, large sectoral variation makes it important to control for sector affiliation in the subsequent analysis.

[Figures 1 and 2 here]

4. Methodology for searching systematic differences across countries

In the next sections, we turn to the analysis of context and reasons for sanctions mentions in corporate annual reports. As seen from the heatmap in Figure 1, sanctions mentions vary substantially across countries. Our aim is to examine the systematic differences across countries in how and why sanctions are mentioned in corporate annual reports.

In terms of firm characteristics, year, and sector distribution, we can assume our sample firms are a representative random sample of the European population, and their effects can be viewed as systematic and treated as fixed. At the country level, however, our sample should be interpreted as consisting of random samples of various sizes of the country-level population. Therefore, the country effects (or parameters of country variables, to be more precise) have to be treated as random in the estimation. This model set-up with both fixed and random effects is best estimated with a generalized linear mixed-effects model (GLME model). Hence, our empirical model can be represented as

$$f(y_{it}) = X\beta + Zu + \epsilon_{it}, \tag{1}$$

where $f()$ is the link function of the generalized linear model and y is the sanctions measure examined.[4] Given that we obtain similar results with all four measures, we only report the results using the most straightforward measure (*Mention*) as the dependent variable. Term X is the matrix of explanatory variables assumed to have fixed effects, and β is the parameter vector of the fixed effects. Term Z is the planning matrix for random effects,

$$Z = (country_i),$$

and $\boldsymbol{u}$ is the parameter vector for the random effects. Firm-level *country* variable records a firm's HQ location. In estimating Equation 1, we assume a diagonal covariance structure for the country random effects.[5] The model error term is ϵ, and the sub-indices i and t refer to firm and year, respectively. The model parameters are estimated using maximum likelihood with Laplace approximation.

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[4] Specifically, we use the canonical logit link function for the dependent variables *Mention*, *First*, and *Pages*. The log link function is used in the case of *TFIDF* variable.

[5] As a robustness check, we tried alternative covariance structures, including full and log-Cholesky, but found that the alternative specifications do not materially change our results. These results are available upon request.

With Equation (1), we estimate four different model specifications to investigate how increasingly extensive sets of explanatory variables explain the residual variance in the sanctions mentions. First, Model REPORT only includes the annual report length, firm size and its squared term, and the year effect:

$$X_{REPORT} = (1, words_{it}, size_{it}, size_{it}^2, year_t),$$

where 1 represents the intercept term. Following Zipf's law, we expect annual report length (*words*) to have a positive coefficient in all specifications (Manning and Schütze, 1999; Loughran and McDonald, 2016). Firm *size* is assumed to have a positive coefficient as larger firms have more established reporting procedures, larger networks of contractors and customers, making exposure to sanctions more likely, and can also be subject to greater public scrutiny which arguably incentivizes them to engage in additional disclosure (He and Plumlee, 2020). The report *year* variable represents yearly dummy variables that aim to capture the systematic time variation in the system-wide sanctions vigilance of the sample firms.

Second, Model FIRM includes commonly used firm-level attributes to capture the effects of firm financial ratios on its reporting behavior. We expect that a firm's sanctions reporting may depend on its age, profitability and revenues, and riskiness:

$$X_{FIRM} = (X_{REPORT}, age_{it}, profitability_{it}, leverage_{it}, sales\ growth_{it}, stock\ exposure_t).$$

Firm *age* can conceivably be correlated with the level of voluntary disclosure about the sanction effects, but previous studies offer contradictive expectations for the sign of this correlation. First, Chen, DeFond, and Park (2002) expect younger firms to disclosure additional information since there is generally greater uncertainty about younger firms' future earnings. In contrast, He and Plumlee (2020) find that firms disclose more information as they get older, likely due to more mature disclosure processes and higher reputational costs. Firm *profitability* and *sales growth* can be expected to have a negative association with the sanction disclosure, as firms reporting bad financial performance are subject to greater uncertainty about future performance and are therefore compelled to explain the source of current underperformance by more extensive disclosure. Finally, we expect firm risk, as measured by *leverage* and *stock exposure*, to be positively associated with sanctions disclosure since stakeholders of risky firms have greater demand for information, especially at times of greater uncertainty (Chen et al., 2002). In all tests, we use log transformations of both firm age and firm size and adjust the financial ratios with industry averages.

Third, Model SECTOR adds sectoral fixed effects to the FIRM-level specification:

$$X_{SECTOR} = (X_{FIRM}, sector_i),$$

where *sector* represents sectoral dummy variables, obtaining the value of one for the sector where the firm operates in and zero otherwise. Finally, Model MACRO includes country-level variables for the firm's home country's trade and investment linkages with Russia:

$$X_{MACRO} = (X_{SECTOR}, export_{it}, import_{it}, outward_i, inward_i),$$

where *export* and *import* measure merchandise goods exports to and imports from Russia at year *t*, as a share of exports and imports of firm *i*'s home country, respectively. Analogously, *outward* (*inward*) foreign direct investment measures the share of firm *i*'s home country of Russian outward (inward) foreign direct investment. We also include interactions of the trade and FDI measures in the MACRO model specification.

We expect country-level trade linkages with Russia to have a positive effect on the probability of a firm mentioning Russia-related sanctions in its annual report. Correspondingly, stronger country-level FDI linkages are expected to positively affect firms' propensity to mention sanctions in their annual reports. Furthermore, sizable Russian FDI stocks in a country should signify notable Russian ownership in at least some corporations in the host country. We obtain the data on inward FDI stock (by ultimate investing country) from the UNCTAD World Investment Report (2017). Given that changes in FDI shares tend to be very slow, we assume that shares in 2017 are a good proxy for shares in 2014–2017.[6] The data on bilateral trade of merchandise goods are obtained from the IMF Direction of Trade Statistics database on a year-by-year basis. Specific variable descriptions, definitions, and data item codes can be found in Appendix A, while Appendix B provides the summary statistics of the variables used in the analysis.

Table 3 reports our estimation results for the binary *Mention* variable. The simple baseline model specification (Model REPORT) includes only the intercept, report length, firm size and size squared, and year and country effects. As expected, report length has a positive coefficient, and firm size and size squared are positive. The McFadden pseudo-R^2 for the REPORT model is 0.247, suggesting an excellent model fit (McFadden, 1979). The FIRM model specification adds firm financial ratios for profitability, growth, and risk. The estimate for the firm-level exposure to the Russian stock market (*stock exposure*) is positive and highly significant in the statistical and economic sense, implying that stock market spillover effects

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[6] As a robustness check, we estimated the MACRO specification using data on FDI stocks in 2012. The estimation results (available upon request) were essentially unchanged from using the 2017 data.

are directly or indirectly increasing firms' propensity to mention sanctions. Moreover, growth shocks, as measured by *sales growth*, are negatively and statistically significantly related to *Mention*, suggesting that reduced sales seem to trigger sanctions mentions in the annual reports as can be expected. The addition of firm-level financial ratios increases McFadden's pseudo-R^2 to 0.258, which is a full percentage point higher compared to the baseline REPORT specification.

The third specification (Model SECTOR) adds sectoral controls to the model. We note a significant sectoral variation in the propensity of firms to mention Russia-related sanctions in their annual reports, as indicated by McFadden's pseudo-R^2 increasing 0.286, which is almost two percentage points higher than for the FIRM specification. Also, after controlling for the sectoral effects, firm *leverage* becomes positively and statistically significantly related to firm's sanction *Mention*. Finally, we control for the country-level macroeconomic effects in the fourth specification (Model MACRO). The addition of trade and FDI linkages as explanatory variables leaves the signs and significance of the firm-level variables unchanged and adds a little but statistically significant amount of firm-level explanatory power. While Russia-related *export* and *import* levels of the home country load positively onto the firm-level likelihood of mentioning sanctions, McFadden's pseudo-R^2 only increases to 0.288, from 0.286 of the SECTOR model. Interestingly, the interaction of *export* and *import* takes a statistically significant negative sign, implying that it is not only the trade linkages but also trade imbalance that increases firm-level attention to sanctions.

In general, the firm-level parameter estimates remain stable and sign consistent across the model specifications. Specifically, we document that large, leveraged firms which experience negative growth shocks and have high sensitivity to the Russian stock market are more likely to mention Russia-related sanctions. We don't find empirical evidence that firm *age* and *profitability* are related to sanctions mentions.

Since firms tend to primarily highlight positive news in their annual reports, our measures of sanctions mention may be downward biased. As a robustness check, we re-estimate the SECTOR model using conceivably "uncontaminated" sampling in the spirit of Horowitz and Manski (1995) and find consistent increases of approximately 50% in the estimated effects for leverage, sales growth, and stock exposure. Moreover, the estimated country effects for Austria, Cyprus, Estonia, Jersey, and Russia increased materially.[7] These

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[7] These results are not reported for the sake of brevity, but are available upon request.

results suggest that risky firms experiencing negative sales shocks, as well as firms from countries with financial or trade linkages with Russia, are probably underreporting the effects of the sanctions in their annual reports.

