Risk of Sanctions*

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Abstract

Does uncertainty created by the risk of sanctions affect trade above and beyond the sanctions actually imposed? While most restrictions on Russian imports were introduced immediately after the February 2022 invasion of Ukraine, the sanctioning countries simultaneously pledged further escalation unless the conflict ended. In line with this threat, we estimate that the subsequent escalations were largely anticipated in advance, with trade flows declining many months before they actually became subject to sanctions. Crucially, this effect was not limited just to sanctioned trade flows: we also estimate a decline for a wide range of never-sanctioned trade flows that nonetheless could have been perceived as being at risk of future sanctions. Overall, our results imply that Russia lost the equivalent of about a month and a half of imports over 2022–23 due to the escalation of sanctions after April 2022, with two-thirds of this loss driven by reductions in never-sanctioned trade flows that were only at risk of sanctions.

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1 Introduction

We are in the midst of a wide trend of deglobalization. To a significant extent, it is caused by economic policies, including Brexit, sanctions against Russia, and trade policies of the current US administration. Recent theoretical developments emphasize how such deglobalizing policies can be effectively weaponized by governments as threats, to be used not only to achieve certain geopolitical goals, but also to enforce the global economic order (Clayton, Maggiori, and Schreger, 2026). At the same time, it is well understood that these policies can have devastating effects on the real economy, not only by themselves but also by the uncertainty in their implementation (e.g., Hassan, Hollander, Lent, and Tahoun, 2024). An open question is whether such uncertainty can itself be weaponized to make deglobalizing policies more effective in practice, or whether instead it merely weakens them by making them more vague and less targeted.

To answer this question, we turn to arguably the biggest application of geoeconomic policies in recent history: trade sanctions against Russia. After its invasion of Ukraine in February 2022, practically overnight, Russia not only became the world's most sanctioned country but also by far the largest economy under substantial sanctions. Importantly, from the very beginning of the conflict, policymakers in the sanctioning countries deliberately did not impose all sanctions immediately so that they could further escalate them in the future if the war continued (Biden, 2022).[1] Equally important, they did not explicitly describe the details of these possible future sanctions. This way, the target economy could be hurt not only later by the future sanctions themselves, but also immediately by the considerable uncertainty surrounding their shape and scale. While there is a fast-growing literature on the effects of sanctions themselves,[2] in this paper, we estimate that the *risk* associated with possible future sanctions can significantly amplify their impact.

To show this empirically, we use an extensive database on sanctions on imports to Russia first introduced in Egorov, Korovkin, Makarin, and Nigmatulina (2025). For each of the nine main

[1] On February 22, President Biden said: "If Russia goes further with this invasion, we stand prepared to go further as [well] — with sanction", "we'll continue to escalate sanctions if Russia escalates", and "Russia will pay an even steeper price if it continues its aggression, including additional sanctions."

[2] See Chupilkin, Javorcik, and Plekhanov (2023), Babina et al. (2023), Tyazhelnikov and Romalis (2024), and Egorov, Korovkin, Makarin, and Nigmatulina (2026) among many others.

sanctioning authorities,[3] this database contains detailed product codes for all imposed sanctions along with their effective dates. We combine this dataset with the customs data for all imports to Russia.[4] These highly detailed data allow us to conduct our analysis at a very detailed level. Thus, from now on, by *product* we mean a narrowly defined 10-digit product category, where the first 6 digits match the Harmonized System (HS) product classification.[5]

We build our case in several steps. First, if a possibility of an escalation of future sanctions is explicitly announced, these sanctions should not come as a complete surprise in the event of such escalation, at least on average. To test for this, we make use of the fact that while most trade sanctions against Russia were imposed just in the first two months of the conflict, almost every month since then has also witnessed the introduction of new sanctions. Such rich variation in the timing of sanctions allows us to use the staggered difference-in-differences (DiD) approach, where we compare trade flows that were about to become sanctioned with all other trade flows, including those already sanctioned and those from neutral countries.[6] Within all sanctions imposed after April 2022, we find that to-be-sanctioned trade flows fell many months before they were actually sanctioned. These negative anticipation effects cannot be explained by any country-level shocks, such as financial sanctions and consumer boycotts, which are absorbed by country-month fixed effects, or by changes in demand for or prices of individual products, which are absorbed by product-month fixed effects.

The fact that *some* sanctions can be anticipated is hardly surprising, since the intent to impose them was announced on the first day of the conflict. What is more surprising is that future sanctions can be predicted up to the country imposing them and the narrowly defined product codes to which they apply. Of course, most sanctions are officially announced before they are implemented, and some information may have leaked even prior to that. However, it is unlikely that this would explain predictions made so many months in advance and at such a detailed level. Moreover, there

[3]The US, the EU, the UK, Switzerland, Canada, Australia, Taiwan, Japan, and South Korea.

[4]See Egorov et al. (2026) for more details.

[5]A country-product *variety* is a part of a product that is supplied to Russia from a specific country.

[6]Recent research highlights potential biases in staggered DiD designs when treatment effects vary substantially across units and over time (see Arkhangelsky and Imbens, 2024 for a review). Following the guidance of Rios-Avila, Nagengast, and Yotov (2024), we address these concerns by employing the ETWFE estimator from Wooldridge (2025), which is particularly well suited for estimating large-scale gravity models.

is at least one other way in which many of the future sanctions could have been easily predicted. As we show in Egorov et al. (2025), different sanctioning countries often sanctioned the same products but at different times. Thus, once one country sanctioned a particular product, it was natural to expect other countries to follow suit. Indeed, most of the country-product varieties sanctioned after the first two months of the conflict fell into this pattern, that is, they were varieties of the previously sanctioned products.

We use this fact to answer our central question: What effect did the uncertainty surrounding future sanctions have on the Russian economy *beyond* the trade flows that were actually sanctioned? Needless to say, there is hardly a credible way to identify *all* trade flows where future sanctions were perceived as likely. Instead, we identify *some* of these trade flows. Specifically, for each product sanctioned by at least one country, we include in this "high-risk" group all of its country-product varieties from other sanctioning countries that were not sanctioned by the end of our sample in December 2023. Our logic is simple: since most later sanctions were imposed on some varieties of already sanctioned products, it was reasonable to expect sanctions also on the remaining varieties of the same products. It is in this sense that we interpret our estimates as the *uncertainty* effects of future sanctions: within this group, there must have been a lot of uncertainty about which varieties would later become sanctioned. This way, even a few actual sanctions in the future could have a substantial immediate impact on the economy.

Thus, in the second set of results, we estimate a significant decline in trade flows that were arguably at high risk of future sanctions. We interpret this decline as the uncertainty effect of sanctions. To check our interpretation of these results, we explore its implications for the dynamics of the estimated effects. In particular, it is natural to expect any prediction to become more accurate as the number of correctly and incorrectly predicted events grows. Therefore, as the conflict continued, it should have become easier to predict which trade flows would fall under sanctions and which would not. Even though this evidence is only suggestive, we indeed verify that our results follow this pattern for all of our estimated effects. Specifically, the anticipation effects became stronger for the later waves of sanctions. Such stronger effects are consistent with more accurate predictions of which trade flows would become sanctioned. In contrast, the uncertainty effects for trade flows perceived to be at risk of sanctions became weaker for the later waves of sanctions.

These weaker effects are also consistent with more accurate predictions of sanctions, since, under perfect foresight, these trade flows should have had no risk of being sanctioned.[7]

To test this interpretation even further, we directly compare the magnitudes of the anticipation and uncertainty effects. Presumably, both types of trade flows were perceived as facing some risk of future sanctions. However, if any additional information was used, then, at least at some point, the to-be-sanctioned trade flows should have been perceived as facing a greater risk than the trade flows that were never sanctioned. Consistent with this interpretation, we find that our estimated uncertainty effects are typically smaller than our estimated anticipation effects. In other words, the magnitude of our estimates appears to increase with the underlying sanction risk.

Lastly, we investigate the aggregate implications of our reduced-form estimates with a simple aggregation exercise. We use our estimated coefficients to construct predicted values for each trade flow with and without various effects of sanctions.[8] We then sum up the individual trade flows to evaluate the various effects on the aggregate imports to Russia. In the end, we find that during 2022–23 Russia lost almost 36 billion dollars worth of imports due to all effects from the escalation of sanctions combined.[9] This sum is roughly equivalent to one and a half months of the Russian imports in 2021 (the average monthly imports in 2021 amounted to 24.12 billion dollars).

Curiously, two-thirds of this overall aggregate figure came from the uncertainty effects of future sanctions. In this sense, just the uncertainty had a larger impact on the Russian imports than the sanctions themselves[10]. The reason behind this striking result is simple: even though the uncertainty effects of possible sanctions are significantly smaller than the effects of the sanctions themselves, they are applied to a much wider range of trade flows and thus become significantly more important in the aggregate. That is, a much larger share of imports was under some risk of future sanctions than actually sanctioned.

If anything, our results are likely to be a lower bound of the actual uncertainty effects, as we

[7]Thus, what we label as anticipation and uncertainty effects can equivalently be interpreted as the effects of correctly and incorrectly anticipated sanctions.

[8]Specifically, predicted values with all effects present are just the predicted values from our regressions. To remove some of the effects in question, we re-calculate the predicted values from the same regression, but we manually equalize the relevant coefficients to zero.

[9]Recall that this is the effect of sanctions imposed only after April 2022, while most sanctions were imposed in March and April 2022.

[10]The direct effect of sanctions contributed only 11 billion dollars out of the total of 36.

could identify only *some* trade flows that were perceived as under the risk of sanctions. Moreover, the reduced-form approach can identify only the effects of heterogeneity in risk. If there was some risk of sanctions for *all* trade flows, the effect of this risk would also be missed by our analysis.

We contribute to the burgeoning literature on geoeconomics (see Mohr and Trebesch, 2025 for a recent overview, but also Thoenig, 2023; Alekseev and Lin, 2024; Becko, 2024; Bianchi and Sosa-Padilla, 2024; Broner, Martin, Meyer, and Trebesch, 2024; Clayton, Maggiori, and Schreger, 2024; Kooi, 2024; Mayer, Mejean, and Thoenig, 2024; Liu and Yang, 2024 among others). Our paper contributes to this literature by estimating the amplifying role of uncertainty in geoeconomic policies.