[Table 3 here]

Overall, the explanatory power of the estimated models ranges from 0.25 to 0.29, satisfying McFadden (1979) bounds of 0.2 to 0.4 for excellent model fit and clearly passing the critical values for the likelihood ratios vis-à-vis a constant model. The standard deviation of the country random effects ranges from 1.05 to 1.29, indicating statistically and economically significant variation in sanctions vigilance across countries.

Any systematic variation across firms in different countries is best seen by analyzing the average fraction of firms in a country mentioning sanctions in their annual reports controlling for report-, sector-, time-, and firm-specific characteristics. Figure 3 below plots these marginal means from the three model specifications in Table 3 for the countries in our sample. The immediate, and somewhat surprising, observation is that adding firm or sectoral effects does not significantly affect the country means. As seen from the figure, firms in Russia are significantly more likely to mention sanctions in their annual reports than firms in any other country. The fact that the marginal country mean is over 0.8 in Russia implies that over 80% of Russian firms mention sanctions after controlling for report-, sector-, time-, and firm-specific characteristics. Notably, firms in Austria, Jersey, Finland, Estonia, Germany, and Cyprus also appear to be strongly affected by Russia-related sanctions measures.

[Figure 3 here]

5. Understanding the sentiment and context of sanctions mentions

It would be arbitrary to assume that all mentions of sanctions are equal as firms likely discuss them in different contexts. For example, a firm could treat sanctions as a threat to its business. Another could see sanctions as an opportunity that could open up new income-generating sources. To account for such differences, we examine the sentiment and context of sanctions

mentions in the annual reports. Specifically, we extract 60-word text snippets (-45, +15) around the term "sanction", conditional on the term being associated with Russia. For each text snippet, we normalize, tokenize, and lemmatize words, as well as exclude stopwords. These text snippets are then analyzed with three methods of textual analysis: *topic modeling*, *sentiment analysis*, and *text classification*. Throughout the analysis, our focus is on the systematic country-level variation in how firms mention Russia-related sanctions in their annual reports.

5.1 Sentiments vary across countries

We examine the tone and sentiment in the text snippets of the annual reports using Loughran and McDonald (2011) lexicon for financial documents (the 2018 updated version) and VADER (Valence Aware Dictionary and sEntiment Reasoner) sentiment algorithm. The Loughran and McDonald sentiment lexicon (word list) annotates words with a sentiment score ranging from -1 to 1, where scores close to 1 indicate strong positive sentiment, scores close to -1 indicate strong negative sentiment and scores close to zero indicate neutral sentiment.[8] The VADER algorithm, in turn, is a parsimonious rules-based model for sentiment analysis that accounts for negations such as *"Was very good"* vs. *"Was not very good"* (Hutto and Gilbert, 2014). For every text snippet, the algorithm calculates a sentiment score as the sum of negative and positive words divided by the total number of words in the text.

Our first observation in this analysis is that the tone of sanctions discussion in the annual reports of our sample firms is noticeably skewed towards the negative side. The mean sentiment score in our data is negative at -0.56. Given the increase in economic uncertainty and outright economic costs associated with Russia-related sanctions, this is exactly what one should expect. Table 4 lists the top-25 most pessimistic firms in our dataset. The most pessimistic corporates are headquartered either in Russia or have direct business exposure to Russia either via trade or investment links. The impact of economic sanctions is clearly seen in negative terms, even if only one corporation (Sberbank) in the top-25 list was directly targeted by the Western sanctions. The sanctions on financial markets have created negative sentiments, especially in the banking sector as two of the top-25 most pessimistic corporations are large international banking groups (Société Générale and HSBC).

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[8] Loughran and McDonald's (2011) lexicon has been widely used to measure tone e.g. in newspaper articles/columns and corporate press releases. For an overview on textual analysis and use of alternative lexicons, see the survey by Loughran and McDonald (2016).

[Table 4 here]

We next strive to explain variation in sentiment scores by estimating a GLME model for sentiment scores.[9] More formally, we estimate

$$f(y) = X\beta + Zu + \epsilon \,, \tag{2}$$

where *f()* is the logit link function, *y* is the sentiment score,[10] *X* is the matrix of explanatory variables, where

$$X = (1, words_{it}, size_i, size_i^2, year_t, sector_i), \text{ and } Z = (country_i, firm_i).$$

Instead of reporting full estimation results, we focus on country-level variation.[11] Figure 4 below shows partial country effects for sentiment scores implied by the GLME model. Each value in the plot is the sentiment on the country variable obtained by marginalizing over the other variables from Equation (2). Statistically significantly (p<0.05) low sentiment countries are marked with a filled circle.

Corporates from Cyprus, Finland, France, and Russia tend to have significantly more negative sentiments about Russia-related sanctions. The fact that Russian firms are especially negative should not come as a surprise, but the negative sentiments in Cyprus, Finland, and France deserve further inquiry.

[Figure 4 here]

5.2 Thematic structure of sanctions mentions

Having established clear cross-country variation in the sentiment of Russia-related sanctions mentions, we next examine the thematic structure of our collection of text snippets. Topic modeling attempts to identify common themes (topics) in a text and to derive patterns in the

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[9] Specifically, we estimate the SECTOR model specification of Equation (1) but control for heterogeneity across firms with firm random effects instead of financial ratios.
[10] Our analysis groups those countries with a few observations that share a common geographic or economic area. Lichtenstein, for example, is grouped with Switzerland and reported as CH. Gibraltar is grouped with Great Britain. Excluding the countries with insufficient number of observations does not change our results.
[11] Full estimation results of the GLME model (2) are not reported, but available upon request.

text structure. We use the Latent Dirichlet Allocation (LDA) statistical technique. LDA is a generative, unsupervised method for identifying latent attributes. It is essentially a cluster analysis for words, producing "topics", i.e. word groups with common context (Loughran and McDonald, 2016). Using LDA cross-validation tests in combination with inspection of perplexity and loglikelihood measures, we find that most of the sample variation stems from three particular topics.[12] Figure 5 shows the topic-specific word clouds for the identified three topics.

[Figure 5 here]

Topic 1 can be labeled as a numbers-related theme on the macroeconomic environment. In this topic group, our Russia-related sanctions text snippets typically include numbers and words such as "growth," "year," "2014," and "economic." To exemplify the context from this topic area, below is an extract from an annual report, which is assigned to Topic 1:

*"... The first few months of the 2014 financial year were still characterized by economic optimism. However, the situation became gloomier as the year progressed in view of emerging geopolitical uncertainties. There was increasing uncertainty from the unresolved conflict over parts of Ukraine and the EU's **sanctions** against **Russia**. Germany's main share index, the DAX, topped the 10,000 points mark on a number of occasions during 2014 but closed the year with relatively moderate year-on-year growth of just over 2.5 percent..."*

Discussions in text snippets assigned to the second group (Topic 2) tend to be more narrowly focused on market reactions and potential direct effects on firm operations. In this topic group, our text snippets typically include words such as "economic," "market," "financial," and "impact." To illustrate the difference between these topics, below is an example of a text snippet assigned to Topic 2:

*"... In 2014, the **Russian** economy was negatively impacted by a significant drop in crude oil prices and a significant devaluation of the **Russian** Rouble, as well as **sanctions** imposed*

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[12] Results of cross-validation tests, perplexity, and loglikelihood measures are available upon request.

*on **Russia** by several countries. In December 2014, the Rouble interest rates have increased*
*significantly after the Central Bank of **Russia** raised its key rate to 17%. The combination*
of the above resulted in reduced access to capital, a higher cost of capital, increased
inflation and uncertainty regarding economic growth, which could negatively affect the
Group's future financial position, results of operations and business prospects..."

The third group (Topic 3) captures a "disclaimer" type of discussion in the sanctions talk, picking a somewhat general description of the sanctions timeline and general legal or business impacts. An example of Topic 3 discussions is:

*"Lastly, Danone conducts business in certain countries, notably Iran and **Russia**, which*
*may be targeted by economic and financial **sanctions** imposed in particular by U.S. or*
European regulations. These regulations prohibit notably transactions with certain
financial institutions and require prior authorization with the proper authorities before
executing any fund transfers. If the Company and/or its subsidiaries do not comply with
these regulations, Danone could be the subject of criminal penalties and/or significant
financial penalties."

We next focus on country-level effects, controlling for year, size, sector, and firm effects. We estimate the GLME model in Equation (2) separately for each topic group, or more precisely:

$$f(y) = X\beta + Zu + \epsilon, \tag{3}$$

where *f()* is the logit link function, *y* is the probability of membership to Topic 1, 2, or 3,

$$X = (1, words_{it}, size_i, size_i^2, year_t, sector_i), \text{ and } Z = (country_i, firm_i).$$

Figure 6 shows partial country effects (i.e., estimated marginal means) from the model in Equation (3).[13] Filled bars denote a statistically significantly higher likelihood of topic membership at the conventional levels.