On the empirical side, the literature has made significant progress in estimating the effects of imposed sanctions. In Egorov et al. (2026), we make use of even richer data sources to evaluate the effects of all import sanctions (and not only of a minority of them imposed after the first two months of the conflict, which are the main focus of this paper) on the Russian economy. In that paper, we show the effects of sanctions not only on trade flows but also on individual firms and their overall economic performance. Chupilkin et al. (2023) and Chupilkin, Javorcik, Peeva, and Plekhanov (2024) use UN COMTRADE and the Russian customs data, respectively, to document the importance of roundabout trade in circumventing the post-2022 trade sanctions against Russia.[11,12]

To be effective, many geoeconomic policies, including sanctions, must be implemented on a sufficiently large scale to generate general equilibrium effects throughout the economy. To the best of our knowledge, we are the first to contribute to this literature by estimating some of these additional effects. Specifically, we estimate both the *anticipation* effects on trade flows that have

[11] Also see the research on the implications of trade sanctions on the use of the US dollar in trade invoicing (Berthou, 2022; Chupilkin, Javorcik, Peeva, and Plekhanov, 2023), the effects of oil embargo and price cap policy (Hilgenstock, Ribakova, Shapoval, Babina, Itskhoki, and Mironov, 2023; Johnson, Rachel, and Wolfram, 2023; Monastyrenko and Picard, 2023; Kilian, Rapson, and Schipper, 2024; Spiro, Wachtmeister, and Gars, 2024; Turner and Sappington, 2024; Bai, Fernández-Villaverde, Li, Xu, and Zanetti, 2025; Cardoso, Salant, and Daubanes, 2025), exit of multinational enterprises (Wellhausen and Zhu, 2024), effects on exporters (Aytun, Hinz, and Özgüzel, 2025), effect on third countries (Corsetti, Demir, and Javorcik, 2024; Li, Li, Park, Wang, and Wu, 2024), effects of export controls on innovation in target countries (Liu, Liu, Makarin, and Wen, 2025), and financial sanctions (Jiao and Wei, 2025).

[12] There is also a literature that estimates the effect of sanctions on political outcomes. Nigmatulina (2021) shows that Russian firms under "smart" sanctions increase in size due to increases in government compensation through subsidies, contracts, and loans. Gold, Hinz, and Valsecchi (2023) find that for an average Russian district, sanctions exposure increases the vote share gained by President Putin and his party by 13 percent.

not yet been sanctioned and the *uncertainty* effects on related but non-sanctioned trade flows. Our results highlight the important role of the latter effects, mostly overlooked by this literature.

The remainder of the paper is organized as follows. Section 2 describes the data and provides key facts about sanctions that motivate our empirical strategy, most of which is laid out in Section 3. We present our main findings in Section 4 and some additional results including robustness checks and our aggregation exercise in Section 5; we conclude in Section 6.

2 Data and Background

Data Sources. We rely on two main sources of data. First, we use a transaction-level dataset of international shipments as recorded by the Federal Customs Service of Russia. It consists of the country of shipment, 10-digit product codes (where the first 6 digits match the Harmonized System (HS) product classification), the country where goods were produced, unit values, total weight of each shipment, and its total contract value. We verify the completeness of this dataset in Egorov et al. (2026), and the same data were also used in Babina et al. (2023), Chupilkin et al. (2023), and Jiao and Wei (2025). We also follow Pierce and Schott (2012) in using synthetic HS codes to deal with the changes in product classification over time.

Second, we use the dataset on sanctions against Russia's imports compiled based on official sources and introduced in Egorov et al. (2025). It consists of import sanctions imposed by nine major trading partners of Russia following February 2022: Australia, Canada, the EU, Japan, South Korea, Switzerland, Taiwan, the UK, and the US. It includes around 50 unique dates of sanction imposition, which we aggregate to a monthly frequency, and 72,000 distinct country-product sanctioned varieties, where products are defined as 10-digit product codes.[13]

An important caveat of the latter data source is that most sanctions are not just a complete ban on a product code. Often, a product is included in the sanctions list not by its code but rather by a text description, where a specific code serves as a suggestion rather than a strict rule. Moreover, there are case-by-case exceptions to many specific sanctions. For example, within a specific product category, only goods above a certain value may be forbidden to be shipped to

[13] Specifically, we use the nearest full month of the actual event date, using the 15th of the month as the cutoff date. E.g., we count the dates from February 16 to March 15 as "March".

Russia, but not others. This is often the case for most consumer products so that, e.g., expensive Swiss watches are sanctioned while cheaper ones are not. Similarly, a firm can sometimes obtain a license to supply even forbidden goods to Russia. Based on public sources only and restricted by limitations of our customs data, we follow a more conservative approach and just use the list of all mentioned product codes as the list of products "subject to sanctions", without discriminating between different types of sanctions. Thus, even a perfect implementation of sanctions should not result in a complete collapse of all sanctioned trade flows.

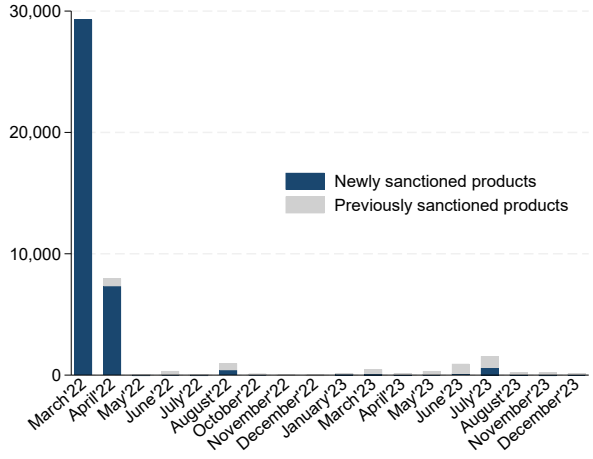
Background. Each country imposed its sanctions on imports to Russia in multiple waves. Different countries also tended to impose their sanctions at different times. As a result, there is a lot of variation in the timing of sanctions. Panel A in Figure 1 shows 18 months during 2022 and 2023 when new sanctions took effect (from here on we refer to them as *cohorts*) and the number of country-product varieties or trade flows that became sanctioned in each cohort. In fact, 86.6% of all sanctions as measured by the number of trade flows were imposed just in the first 2 cohorts (March and April 2022). Still, the remaining minority of sanctioned trade flows represents around 21% of all sanctioned trade value measured by 2021 trade volumes, as shown dynamically in Panel B (red and green lines combined).

As we argue in Section 3, it is likely that the first 2 cohorts of sanctions were not anticipated or, more precisely, there are no pre-trends in these trade flows before March 2022. In contrast, as we estimate later in Section 4, the rest of the sanctions were well anticipated before they were imposed. There are at least two reasons for that. First of all, sanctions are typically announced some time before the start of their enforcement. But even prior to that, it is not uncommon to find some reports in the media about a probable list of products that will be introduced in the next wave of sanctions. Since we measure only the months when sanctions officially take effect, it is natural that everyone gets informed about this date some time in advance.

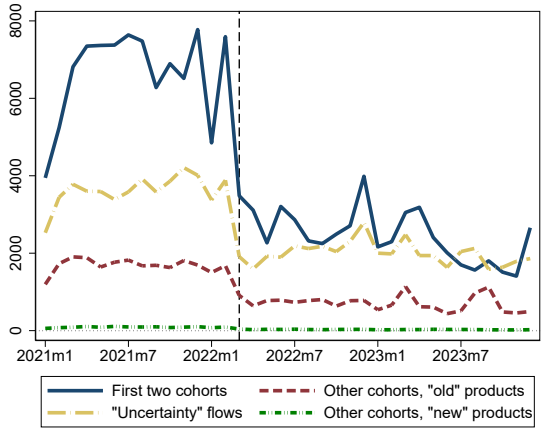
Second, at least to some degree, sanctioning countries did coordinate their efforts. One form of such coordination involved an attempt to impose sanctions on the same list of products across different countries. Yet, even for the same product, different countries introduced their sanctions in different months. In fact, Panel A in Figure 1 separates the sanctions imposed on previously sanc-

Figure 1: Cohorts of sanctions, their number of trade flows and total trade value

Panel A: Number of sanctioned trade flows by cohort



Panel B: Total value of various trade flows



Notes: Panel A shows the total number of sanctioned country-product varieties in each month (cohort). These trade flows are further separated into two groups: those with products previously sanctioned by any other country and those with products sanctioned for the first time in the current month.
Panel B plots the total value of 4 types of trade flows over time. First, the blue line shows the country-product varieties sanctioned in March and April 2022. Next, country-product varieties sanctioned after April 2022 are further divided into two groups: varieties of previously sanctioned products (the red line) and varieties of newly sanctioned products (the green line). The latter varieties belong to countries that have been among the first to sanction these products. These three lines together contain all varieties sanctioned during 2022 and 2023. In addition, we also plot the non-sanctioned imports from sanctioning countries for sanctioned products, that is, products sanctioned at least by one country by the end of 2023 ("uncertainty" flows, the yellow line). The composition of each group of varieties does not change over time. The vertical line marks the start of sanctions in March 2022.
See Figure A.1 in the appendix with the total weight instead of value in Panel B, and without the first two cohorts in Panel A.

tioned products (by any country) and the rest, i.e., products sanctioned for the first time. Panel B further shows that outside of the first 2 cohorts, the newly sanctioned products (the green line) account only for a negligible share of the total sanctioned trade value. Thus, after the first 2 months of the conflict, when 86.6% of all sanctions were already implemented, one could predict almost all of the future sanctions simply by expecting sanctioning countries to join the ban of the products already sanctioned by others. We estimate anticipation effects for these sanctions in Section 4.1.

Crucially, the coordination efforts of the sanctioning countries were far from perfect. As we show in Egorov et al. (2025), different countries ended up sanctioning different sets of products. In particular, the correlation matrix between the sets of products sanctioned by 9 different countries always has positive values, which confirms some coordination efforts, but these values are typically less than 0.5 (see Table 1 in Egorov et al., 2025). For example, once a product was sanctioned at first by the US, there was considerable uncertainty whether the EU or South Korea would later

also sanction the same product. As Panel B of Figure 1 shows, within all products sanctioned by at least one country, the imports of never-sanctioned country-product varieties were much larger than the imports of later sanctioned varieties (the yellow and the red lines respectively). In Section 4.2, we test whether this large part of Russian imports experienced any negative effects from the uncertainty of whether the remaining countries would also sanction these products. Thus, we estimate the effect of sanctions not only for the actually sanctioned trade flows, but also for the trade flows that could have been sanctioned if all sanctioning countries had exactly the same list of sanctioned products.

To sum up, even though the bulk of sanctions against Russian imports came as a surprise (the blue line in Panel B of Figure 1), in this paper we focus on the remaining sanctions that were easy to predict in advance. Specifically, we estimate both the anticipation effects of later sanctions on previously sanctioned products (the red line) and the uncertainty effects on the never-sanctioned trade flows that would have been sanctioned under "perfect" coordination among the participating countries (the yellow line).

Figure A.2 in the Appendix further contrasts the raw data for these trade flows with the rest of the imports from sanctioning countries, that is, imports of products not sanctioned by any country. Clearly, there has been a general decline in trade with Russia since February 2022 across all products, driven by payment and logistical difficulties as well as consumer boycotts. Yet, our main estimated patterns are already visible even in the raw data. Specifically, the decline in trade appears to be directly proportional to the risk of sanctions, as we define it. Our main results in Section 4 confirm this conclusion after accounting for rich variation in the timing of sanctions and numerous additional wartime fixed effects, which we explain in the next section.[14,15]

[14]The overall fall in all sanctioned trade flows, including those sanctioned in the first 2 months of the conflict (the blue line), is analyzed in detail in Egorov et al. (2026) and is outside of the scope of this paper.

[15]To give just one example, Figure A.2 also shows the imports of non-sanctioned products from all "neutral" countries that are neither sanctioning nor "friendly" countries, that is, those that have facilitated rerouting. This group of trade flows would form most of the control group in our estimation. Then, the difference in imports of non-sanctioned products between sanctioning and "neutral" countries would reveal all country-level shocks such as finance and infrastructure sanctions, consumer boycotts, etc. The same shocks are assumed to apply to all trade flows from sanctioning countries, and thus the estimated "uncertainty" effects would be much smaller than the fall in the "uncertainty" flows in the raw data.

3 Methodology

3.1 Pre-trends

We begin by testing whether *any* sanctions were anticipated before the start of the conflict. Moreover, we do this separately for each cohort. Specifically, we estimate the following pre-trend difference-in-differences (DiD) equation:

$$y_{gct} = \sum_{e} \alpha_{et} \times \mathbb{1}(E_{gc} = e) + \tau_{gc} + \eta_{gt} + \omega_{ct} + \zeta_{gct}, \quad t < t_0. \tag{1}$$

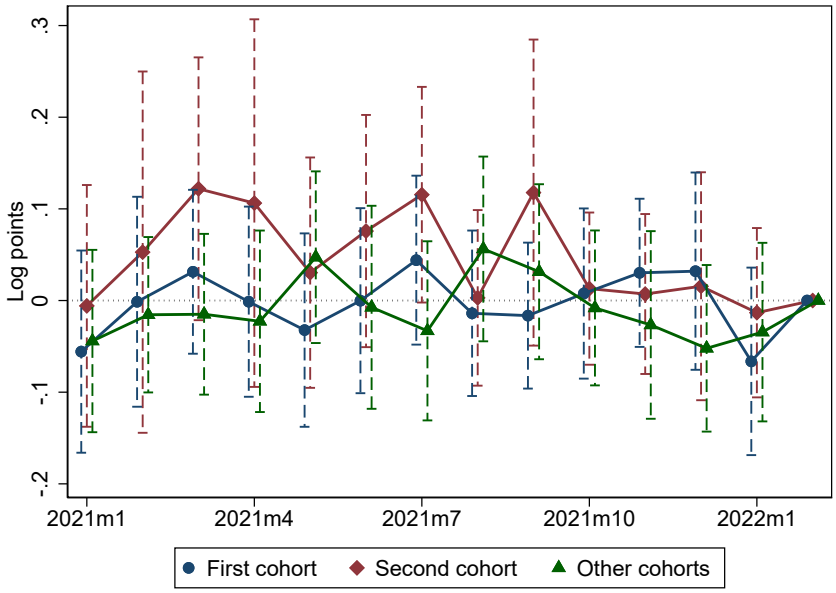
Here, y_{gct} are (log-)trade flows from country of shipment c to Russia of a ten-digit product code g at month t, measured either by total value or by total weight shipped;[16] τ_{gc} are the product-country fixed effects; η_{gt} are the product-month fixed effects; and ω_{ct} are the country-month fixed effects, netting out any country- and product-level shocks. E_{gc} is the month when sanctions take effect on product g by country c (for non-sanctioned imports, $E_{gc} = \infty$), and α_{et} are the cohort-month fixed effects common for all varieties gc within the same cohort e.

Following recent advances in the DiD literature (including Borusyak, Jaravel, and Spiess, 2024), we estimate equation (1) on a sub-sample of untreated observations only, that is, for months before March 2022, which we denote as t_0 (February 2022 is used as the omitted category). In other words, we estimate the set of α_{et} to test whether varieties of each cohort were on a different pre-trend prior to March 2022, once all country- and product-level shocks are netted out. The estimated pre-trends α_{et} are plotted in Figure 2, separately for the first two cohorts, and as an average for all other cohorts.

In fact, we observe no significant pre-trends in the weight of sanctioned varieties for any of the cohorts. This suggests that none of the sanctions were anticipated prior to the start of the conflict in March 2022. Motivated by this finding, in all of our following regressions, we are using the pre-war period as the baseline period (or the omitted category) for our estimation of various sanctions

[16] We use weight of trade flows in our main exposition because it focuses on the effects on quantities without mixing them together with the effects on prices. Still, we repeat all our analysis for the value of trade flows as well and report them in the Appendix. For our aggregation results, we also use both measures, but choose value as the baseline, as it is the most standard and natural way to aggregate trade flows.

Figure 2: Pre-trends in sanctioned trade flows by cohort, log of weight



Notes: This figure presents the dynamic difference-in-differences estimates of equation (1), which assess the pre-trends in each cohort of sanctioned trade flows relative to the non-sanctioned trade flows prior to March 2022 (February 2022 serves as the baseline period). The first two lines show coefficients for the first two cohorts (March and April 2022, respectively), while the last line shows the average for all of the remaining cohorts, weighted by the number of observations in each cohort. The figure uses the total import net weight of a given product from a given country in a given month as an outcome. The logarithms add 1 to the argument's value to avoid missing values. The bars represent 95% confidence intervals. Standard errors are two-way clustered at the country and product levels. The estimation is based on 2,660,378 observations, covering 186 countries and 8,586 products.

effects.

3.2 Baseline specification

We estimate all sanction effects within a single specification using a staggered DiD design:

$$y_{gct} = \sum_{e} \Big[\beta_{et} \times \mathbb{1}(E_{gc} = e) + \gamma_{et} \times \mathbb{1}(E_g^{first} = e) \times Friendly_c + \delta_{et} \times Never_{gc} \times \mathbb{1}(E_g^{first} = e)\Big] \times \mathbb{1}(t \geq t_0) + \tau_{gc} + \eta_{gt} + \omega_{ct} + \zeta_{gct}. \quad (2)$$

The product-country, product-time, and country-time fixed effects (τ_{gc}, η_{gt}, and ω_{ct}) are the same as before, but the coefficients β_{et}, γ_{et}, and δ_{et} now measure the different effects of sanctions. The direct effect of sanctions on sanctioned trade flows is captured by β_{et} for $t \geq e$, where, as before, $e = E_{gc}$ is the month in which sanctions are imposed on trade flow gc. In contrast, the remaining coefficients estimate the indirect, or general equilibrium, effects of sanctions.

Typically, a DiD regression relies on the Stable Unit Treatment Value Assumption (SUTVA), which in this context means that sanctions have no effect on non-sanctioned trade flows. Yet any shock large enough to generate general equilibrium effects is likely to violate this assumption. Of course, the sanctions imposed on Russia were so unprecedented in scale that they likely affected at least some of its non-sanctioned trade flows. We therefore relax this strict SUTVA by identifying those non-sanctioned trade flows for which the sanctions were most likely to generate indirect effects. We then estimate separate effects for such trade flows, thereby excluding them from the control group.[17] As a result, we require only a weaker version of the SUTVA, which rules out indirect effects of sanctions on the remaining, much smaller control group.

We estimate three types of indirect effects of sanctions (and therefore relax the strict SUTVA in three distinct ways). First, once the initial sanctions were imposed, subsequent sanctions must have been anticipated given explicit statements by sanctioning policymakers. Accordingly, the coefficients β_{et} for $t < e$ capture such *anticipation* effects for later cohorts of sanctions.

Second, as we document in Egorov et al. (2026), the imposed sanctions triggered a substantial increase in the *rerouting* of sanctioned products through countries friendly to the Russian regime. $Friendly_c$ is an indicator equal to one if country c is one of the eight countries we classify as "friendly" and zero otherwise.[18] Moreover, for each product g, we define the event E_g^{first} as the month in which product g was first sanctioned by *any* country, $E_g^{first} \equiv \min_c E_{gc}$. The coefficients γ_{et} for $t \geq e$, where $e = E_g^{first}$, therefore estimate the rerouting of sanctioned products through friendly countries, while the coefficients γ_{et} for $t < e$ allow this trade diversion to begin earlier, in anticipation of the first sanctions on product g.

Most importantly, we estimate the *uncertainty* effects of sanctions. To do so, we need to identify import flows that were perceived to be at significant risk of future sanctions. Since we do not know precisely how future sanctions were forecasted, we cannot identify all such flows. In-

[17] Within staggered DiD estimation, most observations serve as part of the "control group" at some point. For example, the pre-treatment observations of later cohorts serve as the "control group" for the post-treatment observations of earlier cohorts. While this is also true in our setting, throughout the paper we use the term "control group" more narrowly to refer to all observations that were never affected by any sanction effect, whether direct or indirect.