[Figure 6 here]

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[13] Full estimation results of the GLME model in Eq. (3) are not reported, but available upon request.

These partial country effects reveal that in most countries firms tend to discuss Russia-related sanctions either in terms of describing the macroeconomic environment or as a disclaimer type of discussion on potential risks. This finding supports our assumption that firms ought to address sanctions in their annual reports if sanctions have an effect on their overall business environment.

We identify three distinctive country groups in how firms tend to discuss Russia-related sanctions. Controlling for sector and firm effects, we find that Austrian, Swiss, German, Italian, and Portuguese companies are statistically significantly more probable to mention sanctions under Topic 1 (macroeconomic environment). Only Russian, Cypriot, and Jersey firms are statistically significantly more prone to mention sanctions under Topic 2 (market impact). Moreover, firms headquartered in these countries tend to clearly use the same topic vocabulary when mentioning sanctions. Russian and Cypriot firms also tended to discuss sanctions in the most negative terms, as shown in our sentiment analysis. This apparent similarity of Russian and Cypriot firms may be explained by close trade and FDI relations of the two economies. A large share of Cypriot firms in the sample may either have direct business exposure to Russia, or be owned by Russian nationals, or both. Finally, firms from Nordic and Benelux countries, along with those from France and Great Britain were more likely to mention sanctions under Topic 3 (disclaimer).

5.3 Text classification analysis

While topic modeling provides a fully unsupervised method to group various text snippets, text classification is about assigning each sanctions mention to a predetermined thematic context – or a class. In our analysis, the natural candidates for predetermined classes are the various sections in a typical annual report. As the annual filings of 10-K reports (annual reports of listed US corporations) have received considerable attention in accounting and finance literature we can consider four pre-trained contexts: "Business," "Risk Factors," "Management Discussions & Analysis," and "Financial Statements." These correspond to SEC 10-K items 1, 1A, 7, and 8, respectively. These items are described in SEC (2021) as:

Item 1 "Business" requires a description of the company's business, including its main products and services, what subsidiaries it owns, and what markets it operates in. This section may also include information about recent events, competition the company faces,

regulations that apply to it, labor issues, special operating costs, or seasonal factors. This is a good place to start to understand how the company operates.

Item 1A "Risk Factors" includes information about the most significant risks that apply to the company or its securities. Companies generally list the risk factors in order of their importance. In practice, this section focuses on the risks themselves, not how the company addresses those risks. Some risks may be true for the entire economy, some may apply only to the company's industry sector or geographic region, and some may be unique to the company.

Item 7 "Management's Discussion and Analysis of Financial Condition and Results of Operations" (MD&A) gives the company's perspective on the business results of the past financial year. The company's operations and financial results, including information about the company's liquidity and capital resources and any known trends or uncertainties that could materially affect the company's results. This section may also discuss management's views of key business risks and what it is doing to address them.

Item 8 "Financial Statements and Supplementary Data" requires the company's audited financial statements. This includes the company's income statement (which is sometimes called the statement of earnings or the statement of operations), balance sheets, statement of cash flows and statement of stockholders' equity. The financial statements are accompanied by notes that explain the information presented in the financial statements.

The contexts are classified using Facebook's *fastText* algorithm (Joulin et al., 2016), which was trained on the sections of 22,633 10-K filings from 2013–2016 retained in the US Security and Exchange Commission's EDGAR database. Using the *fastText* algorithm, we assign the probability for each mention of Russia-related sanctions in our data to belong to each of the 10-K sections, but we especially focus on most relevant Items 1, 1A, 7, and 8. These four items cover almost 90% of all sanctions mentions in our sample, with slightly over one-half of all mentions classified into Items 1 and 1A.

Then, we once again run the GLME model of Equation (2) for each Item context separately and report the marginal probabilities of firms in selected countries reporting within a specific context. To be more precise, we estimate

$$f(y) = X\beta + Zu + \epsilon, \tag{4}$$

where *f()* is the logit link function, *y* is the probability of topic membership to 10-K Item 1 (*Business*), 1A (*Risk Factors*), 7 (*MD&A*), or 8 (*Financial Statement*),

$$X = (1, words_{it}, size_i, size_i^2, year_t, sector_i), \text{ and } Z = (country_i, firm_i).$$

Figure 7 below shows the marginal probabilities of firms in selected countries reporting in a specific context, compared to the baseline. Filled bars denote statistical significance at traditional levels.[14]

[Figure 7 here]

In contrast to other European countries, and especially Germany and Italy, Russian firms are over 20% less likely to report sanctions in the "Business" context. Instead, they are over 20% more likely to mention sanctions in the contexts of "MD&A," "Financial Statement," or somewhat less in "Risk Factors." In stark contrast to other European countries, Russian firms also report about sanctions here in a more operative context. The differences among countries excluding Russia are surprisingly small. Italian, Danish, and Portuguese firms tend to discuss Russia-related sanctions more often in the MD&A context. Otherwise, in comparison to topic modeling results, the differences are relatively mild. Apart from Russia, firms in all European countries tend to discuss sanctions in similar sections of their annual reports.

6. Reconsidering the role of bilateral trade and investment relations

In the final step of our analysis, we take a closer look at the potential causes for cross-country variation in sanctions mentions in corporate annual reports. The results reported previously in Table 3 indicate that bilateral trade linkages increase the likelihood of mentioning sanctions at the firm level, while FDI flows seem to have no effect. However, as mentioned earlier, the estimations with the macroeconomic variables in Table 3 also include Russian firms, trade and FDI values for which had to be set to zero. Moreover, the sample estimates of the macroeconomic variables in this analysis could be biased towards certain countries as 40% of our sample firms are domiciled in relatively few Western European countries (namely, the UK, Germany, France, and Italy). Therefore, in order to reduce this bias, we adopt the Estimated Dependent Variable (EDV) model (Lewis and Linzer, 2005) and re-consider the importance of FDI flows and trade relationships in a two-stage procedure. In the first stage, we estimate

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[14] Full estimation results of the GLME model in Eq. (4) are not reported, but available upon request.

country effects adjusted for firm, year, and sector effects in the same manner as in the SECTOR model in Table 3. In the second stage, we explain these country estimates, excluding Russia's, with country-level trade and FDI linkages with Russia.

When estimating the cross-country EDV model, we explicitly account for the fact that variation in the sampling variance of the observations on the dependent variable (country random effects from the SECTOR model) induces heteroscedasticity. Following Lewis and Linzer (2005), we estimate the EDV model using weighted least squares, where the observations are weighted by the inverse of the standard errors of the dependent variable estimates from the first stage, as well as ordinary least squares with Efron (1982) heteroscedasticity-consistent standard errors.

The estimates from the OLS and WLS estimations are reported in Table 5. Similar to results reported in Table 3, we observe that firms in countries with a higher share of exports to Russia and with a higher trade imbalance with Russia are more likely to mention sanctions in their annual reports. In contrast to estimations in Table 3, the EDV approach uncovers an unobserved relationship between the share of FDI stocks and country-level frequency of sanctions mentions. A country's exposure to both inward and outward direct investments to/from Russia increases the likelihood of firms in this country to mention sanctions, although only outward FDI is statistically significant.

[Table 5 here]

Figure 8 illustrates the positive relationship between the estimated country-level likelihood to mention sanctions and the share of FDI from Russia in a country's total FDI stock, adjusted for the effects of other explanatory variables in the EDV model. Some of the countries (e.g. Cyprus and Jersey) with the largest share of FDI stock from Russia are in fact offshore financial centers, and firms from these countries may be part of the widespread phenomenon of capital round-tripping, i.e. transferring funds through offshore centers back to the home economy in the form of foreign investments (see e.g. Aykut et al., 2017). Furthermore, investments from countries with preferential bilateral tax treatments or advanced capital-origin secrecy (e.g. Netherlands and Austria) may also originate from Russian companies that often set up subsidiaries in these countries as their European business outpost (see e.g. Ledyaeva et al, 2013; 2015). Such capital flows assume sizable participation of Russian nationals in the

ownership stakes of firms located in offshore jurisdictions. Hence, close investment links with Russia do not necessarily increase firms' vigilance to sanctions only because of the reinforced effect from Russia-related restrictions on the overall macroeconomic outlook. Firms may also consider sanctions worth a mention because of Russian roots in the ownership stake even if the company or the sector are not directly targeted.[15]

[Figure 8 here]

Figure 9, in turn, plots the same estimates as in Figure 8 but for the share of Russia in a country's export. As can be noted from the figure, exports to Russia could explain more frequent mentions of sanctions by firms in the Baltic region (Estonia, Latvia, and Finland), as well as Eastern Europe (Ukraine, Poland, and Hungary). In these countries, the share of Russia in total imports and exports is relatively high (9–22%). Even if sanctions directly affect only a small share of total exports, the increased uncertainty may have a negative effect on growth prospects in these countries more broadly. Further, many of the economies that have significant trade links with Russia are also geographically close to Russia, and in some cases share a common history or cultural background or have Russian-speaking minorities. All of these can influence how firms in a given country assess the effects of Russia-related sanctions on their business environment. Overall, it is not surprising that firms domiciled in countries with close trade relations with Russia mention sanctions more often.