[18] We define friendly countries as Armenia, China, Georgia, Hong Kong, Kazakhstan, Kyrgyzstan, Turkey, and the UAE. This classification is based on journalistic accounts documenting these countries as common rerouting hubs for Russian imports. Our results are robust to alternative classifications.

stead, we focus only on one set of trade flows that may have belonged to this group. Specifically, we consider products that were initially sanctioned by some countries but not by others. Some of these products were subsequently sanctioned by other countries, and the corresponding anticipation effects are already captured by the coefficients β_{et} for $t < e$. Others, however, remained unsanctioned by the remaining countries through the end of our sample in December 2023. At the time of the first sanctions on a specific product, it was reasonable to expect that some of the remaining sanctioning countries would follow suit, but it was hard to know exactly who and when.[19] So, we use all such never-sanctioned trade flows of sanctioned products from the sanctioning coalition to estimate the uncertainty effects, captured by the coefficients δ_{et}. Specifically, $Never_{gc}$ is an indicator equal to one if trade flow gc from sanctioning country c was *never* sanctioned, even though product g was, and zero otherwise.[20]

To summarize, we use the single regression (2) to estimate not only the direct effects of sanctions but also their anticipation and uncertainty effects. Estimating these effects jointly is more efficient econometrically, but more importantly, it ensures that our control group remains as unaffected by sanctions as possible in case of such a large shock. It's for the same reason that we include rerouting effects of sanctions in the same regression.

There are two additional technical details that apply to the estimation of all sanction effects, β_{et}, γ_{et}, and δ_{et}. First, motivated by Figure 2, we assume that there was no anticipation of any sanction effects prior to March 2022, denoted by t_0. That's why we estimate all effects only for months after the start of the war, $t \geq t_0$, leaving the entire pre-war period as the omitted category. We further verify this assumption by estimating a separate pre-trend equation symmetric to equation (2).[21] The results are presented in Figures A.4 and Figure A.5 in the Appendix for trade flows measured

[19] To give one specific example, small front-loading washing machines were first sanctioned by the EU in April 2022. At the time, five other sanctioning countries exported these washing machines to Russia: the US, Canada, the UK, Japan, and South Korea. In June 2023, the US also sanctioned its exports of washing machines to Russia. The remaining countries had not sanctioned them by the end of 2023.

[20] Formally, $Never_{gc} = \mathbb{1}(E_{gc} = \infty)\mathbb{1}(E_g^{first} < \infty)\mathbb{1}(\min_g E_{gc} < \infty)$.

[21] Specifically,

$$y_{gct} = \sum_e \left[\alpha_{et}^S \times \mathbb{1}(E_{gc} = e) + \alpha_{et}^F \times \mathbb{1}(E_g^{first} = e) \times Friendly_c + \alpha_{et}^N \times Never_{gc} \times \mathbb{1}(E_g^{first} = e)\right] + \tau_{gc} + \eta_{gt} + \omega_{ct} + \zeta_{gct}, \quad t < t_0. \tag{3}$$

by weight and value, respectively.

An alternative way to interpret the omitted category in equation (2) is to view sanctions as a setting with two treatments. One of them begins in month e. For the direct effect of sanctions (β_{et}), this is the month when a trade flow becomes sanctioned; for the rerouting and uncertainty effects (γ_{et} and δ_{et}), it is the month when the first sanctions on product g are imposed. This corresponds to the standard treatment in most staggered DiD designs. These designs, however, assume no anticipation effects prior to month e and therefore use the entire pre-treatment period (or only month $e-1$) as the omitted category. In contrast, we aim to test for the presence of anticipation effects, which makes the standard methodology inapplicable. We go around this problem by assuming that any anticipation effects (if present) could begin only in March 2022, thereby making the pre-war period a clean comparison point for all trade flows. Thus, March 2022 can be interpreted as triggering a non-staggered treatment of "anticipation of future sanctions" for all trade flows that would subsequently be sanctioned during 2022 and 2023. Put simply, we treat the events of March 2022 as an explicit announcement of all future sanctions.

Second, following recent research on staggered DiD designs, we estimate *cohort-specific* effects of sanctions; that is, all our estimates, β_{et}, γ_{et}, and δ_{et}, depend on e as well as on t. In other words, we allow for fully flexible patterns of heterogeneity in sanctions' impacts across time and cohorts. This way, our equation (2) becomes equivalent to the ETWFE estimator from Wooldridge (2025), which is robust to potential biases arising from "forbidden comparisons" and negative weights. Moreover, this estimator is particularly well suited for estimating computationally intensive gravity models (Rios-Avila et al., 2024) as opposed to some of the popular alternatives (De Chaisemartin and d'Haultfoeuille, 2020; Callaway and Sant'Anna, 2021; Sun and Abraham, 2021).

3.3 Discussion

In the previous section, we discussed how we relax the standard assumptions underlying staggered DiD designs in two ways: by adopting a weaker version of the SUTVA and by allowing for anticipation effects of sanctions. In this section, we further clarify the identification strategy underlying our main specification (2).

So far, we have deliberately excluded from the control group all non-sanctioned trade flows that were likely affected by sanctions, either directly or indirectly. The sanctions imposed on Russia were so extensive that this meant excluding most pre-war trade, measured by value, from the control group. Indeed, this broad disruption of Russian trade was arguably one of the sanctions' intended objectives. The natural question, then, is what remains in the control group that allows us to identify the various effects of sanctions. The answer consists of two main groups of trade flows.

First, we assume that imports of non-sanctioned products from *all* countries were unaffected by sanctions *conditional on our set of controls*. Clearly, many other events occurred since March 2022. These included consumer boycotts and voluntary withdrawals from the Russian market (e.g., see Chupilkin et al., 2024), payment-related sanctions (e.g., the SWIFT ban and the suspension of Visa and Mastercard services), and disruptions to transport infrastructure (e.g., the closure of airspace and the ban on Russian trucks and ships in the EU), all of which made trade in even non-sanctioned products from sanctioning countries substantially more difficult. At the same time, Russia had incentives to expand its trade routes with more friendly countries such as China. To the extent that these country-level shocks affected all products similarly, they are absorbed by our country-time fixed effects, ω_{ct}. Thus, we effectively remove all country-level variation from our estimation.

Moreover, trade sanctions generate non-trivial general equilibrium effects. Many sanctions targeted products perceived as supporting the Russian war effort. Therefore, one might expect an increase in Russian demand for these types of products. On the other hand, the higher prices of sanctioned goods, driven by the sanctions and other factors, would naturally shift expenditures toward non-sanctioned products. To the extent that these product-level shocks affected the same narrowly defined 10-digit products supplied by all countries similarly, they are absorbed by our product-time fixed effects, η_{gt}. Thus, we also remove all product-level variation from our estimation.

Second, given the lack of evidence of rerouting through all countries in the world, we treat imports of sanctioned products from "neutral" countries (i.e., countries that are neither sanctioning

nor friendly) as also being unaffected by sanctions.[22] Again, this assumption is made only conditional on our set of controls. Taken together, these two groups of trade flows provide sufficient variation to identify the three distinct effects of sanctions. In fact, despite the broad impact of sanctions, 69% of all observations end up in the control group when estimating specification (2).

It is worth emphasizing that these assumptions, if anything, make our estimates more conservative. By construction, our rich set of controls absorbs some of the effects of sanctions. For example, including product-time fixed effects, η_{gt}, means that we always treat product-level demand as given, thereby abstracting from any effects of sanctions on that demand. Consequently, our estimates do not capture some potentially important effects of sanctions. More importantly, violations of these assumptions would imply larger, not smaller sanction effects. Specifically, if sanctions also reduced trade flows in the control group, our estimates would be biased downward (in absolute terms). In the extreme case where all trade flows were affected similarly by sanctions, we would estimate effects of zero.

The same argument applies to the way we measure the risk of sanctions in identifying their uncertainty effects. Namely, we assume that only non-sanctioned varieties of sanctioned products from sanctioning countries faced a non-zero risk of future sanctions. Of course, other trade flows may also have been exposed to some risk of sanctions. For example, additional countries might have been expected to join the sanctioning coalition, or the existing sanctions might have been expected to expand to an even broader set of products, including those that we treat as non-sanctioned. In either case, any additional sanction risk that we fail to capture affects our control group and therefore biases our estimates downward, not upward (in absolute terms).

As in most applications of staggered DiD methodology, we also assume that the timing of sanctions is not endogenous to the outcomes that we measure. Specifically, it cannot be the case that policymakers in sanctioning countries strategically wait until certain trade flows have already declined sufficiently before imposing sanctions on them. Since we find significant effects both for anticipation and uncertainty effects, violating this assumption would require policymakers to wait until both types of trade flows changed accordingly. Moreover, these changes would have to

[22]There were 146 such countries with positive trade flows in 2021. Some of the largest were Vietnam, India, Indonesia, Brazil, Malaysia, and Ecuador.

coincide in timing without being driven by the sanctions themselves.

Importantly, we do not need to assume exogenous selection of sanctioned products into different cohorts. At least in part, the intention of the sanctioning countries was to gradually build up the pressure on the Russian government, and some strategically important products may therefore have been deliberately reserved for later cohorts. It is also difficult to rule out the possibility that private exporters lobbied their governments to postpone sanctions on products for which the Russian market was particularly important. At the same time, some delays in the adoption of sanctions may simply have reflected the negotiation process or other political factors unrelated to economic conditions. Although we report some comparisons between earlier and later cohorts, we view this evidence as *suggestive* only without insisting on either of the two possibilities above.

4 Main Results

In this section, we present the main results from our estimation. We report the estimated anticipation and uncertainty effects in Sections 4.1 and 4.2, respectively. After that, we directly compare them to show that greater sanction risk leads to more adverse effects on trade volumes.

4.1 Anticipation Effects

We start by testing whether sanctions imposed after April 2022 exhibit any signs of being anticipated. We do this by examining the behavior of to-be-sanctioned trade flows *before* they actually got sanctioned, but after the start of the conflict, when it was reasonable to expect such sanctions. Specifically, we present the estimated cohort-specific monthly fixed effects β_{et} from equation (2) and report their averages aggregated across all cohorts (except for the first two)[23] in Figure 3.[24]

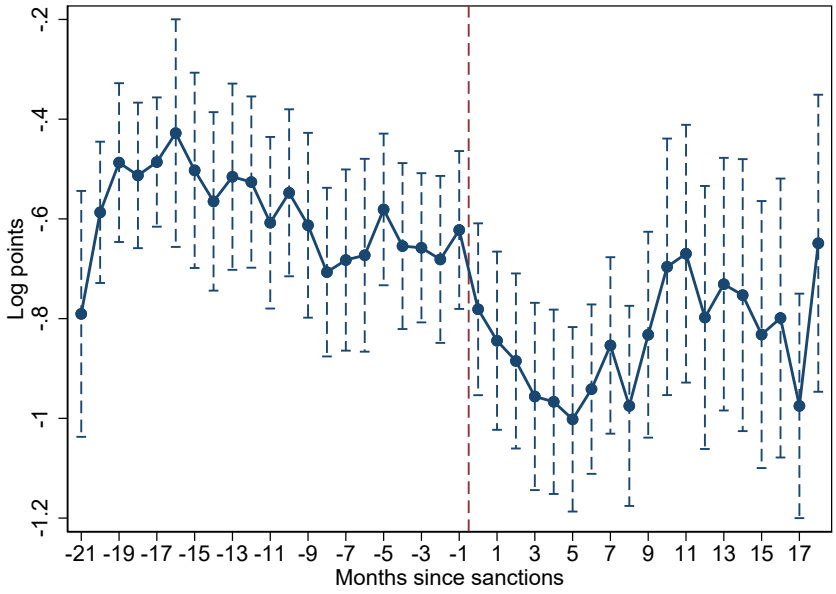
As we document in Egorov et al. (2026), there is a large and persistent drop in trade flows after they become sanctioned.[25] The striking feature of Figure 3 is the degree to which trade flows fall many months before sanctions take place. While a significant discontinuity remains around the

[23] See the estimates for these cohorts in Figure A.3 in the Appendix.

[24] This estimation is based on the total of 6,840,972 observations. These include 186 distinct countries and 8,586 distinct products.

[25] We omit the last point estimate of -1.64 for 19 months after the start of sanctions from Figure 3 as an outlier. In any case, the last and first 2 points are based on less than 1% of all treated observations used in this Figure, which makes them not representative of most sanctions.

Figure 3: The effects of sanctions and their anticipation, log of weight



Notes: This figure presents the estimated anticipation and treatment effects for the sanctioned trade flows, β_{et}, from equation (2). Specifically, it plots the average of the estimated β_{et} across all sanction cohorts e, excluding the first two cohorts (with each cohort weighted by the number of observations). The x-axis shows the number of months before and after a trade flow becomes subject to sanctions, with each coefficient estimated relative to the pre-war months, which form the omitted category. We interpret coefficients to the left of the sanction date as anticipation effects and those to the right as direct effects of sanctions. The last point estimate for 19 months after the start of sanctions is omitted. The figure uses the total import net weight of a given product from a given country in a given month as the outcome variable. We add one before taking logarithms to avoid missing values. The bars represent 95% confidence intervals. Standard errors are two-way clustered at the country and product levels. See Figure A.6 in the Appendix for analogous estimates using import value instead of weight.

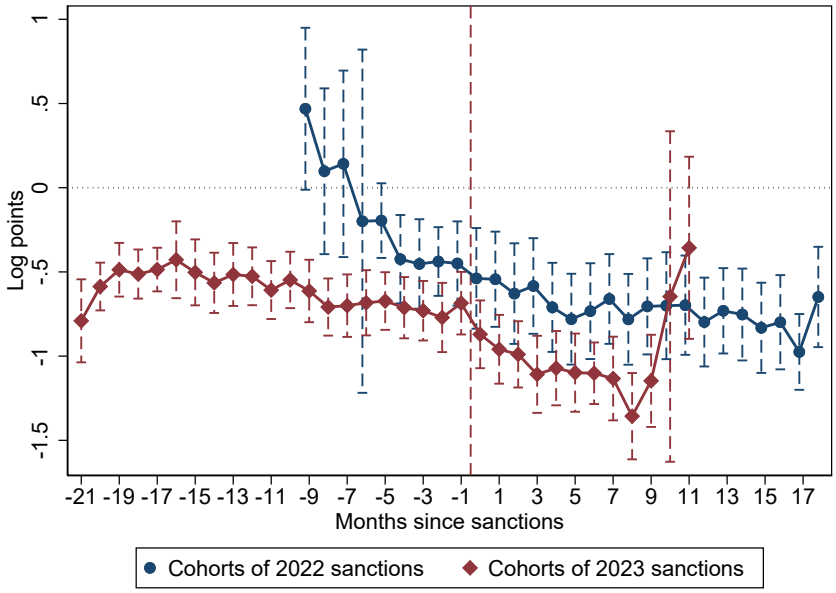
start of sanctions, arguably, most of the sanctions' effects are realized before their actual start. In particular, all *pre*-sanctions estimates aggregated to a single point amount to an average decline of 0.61 log points or 46%, while all *post*-sanctions estimates amount to an average decline of 0.81 log points or 56% (both relative to the pre-war period).[26]

This finding is in sharp contrast to the notion that expected future sanctions can be easily avoided by preemptively stocking up on to-be-sanctioned products, especially since doing this would not violate any of the current trade restrictions. Not only do we not find any evidence of accumulating products prior to their ban, but, on the contrary, we estimate a large and substantial fall in imports before the sanctions, while it is still legal to continue with this trade.

To be clear, imports of all products – whether sanctioned or not – from the sanctioning countries have been falling since the start of the conflict, as captured by our country-time fixed effects.

[26] See these and other results in Table A.1 in the Appendix.

Figure 4: Early vs late effects of sanctions and their anticipation, log of weight



Notes: This figure presents the estimated anticipation and treatment effects for the sanctioned trade flows, β_{et}, from equation (2). Specifically, it plots the average of the estimated β_{et} across all sanction cohorts e, excluding the first two cohorts (with each cohort weighted by the number of observations). The red line shows the average for all cohorts of sanctions in 2023, while the blue line shows the average for all sanctions imposed between May and December 2022. The x-axis shows the number of months before and after a trade flow becomes subject to sanctions, with each coefficient estimated relative to the pre-war months, which form the omitted category. We interpret coefficients to the left of the sanction date as anticipation effects and those to the right as direct effects of sanctions. The last point estimate for 19 months after the start of sanctions is omitted. The figure uses the total import net weight of a given product from a given country in a given month as the outcome variable. We add one before taking logarithms to avoid missing values. The bars represent 95% confidence intervals. Standard errors are two-way clustered at the country and product levels. See Figure A.6 in the Appendix for analogous estimates using import value instead of weight.

What is striking here is that within the set of non-sanctioned products, those trade flows that were sanctioned later fell by 46% more than the rest. Similarly, this decline cannot be accounted for by changes in demand for sanctioned products (captured by product-time fixed effects).

Next, we check whether the pre-emptive drop is caused by the risk of sanctions rather than by other factors affecting to-be-sanctioned trade flows. If this is the case, one might expect the general accuracy of predicting future sanctions to improve over time as more information about the sanctioning process becomes available and the set of correctly and incorrectly anticipated sanctions expands. Thus, the preemptive fall of to-be-sanctioned trade flows that we observe in the data should become even stronger over time. To check this, we disaggregate our estimates from Figure 3 into anticipation effects of 2022 sanctions vs 2023 sanctions. Figure 4 reports our estimates separately for these two groups of sanctions.

Since later cohorts may have been strategically composed of products more sensitive to sanctions, these results must be interpreted with caution. Still, at each available horizon, the anticipation effects of later sanctions appear to be stronger than those of earlier sanctions. Thus, this heterogeneity *across* cohorts of sanctions is consistent with our interpretation of the behavior of trade flows *within* each cohort.

It is also interesting to note that trade flows that were sanctioned much later in 2023 started to fall immediately since the start of the conflict, often more than a year ahead of the actual sanctions. This pattern is consistent with our guess of how some of the sanctions were anticipated. In particular, it was reasonable to expect that sanctioning countries would cooperate and would later sanction the same products as already sanctioned by others. However, it may have been hard to predict which of these would be sanctioned sooner rather than later. Thus, the early months of the conflict saw a similar decline for all such trade flows, resulting in substantial effects even for trade flows that were sanctioned much later.

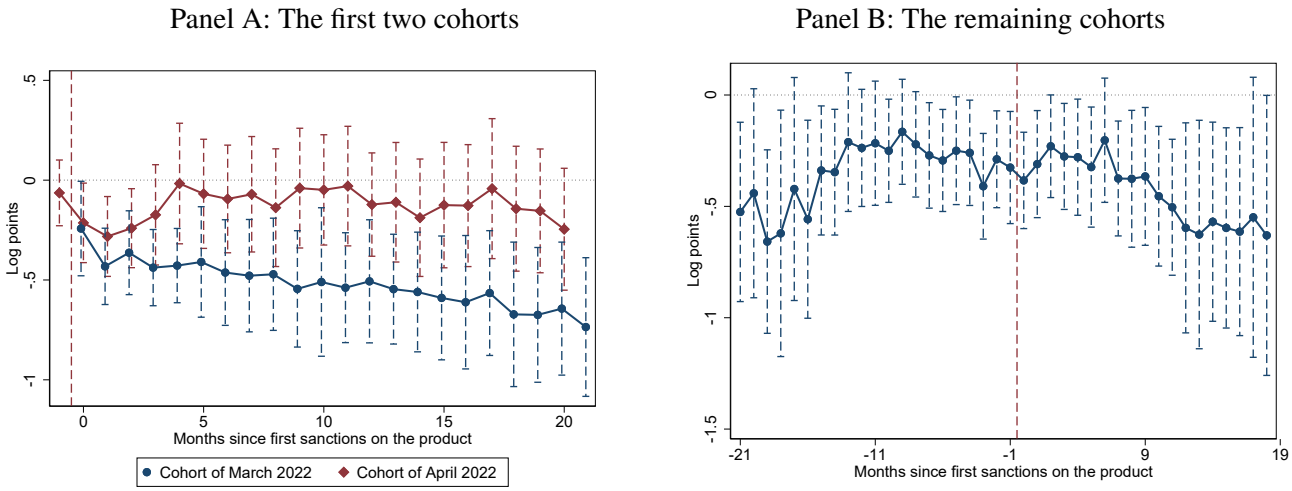
When estimating the rerouting effects, γ_{et}, we find that most of these effects were concentrated in the first two cohorts and therefore played only an insignificant role in the subsequent escalation of sanctions. The estimated coefficients, γ_{et}, are plotted in Figure A.7 in the Appendix.

4.2 Uncertainty Effects

So far we have presented some evidence suggesting that the accuracy of the prediction of future sanctions has improved over time. This implies that some mistakes must have been made in these predictions, especially early on. If so, there should also be a decrease in import flows that were never sanctioned but were perceived as likely to become sanctioned.