[Figure 9 here]

Collectively, Figures 8 and 9 suggest a rational basis for the sensitivity of firms from particular countries to recent cases involving Russian sanctions. While firms from some countries report sanctions due to larger exposure to trading relationships with Russia, it seems that firms from countries with the largest fraction of mentioning firms underline sanctions in their annual reports due to their home country's heightened exposure to inbound Russian FDI. In additional unreported tests, we also plot regression coefficients estimated for sentiment

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[15] As our dataset does not include information on the ultimate owners, we leave this question for future research.

scores as in Equation (2) against FDI and trade exposure figures.[16] We observe a similar correlation between the negativity of sentiments and macroeconomic exposure as with the frequency of sanctions mentions.

In general, the estimation results in Table 5 suggest that trade relationships with Russia and FDI flows can explain about 55% of the variation in the estimated country effects model, implying that country-level macroeconomic factors can explain a large share of firm-level vigilance to sanctions. However, for a number of countries, trade or investment relationships are not very helpful in explaining firms' propensity to mention Russia-related sanctions. For example, a third of Czech firms in our sample mention sanctions in their annual reports. The Czech Republic's export and import shares with Russia are below 5%, and both inward and outward FDI stocks are less than 1%. Hence, it is reasonable to assume that some other factors are influencing their vigilance to sanctions. At the same time, we also observe that about 55% of Italian firms in the banking and investment sector mention Russian sanctions in their annual reports. While this may seem surprising at first glance, we note that large Italian banking groups (Intesa and Unicredit) have 100% subsidiaries in Russia. Given that the largest financial institutions in Russia are sanctioned directly, European banks that are part of larger banking conglomerates with operations in Russia most likely consider these restrictions as a potential risk, which is reflected in their annual reports.

7. Conclusions

Economic sanctions have become an increasingly popular international policy tool in recent years. Globally, the number of sanctions in force almost doubled between 2006 and 2014 (Felbermayr et al., 2020). The evidence on the effects and effectiveness of sanctions, however, is still sketchy. Our paper aims to increase the understanding of how firms in both the sender and in the target country view sanctions and what may explain cross-country differences in firm attitudes.

Based on data collected from almost 11,500 annual reports of European corporations from 2014 – 2017, we analyze how firms assess Russia-related sanctions initially imposed in 2014 and extended later. Both the multilateral sanctions on Russia and Russian import restrictions apply only to specific goods and services, and often only to a small set of

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[16] These results are available upon request.

corporations in military industries, specific companies in the finance and energy sectors, or both. Sanctions are, however, a cause of concern also for some firms not directly targeted by the sanctions measures in all sectors. We show that about 11% of annual reports in our sample mention Russia-related sanctions. A more detailed statistical analysis reveals that the estimated likelihood of mentioning the sanctions is considerably higher for firms that are large, leveraged, experience negative growth shocks, have high sensitivity to the Russian stock market, and operate in certain business sectors. Despite controlling for firm, sector, and year effects, there is still considerable variation in the sanction mentions across the sample countries.

The sentiment about the sanctions measures in the annual reports is clearly negative. Controlling for firm size and sector, corporates from Cyprus, Finland, France, and Russia tend to have significantly more negative sentiments towards Russia-related sanctions. To gain further insight, we use topic modeling to explore thematic structure in the text snippets around Russia-related sanctions. Controlling for firm-level characteristics, as well as sector and year effects, we establish three distinctive country groups in how firms tend to discuss Russia-related sanctions. We found that Austrian, Swiss, German, Italian, and Portuguese companies were likely to discuss sanctions as a factor in the general macroeconomic environment. Firms from Nordic and Benelux countries, as well as from France and Great Britain, tended to mention sanctions in relatively narrow, disclaimer-type discussions. Only Russian, Cypriot, and Jersey firms mentioned sanctions in terms of direct market impact. An additional context analysis reveals that Russian firms also report about sanctions in a more operative context, which is in stark contrast to other European countries.

These significant country-level differences clearly call for an explanation. In the spirit of the traditional view of international relations (trade-conflict literature) suggesting that countries with extensive economic ties are expected to avoid disrupting trade relations, we explored the role of international trade and foreign direct investments in shaping a firm's decision to mention sanctions in its annual report. We show that shares of FDI stocks in or from Russia and high shares of imports or exports with Russia are useful in explaining the cross-country variation. Nevertheless, our analysis also reveals that a nontrivial share of variation remains unexplained. We hope our findings will serve as a useful first step in guiding future research.

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Figure 1. Heatmap of sanctions mentions.

The figure shows the heatmap distribution of the mean fraction of firms that mention sanctions in their annual reports in 2014. The darker the area, the higher the share of firms in the region mentioning sanctions.
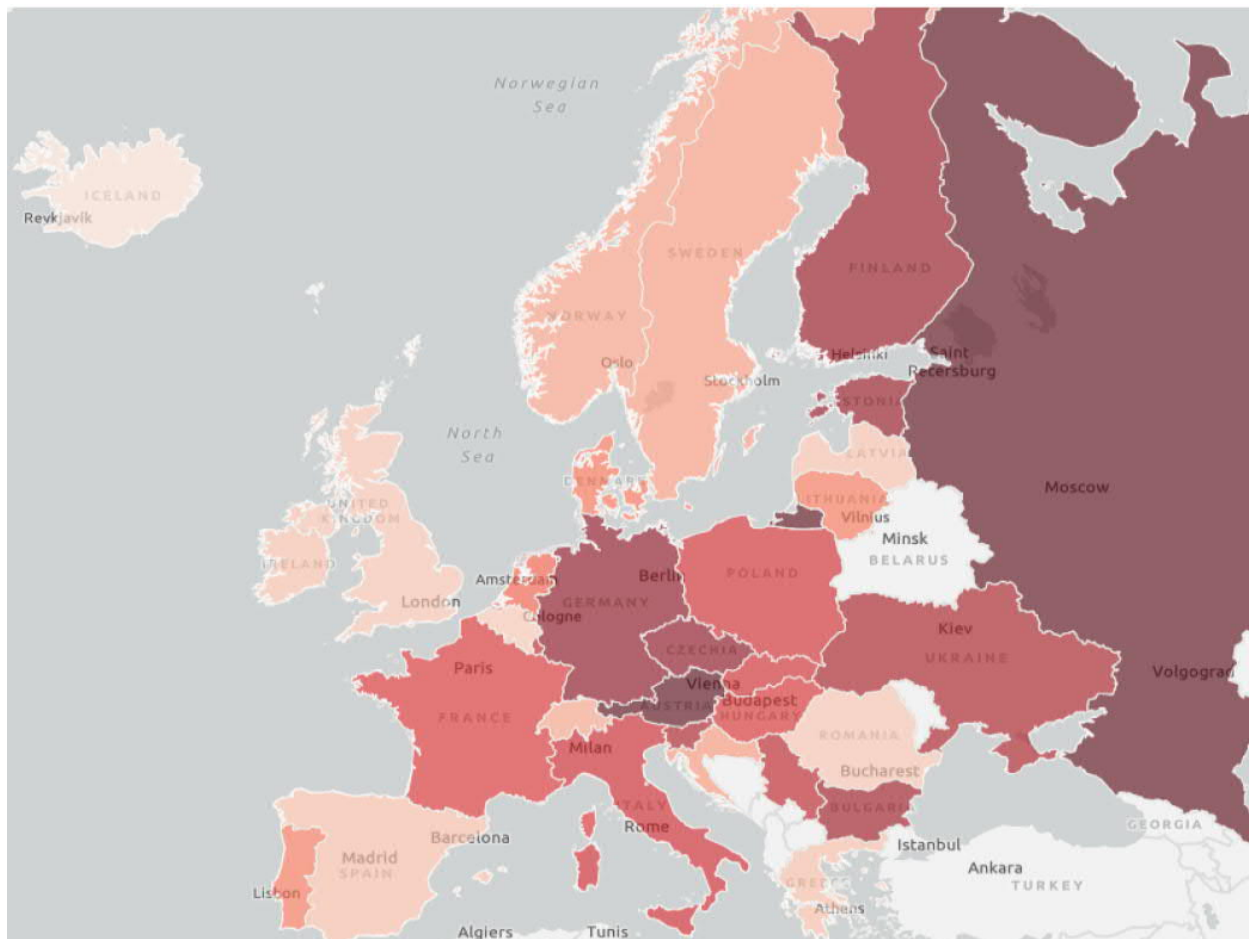
Figure 2. Sanctions mentions by sector.