In this section, we present our estimates of the uncertainty effects δ_{et} from equation (2). Figure 5 plots them separately for the first two cohorts and as an average for all later cohorts. It is worth keeping in mind that cohorts here are defined differently from Section 4.1. None of the observations behind the presented coefficients are under sanctions. Instead, these reflect non-sanctioned varieties of products that were first sanctioned by some other countries in different months. Also, the first two cohorts account for 86% of all observations with uncertainty effects (27 and 59% respectively), which makes them the most "representative".

Figure 5: Uncertainty effects, log of weight



Notes: This figure presents the estimated uncertainty effects, δ_{et}, from equation (2). Specifically, Panel A plots the estimated δ_{et} separately for the first two cohorts, while Panel B plots the average across the remaining cohorts, with each cohort e weighted by the number of observations. The x-axis shows the number of months before and after the first sanctions on a given product, with each coefficient estimated relative to the pre-war months, which form the omitted category. The last point estimate for 19 months after the start of sanctions is omitted. The figure uses the total import net weight of a given product from a given country in a given month as the outcome variable. We add one before taking logarithms to avoid missing values. The bars represent 95% confidence intervals. Standard errors are two-way clustered at the country and product levels. See Figure A.8 in the Appendix for analogous estimates using import value instead of weight.

The uncertainty effects for the first cohort in Panel A are remarkably large and persistent. This is particularly surprising given that none of the underlying trade flows were ever under any sanctions. Instead, they were only perceived as under the risk of future sanctions. The risk that, it appears, has never dissipated.

This is, however, not always the case, as the second cohort illustrates. For this particular cohort, there are significant uncertainty effects only for the first 3 months after the first sanctions on the same product. After that, there is virtually no perceived risk for this group of trade flows to be sanctioned.

This difference in uncertainty effects between the first two cohorts reflects both the possibly endogenous composition of various cohorts and all the additional information that we have missed with our simple strategy of identifying trade flows under some risk of future sanctions. At the very least, keeping track of some official announcements can reveal some trade flows with only minimal risk of future sanctions.

The estimates for the next 13 cohorts are considerably noisier, since there are only 14% of all

observations with uncertainty effects to identify them. Thus, we report only our average estimates for these 13 cohorts together in Panel B. Interestingly, uncertainty effects are significant not only after the first sanctions on the same product but before as well. Recall that most sanctions were relatively straightforward to predict because they were imposed on the products already sanctioned by someone else. In contrast, by construction, here we focus only on the trade flows with the products *before* they got sanctioned for the first time. In this sense, these early uncertainty effects, δ_{et} for $t < e$, are not directly comparable to the anticipation effects, β_{et} with $t < e$, as the latter involve future sanctions that were much easier to predict. Nonetheless, this finding illustrates that firms at the time unsurprisingly used a richer information set to predict sanctions than we exploit in this paper.

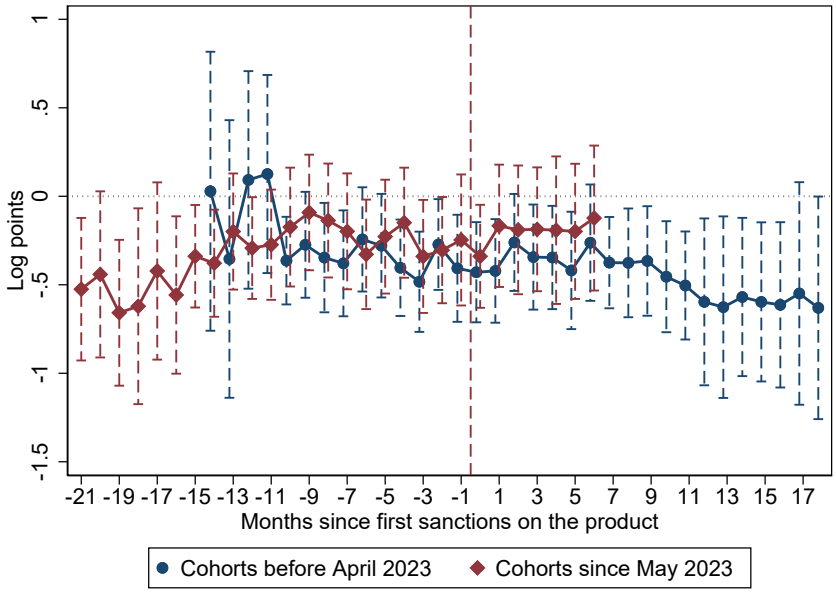
Aggregated to a single average before and after the first sanctions on the product, the estimated uncertainty effects amount to 25% and 30% declines respectively (0.29 and 0.35 log-points, see Table A.1 in the Appendix). Both of these figures are lower than the 46% decline associated with the anticipation effects, estimated in the previous section. These results are therefore consistent with the notion that the magnitudes of our anticipation and uncertainty effects are proportional to the magnitudes of the underlying risk of sanctions.

Next, recall that our previous findings in Figure 4 suggested that the accuracy of predicting future sanctions has improved over time. Now we check whether the same pattern can be found in the evolution of our uncertainty effects.

As Figure 5 illustrates, there could be many differences in the uncertainty effects between individual cohorts, caused in part by their non-random selection. Thus, we combine our estimates across several cohorts to "average out" more of the idiosyncratic differences between them. This way, the comparison between *groups* of cohorts has a better chance to reflect any *systematic* changes in uncertainty effects across time. Still, the resulting differences could also reflect a systematic part of the non-random selection of cohorts, and thus, we interpret our results here only as suggestive.

Figure 6 presents the average uncertainty effects separately for the periods before and after

Figure 6: Early vs late uncertainty effects, log of weight



Notes: This figure presents the estimated uncertainty effects, δ_{et}, from equation (2). Specifically, it plots the average of the estimated δ_{et} across all sanction cohorts e, excluding the first two cohorts (with each cohort weighted by the number of observations). The red line shows the average for all cohorts of sanctions in 2023, while the blue line shows the average for all sanctions imposed between May 2022 and April 2023. The x-axis shows the number of months before and after the product gets sanctioned for the first time by any country. Each coefficient is estimated relative to the pre-war months (which form the omitted category). The figure uses the total import net weight of a given product from a given country in a given month as an outcome. The logarithms add 1 to the argument's value to avoid missing values. The bars represent 95% confidence intervals. Standard errors are two-way clustered at the country and product levels. See Figure A.8 in the Appendix for analogous estimates using import value instead of weight.

May 2023.[27] Here, at almost all available horizons, the point estimates of later uncertainty effects are smaller than those of the earlier ones. Moreover, after the first sanctions on a product, the point estimates of later uncertainty effects become very close to zero, while the point estimates of earlier effects continue to be quite substantial.

4.3 Magnitude of Risk

Until now, we have presented the estimated anticipation and uncertainty effects separately, comparing their magnitudes only on average. If these effects are indeed driven by the risk of future sanctions, there should be a much closer relationship between them: the greater the risk, the larger the effect. In this section, we test this prediction at a much more granular level – by

[27] If we divide all cohorts by year, into 2022 and 2023, the estimates of the early cohorts become too noisy as these cohorts account only for 15% of the underlying observations. To obtain more accurate estimates for two groups of cohorts, we divide all cohorts into two groups more evenly (49 and 51% of observations), with May 2023 as the breakpoint between the two groups.

comparing individual estimates rather than their averages.

Our previous estimates of these two effects were not directly comparable because they were defined relative to different events: sanctions on a particular trade flow in one case and the first sanctions on the corresponding product in the other. In the following specification, we re-estimate both effects in a way that allows for their direct comparison:

$$y_{gct} = \sum_{e} \left[\delta^{L}_{et} Later_{gc} + \delta^{N}_{et} Never_{gc}\right] \mathbb{1}(E_g^{first} = e)\mathbb{1}(t \geq t_0) + \tau_{gc} + \eta_{gt} + \omega_{ct} + \zeta_{gct}, \qquad (4)$$

where $Later_{gc}$ is an indicator equal to one if trade flow gc was sanctioned *later* than product g was first sanctioned by another country, $c' \neq c$, and zero otherwise. Thus, this indicator equals one only for a subset of sanctioned trade flows – namely, those that could have appeared indistinguishable from the "uncertainty" flows at the time when the product was first sanctioned. Consequently, the coefficients δ^{L}_{et} measure the same anticipation effects as the coefficients β_{et} from our baseline specification (2) but in a different way.

Before explaining this in more detail, it is important to note that we estimate equation (4) on only a subsample of our data. Specifically, we exclude three groups of observations from the full sample. First, we drop all trade flows that are currently under sanctions, because we do not need to estimate the direct effects of sanctions here. Second, we similarly omit the trade flows used to estimate the rerouting effects (those with $\mathbb{1}(E_g^{first} = e) \times Friendly_c = 1$). Third, to make the anticipation and uncertainty effects directly comparable, we exclude sanctioned trade flows that were sanctioned at the same time as the first sanctions on the corresponding products, just because this small subset of sanctions was much harder to predict than the rest.

To paraphrase, we keep the same control group as in our baseline specification (2) but substantially reduce the "treatment" group to focus only on two types of sanction effects: anticipation and uncertainty. Specifically, we estimate changes in two types of trade flows exposed to the risk of sanctions. Once the first sanctions on product g are imposed, we follow all currently non-sanctioned varieties of the same product exported by the sanctioning coalition. For some of them, the risk eventually materializes (the "later" group), whereas for others it does not (the "never" group), even though at the time it was reasonable to expect future sanctions for all of them. In this

sense, the two groups could have appeared indistinguishable ex ante, at least under our admittedly simple way of predicting future sanctions.

As a result, the coefficients δ_{et}^{L} from equation (4) fundamentally measure the same anticipation effects as the coefficients β_{et} from our baseline specification (2). There are only two main differences between them. First, β_{et} measure anticipation effects for *all* future sanctions, whereas δ_{et}^{L} do so only for future sanctions on previously sanctioned products.[28] Second, in our baseline specification (2), we allow anticipation effects to vary across the cohorts in which trade flows are sanctioned. Here, instead, we allow them to vary across the cohorts defined by the first sanctions on products. In this respect, this alternative specification not only makes anticipation effects directly comparable to uncertainty effects but also provides a robustness check for our main results, as it allows for a different type of heterogeneity.