The figure presents mentions of sanctions by sector. The outer bright line is the average percentage of firms mentioning sanctions at least once during 2014-2017. The inner dark line is the average percentage of firms mentioning sanctions, adjusted for firm characteristics and average country and year effects.
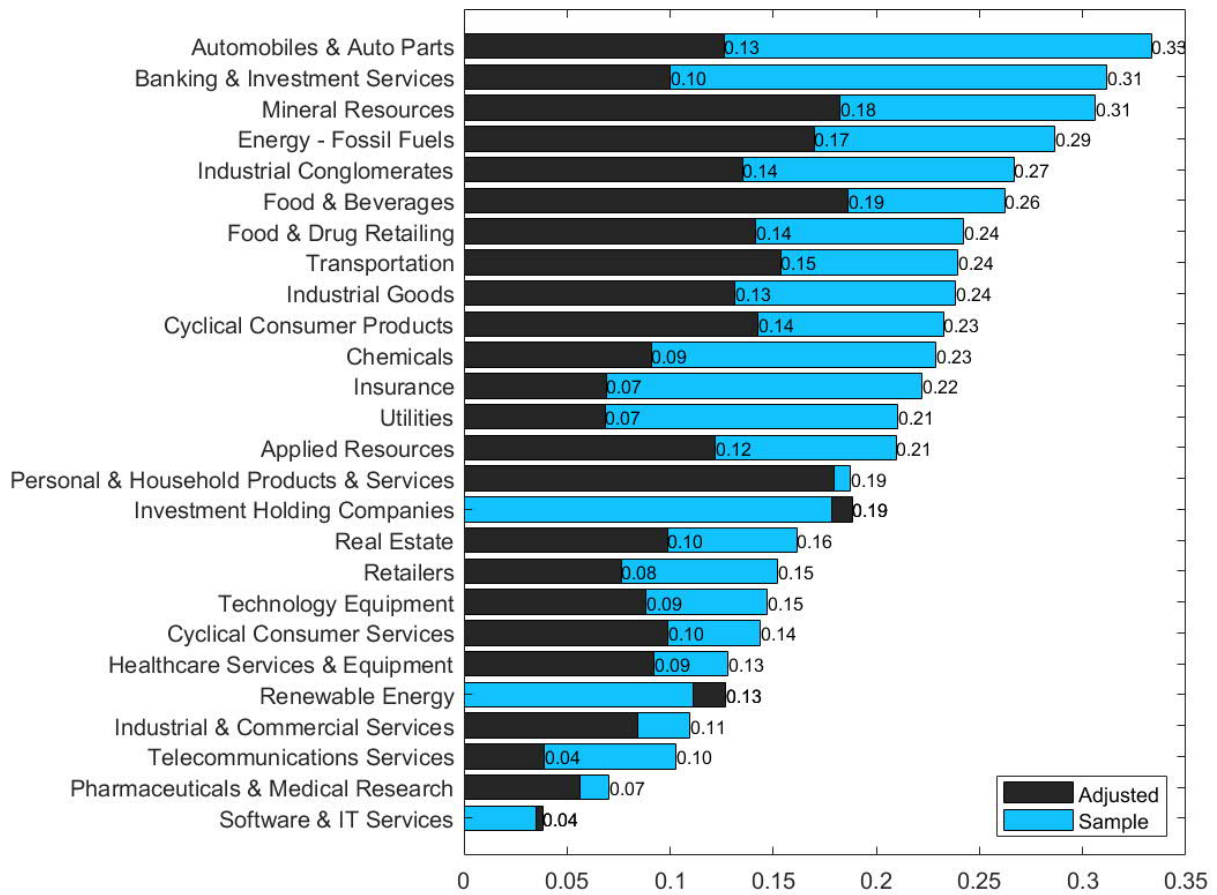
Figure 3. Marginal country means for the sanctions mentions (0/1).

The figure plots the average fraction of firms in a country that mention sanctions in their annual reports, controlling for report-, sector-, time-, and firm-specific characteristics. Marginal country means are derived from the FIRM, SECTOR, and MACRO model specification as in Table 3 for all the countries in the sample.
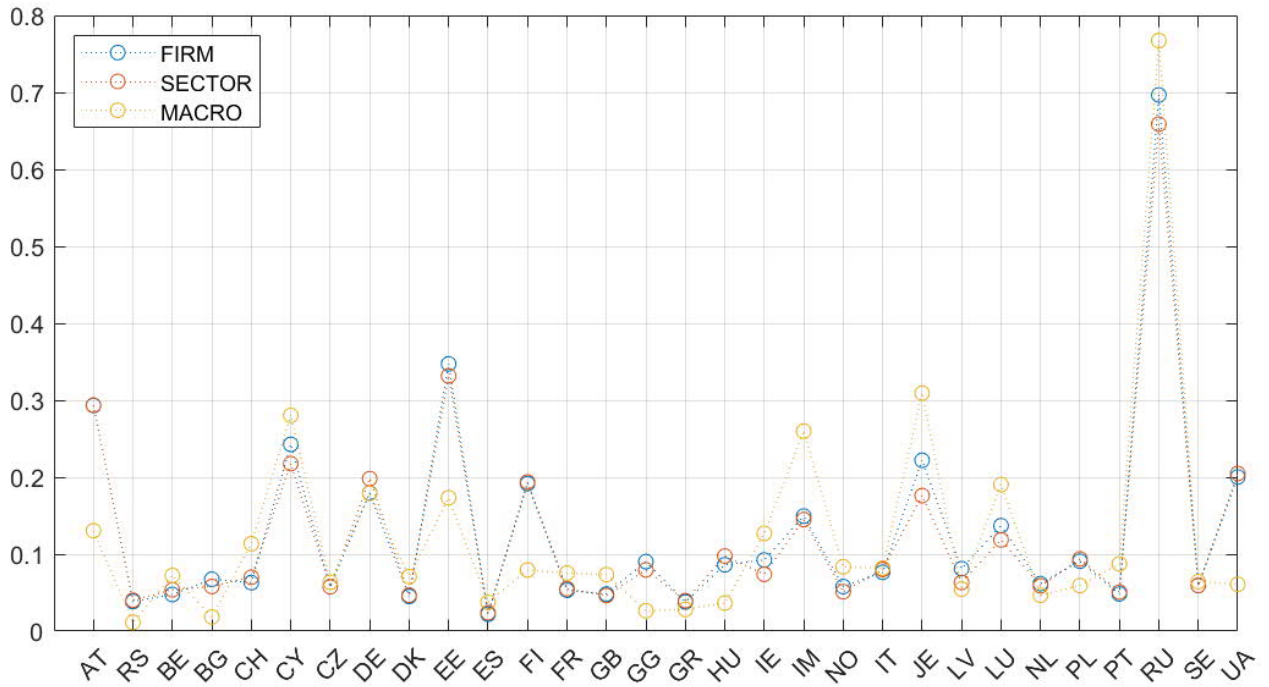
Figure 4. Estimated sentiments at the country level.

The figure plots partial country effects for sentiment scores implied by the GLME model. Each value in the plot is a predicted sentiment on the country variable by marginalizing over the other variables from Equation (2). Statistically significantly (p<0.05) low sentiment countries are marked with a filled circle.
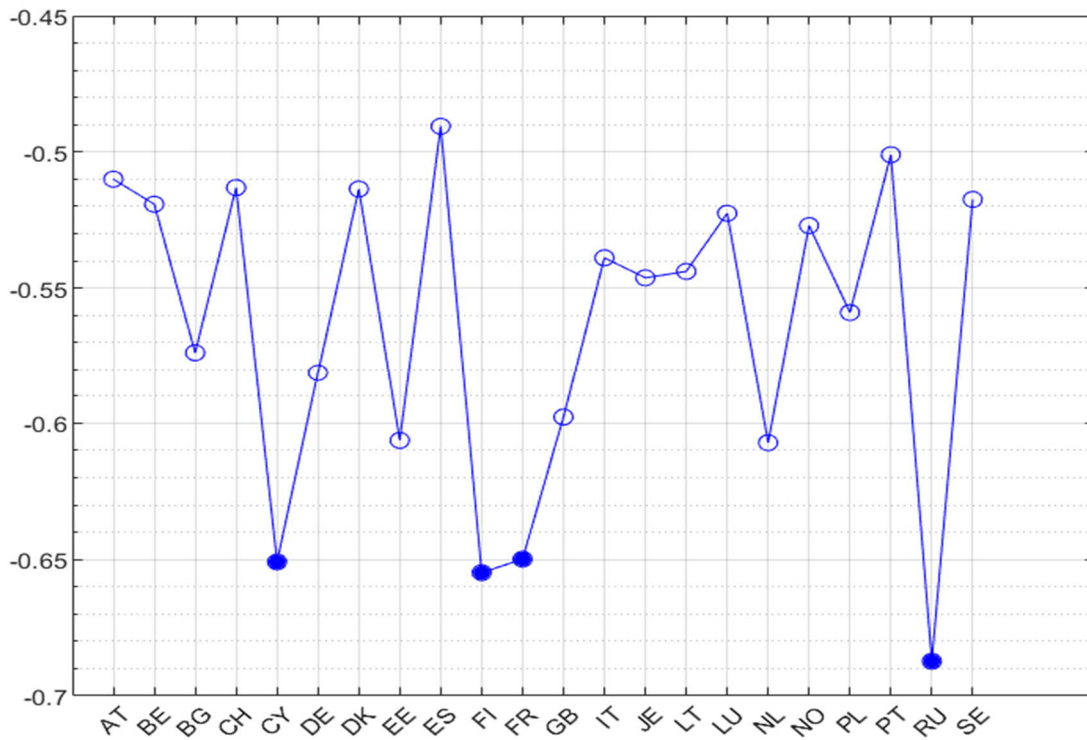
Figure 5. Word clouds for the three LDA topic groups of Russia-related sanctions.

The topic-specific word clouds for the identified three topics account for most of the sample variation using a generative, unsupervised method for identifying latent attributes.

Figure 6. Country-level likelihood of LDA topic membership.

The figure shows partial country effects (i.e. estimated marginal means) from the mixed-effect GLME model in Equation (3). Filled bars denote a statistically significantly higher likelihood of topic membership at conventional levels.
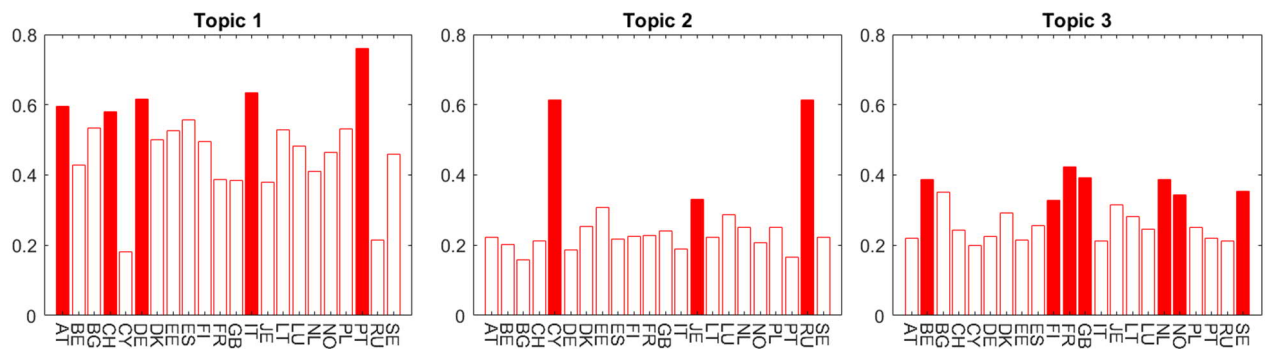
Figure 7. Country-level estimated reporting contexts compared to the baseline.

The figure shows the marginal probabilities of firms in selected countries reporting in a specific context, compared to the baseline. Filled bars denote statistical significance at traditional levels.
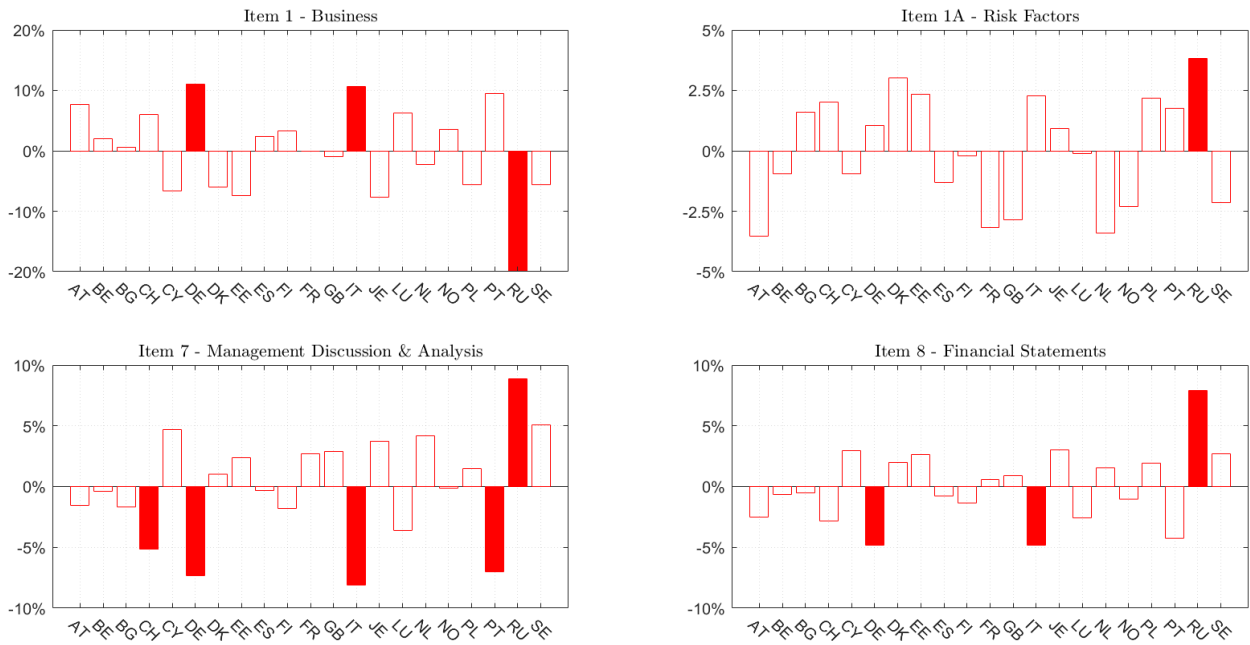
Figure 8. Country estimates of sanctions *Mentions* and direct investment from Russia

The added-variable plot illustrates the relationship between the estimated country-level likelihood to mention sanctions and the share of FDI from Russia in a country's total FDI stock, adjusted for bilateral trade and the share of FDI from the country in Russia's total FDI stock. The estimated country-level likelihoods to mention sanctions, on the vertical axis, are based on the random country effects from the SECTOR model in Table 3 and are adjusted for average firm characteristics as well as sector and year fixed effects. The solid line depicts a partial regression fit from the weighted least-squares estimation in Table 5.
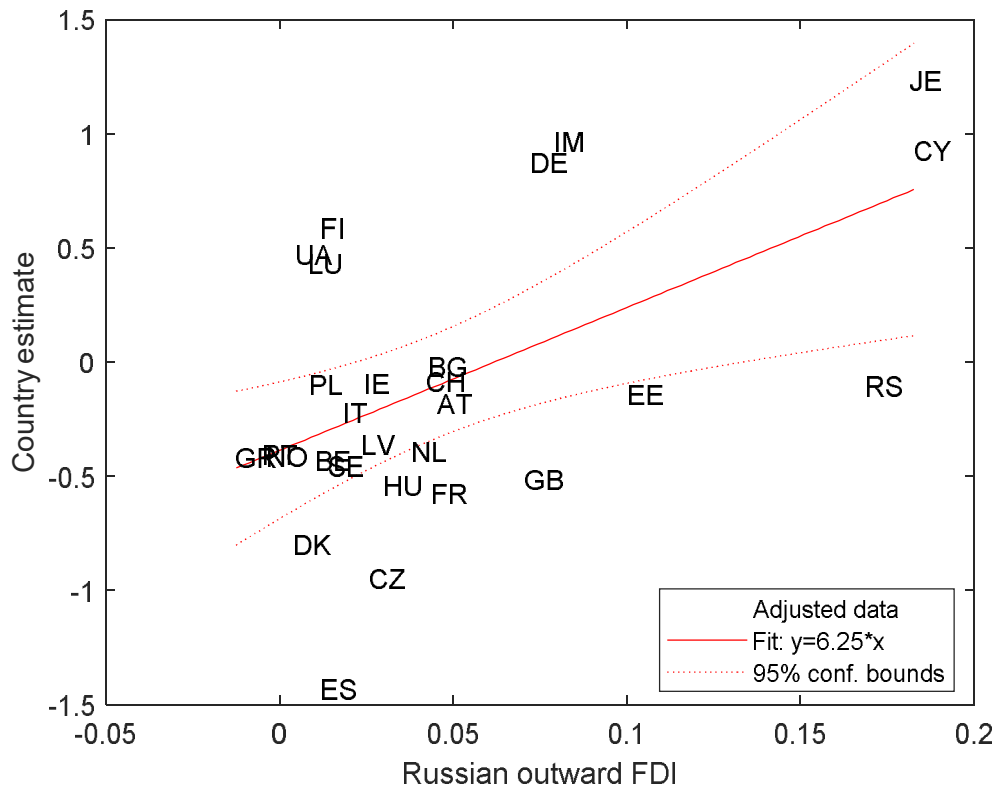
Figure 9. Country-level estimates of sanctions *Mentions* and exports to Russia