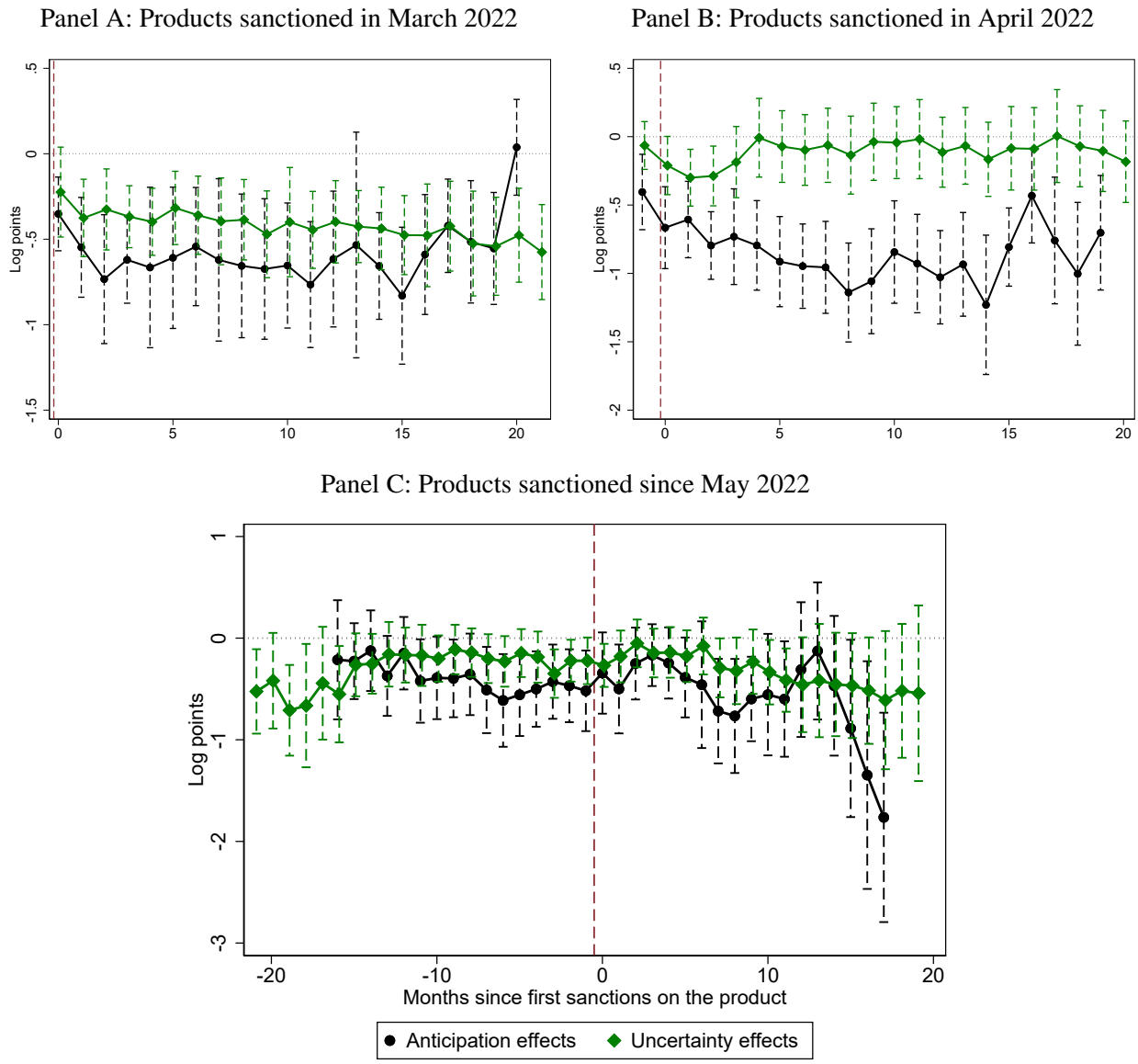
Figure 7 presents our results. As before, we report the estimates separately for the first and second cohorts and as an average across all remaining cohorts. As expected, the estimated uncertainty effects are broadly similar to those obtained in our main specification. The striking feature of the figure, however, is that almost all point estimates of the uncertainty effects are smaller than the corresponding estimates of the anticipation effects. This pattern holds not only for the near-zero uncertainty effects of the second cohort but also for all remaining cohorts.

This robust pattern in the data confirms the main prediction of our interpretation of the estimated effects: the smaller the risk, the smaller the effect. More precisely, aggregated to a single number, the anticipation and uncertainty effects amount to 45 and 34% declines for the first cohort respectively. Thus, uncertainty effects are about 76% (34/45) of anticipation effects, on average, for this cohort. Moreover, recall that our estimated average direct effect of sanctions themselves was about 56% decline (see Table A.1). This implies that the unrealized but perceived risk of sanctions can be 61% (34/56) as effective as the actual sanctions. This is, however, not always the case, as the results for the second cohort in Panel B illustrate.

Finally, we formally test whether the anticipation and uncertainty effects differ significantly for each cohort. To do so, for each cohort we compute the difference between the average uncertainty and anticipation effects, with each time period weighted by the number of underlying observations.

[28] Recall from Figure 1 that these account for the vast majority of all future sanctions.

Figure 7: Anticipation and uncertainty effects, log of weight



Notes: This figure presents the estimated anticipation and uncertainty effects, δ_{et}^{L} and δ_{et}^{N}, from equation (4). Specifically, Panels A and B plot the estimated effects for the first and second cohorts, respectively, while Panel C plots the average across the remaining cohorts, with each cohort e weighted by the number of observations. The x-axis shows the number of months before and after the first sanctions on a given product, with each coefficient estimated relative to the pre-war months, which form the omitted category. The figure uses the total import net weight of a given product from a given country in a given month as the outcome variable. We add one before taking logarithms to avoid missing values. The bars represent 95% confidence intervals. Standard errors are two-way clustered at the country and product levels. The estimation is based on 4,467,153 observations, covering 186 countries and 7,841 products. See Figure A.9 in the Appendix for analogous estimates using import value instead of weight.

The results are plotted in Panel A of Figure A.10 in the Appendix. Outside the first two cohorts, most cohorts have very few observations, making these estimates quite noisy. Nevertheless, there is not a single cohort for which the anticipation effects are significantly smaller than the uncertainty

effects. In contrast, there are several cohorts for which the opposite is true. This finding further reinforces our main conclusion regarding the role of the magnitude of sanction risk.

5 Additional Results

In this section, we perform several robustness checks, aggregate our reduced-form estimates to evaluate their implications for total Russian imports, and discuss alternative interpretations of our results.

5.1 Robustness

Non-staggered DiD. Our baseline specification (2) uses the full sample to estimate all sanction effects, both direct and indirect. As shown by Wooldridge (2025), this ETWFE estimator is not only robust to the possible problems associated with staggered DiD methodology (such as "forbidden comparisons" and negative weights), but it also estimates the treatment effects in the most efficient way. Once the full heterogeneity of the underlying treatment effects is allowed for, it makes all permitted comparisons between the various groups of observations, thereby providing a more efficient estimator than those based on only a subset of these comparisons.

Still, such estimators can be somewhat less transparent precisely because they implicitly make so many different comparisons. To reveal which patterns in the data truly drive our results, we now switch to a less efficient but more transparent estimator. More precisely, we keep the control group unchanged but exclude from the sample all cohorts of sanction effects except one. This allows us to employ a standard *non-staggered* DiD methodology to estimate the treatment effects for each cohort separately. Specifically, for each cohort e, we estimate

$$y_{gct} = \left[\delta^L_{et} Later_{gc} + \delta^N_{et} Never_{gc}\right] \mathbb{1}(E^{first}_g = e)\mathbb{1}(t \geq t_0) + \tau_{gc} + \eta_{gt} + \omega_{ct} + \zeta_{gct}, \qquad (5)$$

where there are only two differences from our baseline specification (4). First, the right-hand side now contains treatment effects for a single cohort only, rather than for all possible cohorts. Second, we drop from the sample all treated observations from cohorts other than e. As a result, equation (5) essentially estimates an event study for a single cohort, completely ruling out any comparisons between different cohorts of sanctions.

The estimated anticipation and treatment effects for the first two cohorts (which account for almost 90% of all treated observations) are reported in Figure A.11 in the Appendix. The results are very similar to our baseline results, depicted in Panels A and B of Figure 7. Further, we summarize the results for all cohorts by computing cohort-specific differences between anticipation and uncertainty effects in Panel B of Figure A.10. Once again, the results are remarkably similar to our baseline estimates. This similarity reveals that our baseline estimates are driven mostly by comparisons between the treated group for each sanction effect and the entire control group, rather than by comparisons between different treated groups.

Upstream vs downstream products. In our main specification (2), we tried to account for all possible general equilibrium effects of sanctions in two ways. First, we explicitly allowed some observations to be affected by sanctions, thereby moving them from the control group to new treatment groups. Second, we introduced a rich set of country-time and product-time fixed effects that absorbed *all* general equilibrium effects that are common to all products within a country and to all varieties within a product, respectively. Importantly, this also includes *product-level* general equilibrium effects that operate through demand and input-output linkages, such as changes in demand for non-sanctioned products that are used as substitutes or complements of sanctioned products.

Our identification strategy, however, does not account for similar linkages across individual *varieties* of the same product. Nonetheless, different varieties within the same 10-digit product tend to be substitutes rather than complements. Thus, sanctions on one variety should only increase Russian demand for the others. As a result, we would under-, rather than over-, estimate the uncertainty effects.

A greater threat to identification comes from other concurrent shocks that affected varieties from sanctioning countries differently from other varieties of the same products. Specifically, many Western multinational enterprises either paused their production or sold their businesses in Russia since 2022 (Chupilkin et al., 2024). Presumably, these production facilities used to import many specialized inputs from their headquarters countries. Other shocks may have similarly disrupted high-tech production within Russia. To the extent that only inputs shipped from high-income

countries are suitable for such high-tech production, these events may have differentially reduced Russian demand for varieties from sanctioning countries relative to other varieties of the same products.

Similarly, our country-time fixed effects absorb only those effects of consumer boycotts in sanctioning countries that apply equally to all products. Still, a company supplying microchips to Russia may face a stronger backlash than a company supplying chocolate. Thus, heterogeneity in consumer boycotts across products may similarly inflate our uncertainty estimates.

We can partially address these concerns by examining the heterogeneity of our estimates with respect to upstream and downstream products. First, a possible disruption of high-tech production in Russia should have negatively affected imports of intermediate products but not imports of final goods. Second, most dual-use goods are similarly intermediate inputs rather than final products. Thus, consumers in sanctioning countries may protest more strongly against exports of intermediates rather than exports of final goods to Russia.