The added-variable plot illustrates the relationship between the estimated country-level likelihood to mention sanctions and the share of Russia in a country's total exports, adjusted for bilateral trade and the share of FDI from the country in Russia's total FDI stock. The estimated country-level likelihoods to mention sanctions, on the vertical axis, are based on the random country effects from the SECTOR model in Table 3 and are adjusted for average firm characteristics as well as sector and year fixed effects. The solid line depicts a partial regression fit from the weighted least-squares estimation in Table 5.
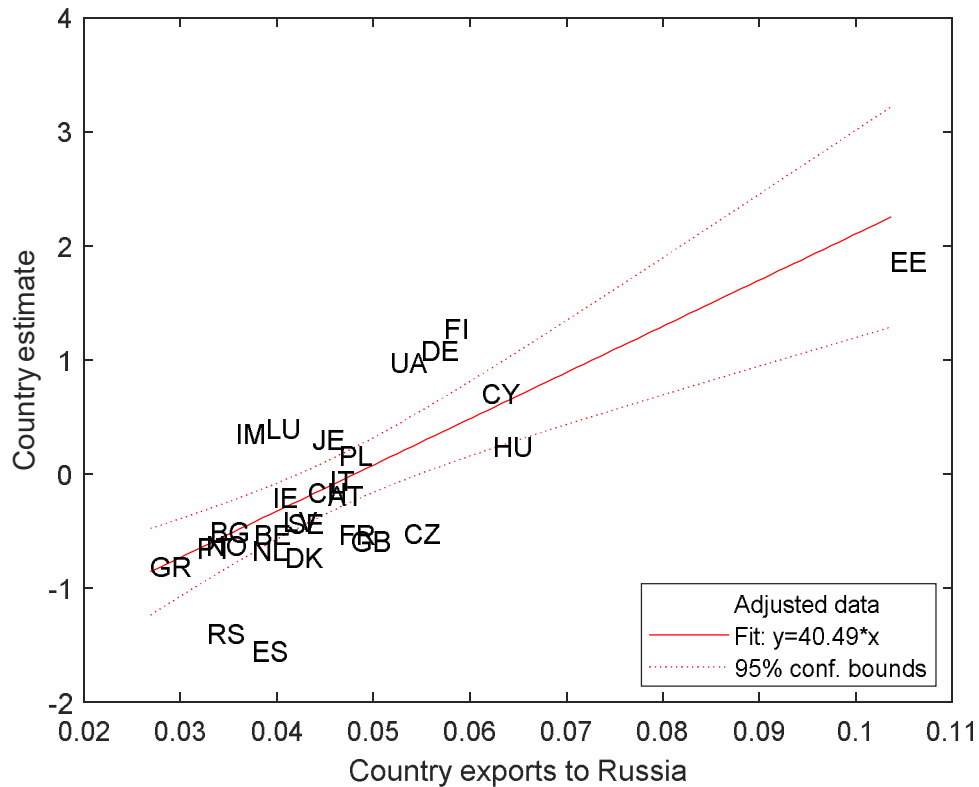
Table 1. Sample selection and summary statistics

Panel A: Sample selection procedure

	Firms	Firm-years
Initial sample	5,888	16,376
- non-corporates & other organizations	-571	-1,479
- small firms	-568	-966
- less than three reports	-1,685	-2,446
Final sample	3,064	11,485

Panel B: Summary statistics for sanctions mentions

Variable	*Mean*	*Median*	*Std dev*	*Min*	*Max*	*N*
Mention (0/1)	0.11	0.00	0.31	0.00	1.00	11,485
First page	68.71	77.55	25.54	1.59	99.43	1,257
Pages	1.29	1.00	1.09	0.09	10.61	1,257
TF-IDF	0.88	0.77	0.65	0.00	4.10	1,257

Table 2. Characteristics of sample firms

Panel A: Distribution of observations across sectors, organization subtypes, countries, and regions

Sector	N	%	Country	Reg*	N	%
Banking & Investment Services	423	13.8 %	United Kingdom	NE	611	19.9 %
Industrial & Commercial Services	246	8.0 %	Germany	WE	308	10.1 %
Industrial Goods	218	7.1 %	Sweden	NE	242	7.9 %
Software & IT Services	200	6.6 %	France	WE	180	5.9 %
Energy - Fossil Fuels	192	6.3 %	Switzerland	WE	162	5.3 %
Mineral Resources	160	5.2 %	Italy	SE	150	4.9 %
Cyclical Consumer Services	139	4.6 %	Norway	NE	137	4.4 %
Pharmaceuticals & Medical Research	142	4.7 %	Finland	NE	129	4.2 %
Cyclical Consumer Products	130	4.3 %	Netherlands	WE	123	4.0 %
Real Estate	124	4.1 %	Russia	EE	103	3.4 %
Food & Beverages	122	4.0 %	Poland	EE	98	3.2 %
Transportation	121	3.9 %	Denmark	NE	96	3.0 %
Technology Equipment	102	3.3 %	Spain	SE	78	2.6 %
Utilities	113	3.7 %	Belgium	WE	71	2.3 %
Chemicals	83	2.7 %	Ireland	NE	48	1.6 %
Insurance	81	2.6 %	Greece	SE	45	1.5 %
Automobiles & Auto Parts	78	2.6 %	Romania	EE	44	1.4 %
Healthcare Services & Equipment	78	2.6 %	Luxembourg	WE	42	1.4 %
Applied Resources	62	2.0 %	Austria	WE	40	1.3 %
Telecommunications Services	68	2.2 %	Jersey	NE	39	1.3 %
Retailers	46	1.5 %	Portugal	SE	40	1.3 %
Food & Drug Retailing	33	1.1 %	Cyprus	SE	30	1.0 %
Investment Holding Companies	28	0.9 %	Croatia	SE	27	0.9 %
Collective Investments	26	0.9 %	Lithuania	NE	25	0.8 %
Personal & Household Products & Services	16	0.5 %	Isle of Man	NE	21	0.7 %
Renewable Energy	18	0.6 %	Malta	SE	21	0.7 %
Industrial Conglomerates	15	0.5 %	Estonia	NE	19	0.6 %
			Guernsey	NE	17	0.6 %
Subtype	**N**	**%**	Latvia	NE	17	0.6 %
Company	2,621	85.5 %	Czech Republic	EE	15	0.5 %
Bank	220	7.2 %	Hungary	EE	14	0.5 %
Investment Company	85	2.8 %	Slovenia	SE	14	0.5 %
Government-Owned Corporation	62	2.0 %	Bulgaria	EE	10	0.3 %
Insurance Company	47	1.5 %	Ukraine	EE	10	0.3 %
Bank or Financial Holding Company	29	0.9 %	Other		38	1.2 %

Thomson Reuters Eikon regions included are West Europe (WE), North Europe (NE), South Europe (SE), and East Europe (EE).

Panel B: Distribution of observations across size classes, regions, and fiscal years

size (EUR)	10^6	10^7	10^8	10^9	10^{10}	10^{11}	10^{12}
	137	549	942	957	361	106	12
	4.5 %	18.0 %	30.8 %	31.3 %	11.6 %	3.4 %	0.4 %

region	Northern	Western	Southern	Eastern
	1,408	928	425	303
	46.0 %	30.3 %	13.9 %	9.9 %

year	FY2014	FY2015	FY2016	FY2017
	2,866	2,997	2,889	2,733
	25.0 %	26.1 %	25.2 %	23.8 %

Table 3. Mixed effects model for sanction mentions (0/1)

The table reports the results of the GLME models for the binary *Mention* variable. Model REPORT includes the intercept, report-level control variables (report length and firm size), and year and country fixed effects. Model FIRM adds firm age and financial ratios. Model SECTOR adds sectoral fixed effects. Model MACRO includes country-level trade and FDI variables. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively. All variables follow the Appendix A definitions.

Variables	REPORT coeff.	(*t-stat*)	FIRM coeff.	(*t-stat*)	SECTOR coeff.	(*t-stat*)	MACRO coeff.	(*t-stat*)
(Intercept)	-12.39***	(-13.48)	-12.62***	(-13.45)	-12.93***	(-12.99)	-14.05***	(-12.40)
Firm-level variables								
words	0.81***	(10.14)	0.80***	(9.86)	0.90***	(10.76)	0.90***	(10.75)
firm size	0.20***	(4.35)	0.20***	(4.19)	0.17***	(3.15)	0.17***	(3.14)
firm size^2	0.07***	(3.47)	0.07***	(2.96)	0.11***	(4.57)	0.11***	(4.60)
firm age			0.08**	(2.11)	-0.02	(-0.47)	-0.02	(-0.45)
profitability			-0.05	(-0.14)	0.14	(0.37)	0.12	(0.32)
leverage			0.23	(1.20)	0.41**	(2.12)	0.41**	(2.11)
sales growth			-0.62***	(-4.62)	-0.60***	(-4.37)	-0.61***	(-4.40)
stock exposure			1.50***	(7.97)	1.09***	(5.48)	1.10***	(5.51)
Country-level variables								
exports to Russia							21.16**	(2.01)
imports from Russia							13.53**	(2.36)
Russian outward FDI							-0.54	(-0.04)
Russian inward FDI							-1.51	(-0.04)
exports × imports							-121.3***	(-2.91)
outward × inward							841.8	(0.37)
Random effects sigma								
Country	1.052		1.072		1.069		1.286	
(95% CIs)	(0.82, 1.36)		(0.83, 1.38)		(0.83, 1.38)		(0.98, 1.69)	
Year effects	Yes		Yes		Yes		Yes	
Country effects	Yes		Yes		Yes		Yes	
Sectoral effects	No		No		Yes		Yes	
Observations	11485		11485		11485		11485	
Log-likelihood	-2986		-2941		-2831		-2824	
McFadden's pseudo-R^2	0.247		0.258		0.286		0.288	
Likelihood ratio	1960***		2050***		2270***		2284***	

Table 4. Most-pessimistic firms based on sentiment analysis

The table lists the top-25 most-pessimistic firms in the dataset based on their sentiment scores calculated as the sum of negative and positive words divided by the total number of words in the text using the Loughran and McDonald (2011) lexicon for financial documents and the VADER sentiment algorithm.

y	Name	Country	Sector
-0.84	MD Medical Group Investments PLC	CY	Healthcare Services & Equipment
-0.83	Sibur Holding PAO	RU	Energy - Fossil Fuels
-0.80	AFK Sistema PAO	RU	Industrial Conglomerates
-0.80	O'key Group SA	LU	Food & Drug Retailing
-0.79	FSK YeES PAO	RU	Utilities
-0.77	Gazprom PAO	RU	Energy - Fossil Fuels
-0.76	Mobil'nye Telesistemy PAO	RU	Telecommunications Services
-0.76	Societe Generale SA	FR	Banking & Investment Services
-0.76	HSBC Holdings PLC	GB	Banking & Investment Services
-0.76	Severstal PAO	RU	Mineral Resources
-0.76	MKHK EuroChem AO	RU	Chemicals
-0.74	Gruppa LSR PAO	RU	Real Estate
-0.74	Gruppa Kompaniy PIK PAO	RU	Cyclical Consumer Products
-0.74	Nord Gold SE	NL	Mineral Resources
-0.73	DZ Bank AG Deutsche Zentral Genossenschaftsbank	DE	Banking & Investment Services
-0.73	TransContainer PAO	RU	Transportation
-0.73	Nokian Tyres PLC	FI	Automobiles & Auto Parts
-0.73	EuroHold Bulgaria AD	BG	Insurance
-0.73	Ferronordic Machines AB	SE	Industrial Goods
-0.72	Uponor Oyj	FI	Cyclical Consumer Products
-0.72	Federal Hydro-Generating Company RusHydro PAO	RU	Utilities
-0.71	Sberbank Rossii PAO	RU	Banking & Investment Services
-0.70	NK Lukoil PAO	RU	Energy - Fossil Fuels
-0.70	Pertopavlovsk PLC	GB	Mineral Resources
-0.68	EVRAZ PLC	GB	Mineral Resources

Table 5. The effect of trade and FDI exposure to Russia on country-level sanctions vigilance

The table reports the results of the Estimated Dependent Variable model (Lewis and Linzer, 2005). The dependent variable is the estimated country effects from the SECTOR model in Table 3, adjusted for firm, year, and sector effects and excluding Russia. In addition, Guernsey is excluded due to unavailable trade data. Model OLS refers to ordinary least-squares estimation using Efron (1982) heteroscedasticity robust standard errors for small samples. Model WLS refers to weighted least-squares estimation, where the observations are weighted by the inverse of the standard errors of the dependent variable estimates. *, **, and *** denote statistical significance at the 10%, 5%, and 1% levels, respectively. All variables follow the Appendix A definitions.

Variable	OLS		WLS	
	coefficient	(*t-stat*)	coefficient	(*t-stat*)
(Intercept)	-0.90***	(-3.04)	-0.92***	(-3.74)
exports to Russia	40.26***	(4.09)	40.49***	(5.22)
imports from Russia	-5.88	(-1.64)	-5.75**	(-2.28)
inward FDI to Russia	2.39	(0.30)	2.58	(0.45)
outward FDI from Russia	6.12**	(2.13)	6.25***	(3.00)
exports × imports	-128.1***	(-3.73)	-129.5***	(-4.98)
outward × inward	406.3	(0.64)	386.7	(1.14)
Observations	28		28	
Adjusted R^2	0.55		0.56	
F-statistic	6.57***		6.82***	

Appendix A. Definition of variables

Variable	Eikon data item	Description
i		A subscript indexing observation across firms.
t		A subscript indexing observation across time.
$firm_i$	*TR.OrganizationPermID*	An organization level permanent identifier for firm i.
$sector_i$	*TR.TRBCBusinessSectorName*	The primary Thomson Reuters Business Classification (TRBC) business sector of firm i.
$country_i$	*TR.HeadquartersCountry*	The country of firm i headquarters (domicile).
$region_i$	*TR.HQMinorRegion*	The geographical region of firm i headquarters.
$assets_{it}$	*TR.TotalAssets*	Total assets of firm i at the end of fiscal year t.
$size_{it}$		Base-10 logarithm of the total assets of firm i at time t.
age_{it}	*TR.OrgFoundedYear*	Natural logarithm of the number of years since firm i was founded.
$profitability_{it}$	*TR.ROATotalAssetsPercent*	Industry-adjusted return on total assets for firm i at time t, where return is the net income before extraordinary items at the end of the fiscal year.
$leverage_{it}$	*TR.TotDebtTotAssetsPct*	Industry-adjusted total debt to total assets ratio of firm i at the end of fiscal year t.
$sales_{it}$	*TR.TotalRevenue*	Total revenue of firm i at the end of fiscal year t.
$sales\ growth_{it}$		Industry-adjusted log difference in sales between year t and t-1.
$stock\ exposure_i$	*TR.PriceClose*	Stock price sensitivity to the Russian stock market valuation, measured by coefficient γ_i in a two-market asset pricing model $\Delta price_{it} = \alpha + \beta_i \times \Delta EUROSTOXX_t + \gamma_i \times \Delta IMOEX_t + \varepsilon_{it}$. The model is estimated using weekly returns from 2014-2017. The firm exposure is adjusted by the country average exposure. Private firms' exposure is assumed to be equal to the country average.
$export_{it}$	(IMF Direction of Trade)	Year-t share of Russia in merchandise goods exports of firm i's home country.
$import_{it}$	(IMF Direction of Trade)	Year-t share of Russia in merchandise goods imports of firm i's home country.
$outward\ FDI_i$	(UNCTAD World Investment Report 2017)	The share of firm i's home country of Russian outward foreign direct investment in 2017.
$inward\ FDI_i$	(UNCTAD World Investment Report 2017).	The share of Russia in foreign direct investment of firm i's home country in 2017.

Appendix B. Summary statistics for the firm- and country-level regressors

The table reports summary statistics for the firm- and country-level regressors in Equation (1). Variable *words* is reported in absolute terms, *firm size* in EUR millions, and *firm age* in years. Otherwise, all variables follow the definitions in Appendix A.

Variable	Mean	St.Dev.	P1	P25	P50	P75	P99	N
Firm-level variables								
words	63181	49477	9263	31072	49307	79220	244293	11485
firm size	31146	87149	3	186	1281	9169	409975	11485
firm age	51	48	3	17	29	72	170	11485
profitability	-1.81	14.17	-65.54	-2.60	0.29	3.74	22.36	11485
leverage	4.60	20.43	-26.27	-9.34	0.16	13.50	78.88	11485
sales growth	2.53	30.22	-107.10	-5.58	0.98	9.97	114.15	11485
stock exposure	0.00	0.17	-0.40	-0.08	0.00	0.05	0.62	11485
Country-level variables								
exports to Russia	2.16	3.77	0.00	0.85	1.14	1.82	25.08	11485
imports from Russia	3.63	4.70	0.00	1.10	1.95	3.99	24.40	11485
Russian outward FDI	1.86	4.68	0.00	0.21	0.33	0.55	24.80	11485
Russian inward FDI	3.35	3.02	0.00	0.24	1.47	7.09	7.53	11485