To address this concern, for each product, we construct the share of final consumption in its total imports based on the import-use part of the 2021 input-output tables from Russia. Basically, some imported products were disproportionately used for final consumption, while others were used as intermediate inputs. We divide all products into four roughly equal groups based on this measure of upstreamness. We then extend specification (4) to allow for heterogeneity in the effects with respect to different product groups:

$$y_{gct} = \sum_{e} \sum_{n} D_g^n \left[\delta_{et}^{Ln} Later_{gc} + \delta_{et}^{Nn} Never_{gc}\right] \mathbb{1}(E_g^{first} = e)\mathbb{1}(t \geq t_0) + \tau_{gc} + \eta_{gt} + \omega_{ct} + \zeta_{gct}, \quad (6)$$

where D_g^n is an indicator that takes the value of 1 if product g belongs to group n, and 0 otherwise; $\sum_n D_g^n = 1$. Basically, this way we estimate the anticipation and uncertainty effects separately for each product group.

The estimated coefficients are plotted in Figure A.12 in the Appendix. In fact, we do find different anticipation and treatment effects for consumer and intermediate products. The biggest outlier by far is the group of the most downstream products, for which we find no anticipation or uncertainty effects. There are, however, almost no direct sanctions effects on this group of products

either, as most consumer products were sanctioned as "luxury" goods. As such, sanctions were imposed only on a subset of goods above a certain price threshold within the same 10-digit product code, while it remained perfectly legal to import cheaper goods within the same product code. The absence of direct sanction effects also implies the absence of indirect effects, and thus this group of products can not be used to distinguish between the two alternative drivers of our results.

More importantly, the differences between the remaining product groups are not monotone with respect to our measure of upstreamness, even at the level of point estimates (many of the differences are not statistically significant). Thus, it is not generally true that the higher the share of intermediates in a product, the stronger our estimates for anticipation and uncertainty effects are. As a result, although these alternative explanations can account for some of our estimates, they are unlikely to be the main drivers of our results.

Intensive vs extensive margins. Lastly, we verify that our central results are driven by both the intensive and extensive margins of trade. In the intensive margin specification, we re-estimate equation (4) after replacing the dependent variable y_{gct} with the log of net weight, thereby excluding all observations with zero trade flows from our estimation. In the extensive margin specification, we similarly replace y_{gct} in equation (4) with a dummy that equals one for non-zero trade flows and zero otherwise.

The results are depicted in Figure A.14 in the Appendix. We find significant anticipation effects for both margins of trade, while the uncertainty effects appear to be driven more by the intensive margin. Keeping this in mind, we check the robustness of our aggregation exercise in the next section by repeating it based only on the intensive margin estimates.

5.2 Aggregation

So far, we have estimated the direct effect of sanctions along with several indirect effects. In this section, we calculate the implications of our estimates for aggregate Russian imports.

In particular, we start by computing the predicted values for all trade flows $\hat{y}_{gct}$ based on our estimates from equation (2), but we manually set to zero all our estimated sanction effects, $\hat{\beta}_{et} = \hat{\gamma}_{et} = \hat{\delta}_{et} = 0$. We convert these logs to the absolute levels of weight (or value) by taking an exponent, and then sum them up across all trade flows to get the aggregate Russian imports. This

is our benchmark figure in the absence of trade sanctions after April 2022. Importantly, we keep the first two waves of sanctions (March and April 2022) and other concurrent shocks (absorbed by product- and country-time fixed effects) fixed in all of our calculations, thus focusing only on the escalation of trade sanctions after April 2022.

Next, we repeat a similar calculation several times, but we set some of our effects to their estimated values while we keep all other coefficients unchanged. For example, to single out the role of the anticipation effects of sanctioned trade flows, we change $\hat{\beta}_{et}$ for all $t < e$, while keeping intact the effects of realized sanctions $\hat{\beta}_{et}$ for $t \geq e$ and all other coefficients. We then take exponents of these predicted values and sum them up. We interpret the resulting sum as the aggregate Russian imports in the presence of only the anticipation effects for sanctioned trade flows, without these sanctions themselves.[29]

Once we aggregate all such calculations, we can compute the total value (or weight) of all imports lost due to the escalation of trade sanctions after April 2022. The results presented in Table 1 imply that the total value of Russian imports has declined by almost 36 billion dollars (spread out over 22 months of the conflict). For comparison, the average Russian monthly imports in 2021 amounted to 24.12 billion dollars. Thus, the total losses due to the escalation of sanctions were roughly equivalent to losing one and a half months of the pre-war imports' value.[30]

Crucially, two-thirds of these losses are driven by the uncertainty effects, that is, they are driven by the reduction in trade flows that were never actually sanctioned. Of course, they might be still sanctioned in the future, after the end of our sample in December 2023, but then it would be nonetheless hard to justify such large losses *years* before that happens. Such a possibility is also inconsistent with our finding that the uncertainty effects diminish over time (Figure 6) in contrast to the increasing anticipation effects for the actually sanctioned trade flows (Figure 4). Therefore, the risk of future sanctions appears to have had a larger impact on the Russian economy than the

[29]Similarly, we change the values of $\hat{\gamma}_{et}$ for $t < e$ to calculate the aggregate imports with anticipation effects for rerouting, or we change $\hat{\gamma}_{et}$ for $t \geq e$ to calculate imports with the actual rerouting. But for the calculation with uncertainty effects, we always change $\hat{\delta}_{et}$ for all t, including the first two cohorts.

[30]Figure A.15 in the Appendix shows the dynamics of counterfactual Russian imports with and without the escalation of trade sanctions. Note that in both cases there is a huge disruption of trade at the beginning of the conflict. This is because we keep the first two cohorts of sanctions in all of our calculations. Similarly, all adverse concurrent shocks absorbed by product- and country-time fixed effects remain constant in all simulations.

Table 1: Change in Total Russian Imports due to Escalation of Sanctions after April 2022

Change due to...	Value, bln USD	Weight, bln kg
anticipation of sanctions	-2.74	-0.05
sanctions themselves	-10.96	-0.08
anticipation of rerouting	0.30	-0.04
rerouting itself	1.38	0.05
uncertainty in sanctions	-23.94	-1.68
All effects combined	-35.96	-1.80

Notes: This table aggregates the reduced-form estimates to calculate their implications for the aggregate Russian imports over the period of March 2022 - December 2023. The two columns are based on the estimates from equation (2), where the dependent variable y_{gct} is the log of value and weight, respectively. The last line shows the change in Russian imports due to the presence of all effects together, while the other lines break down this total effect into five separate sources: $\hat{\beta}_{et}$ $t < e$, $\hat{\beta}_{et}$ $t \geq e$, $\hat{\gamma}_{et}$ $t < e$, $\hat{\gamma}_{et}$ $t \geq e$, and $\hat{\delta}_{et}$ $\forall t$ from (2). The calculation of the first four effects is made for all cohorts of sanctions after the first two.

sanctions themselves.

The explanation behind the magnitudes of our results is straightforward. The total non-sanctioned value of all import flows to Russia from sanctioning countries remains so high that even relatively modest and short-lived uncertainty effects can amount to very substantial losses (recall Panel B of Figure 1).[31]

Our results for the total weight of lost imports are mostly consistent with the results for value (the average monthly imports in 2021 amounted to 6.25 billion kilograms, but sanctioned products have a much higher value per weight on average). We also repeat our analysis only on nonzero trade flows, where we estimate the intensive margin of anticipation effects (as opposed to both intensive and extensive margins in our main specification). The aggregated results are summarized in Table A.2 in the Appendix and remain largely consistent with our baseline figures.

5.3 Discussion

It is important to acknowledge that several different narratives are consistent with our results.

Role of intermediaries. First, there could be many potential drivers of the indirect sanction effects: Russian consumers, Russian importers, foreign exporters, and various intermediaries, in-

[31] Note that this may or may not imply that the escalation of sanctions was smaller than anticipated, depending on the elasticity of trade flows to changes in risk. Specifically, highly elastic trade flows may collapse in response to even small changes in risk. Thus, our results should not be interpreted as indicative of the overall level of the risk of future sanctions.

cluding banks involved in payments and logistics companies involved in shipments. For example, individual exporters in sanctioning countries or Russian importers may be unwilling to invest in relationships that could become subject to sanctions in the near future. Such supplier-client relationships are likely to matter more for differentiated products than for homogeneous products such as commodities, which are traded on organized exchanges where the role of long-term firm-to-firm relationships is much more limited. If the reluctance to invest in long-term relationships in the face of sanction risk is the main driver of our results, we should observe significantly larger effects for more differentiated products.

To check for this possibility, we use the product classification of Rauch (1999) and specification (6) to estimate heterogeneity in the effects with respect to product differentiation. The results are presented in Figure A.13 in the Appendix. Although the point estimates for differentiated products are generally smaller than those for non-differentiated products, the differences are only marginal and not statistically significant. Thus, these results suggest only a limited role for final suppliers and clients, thereby making it more likely that intermediaries or Russian consumers play a prominent role in the observed effects. Indeed, it should hardly matter for banks, for example, whether to extend trade credit for shipments of coffee or cars.

Even though there is no empirical evidence directly tying our estimates to the behavior of intermediaries, this interpretation is supported by extensive anecdotal evidence. For example, in March 2022, the Danish shipping and logistics company Maersk stopped accepting all new bookings for shipments, citing "the uncertainties with applications of sanctions."[32] Further, the company introduced an additional surcharge on ongoing shipments, explaining that "recent sanctions imposed against Russia and the regular adjustments that are being made to the list of restrictions have had a direct and indirect effect on the safety and stability of our people, operations and global supply chains. For the latter, we are seeing a notable impact on increased transit times, cargo detention, and cost of transportation."[33]

On the payment side, Allison and Keatinge (2025) interviewed several financial institutions and pointed out that "Another issue is that goods declared in shipping documentation may not be

[32] https://www.maersk.com/news/articles/2022/02/24/russia-ukraine-situation-update
[33] https://www.maersk.com/news/articles/2022/03/02/novorossiysk-russia-emergency-risk-surcharge

specific enough to identify whether or not they are subject to Russia sanctions. Interviewees often referred to categories of common industrial equipment, such as ball bearings and pipes, some sizes or specifications of which are restricted, while others are not. They said this lack of granularity forces compliance to make a 'go/no-go' decision with high stakes for their customer relationships, based on limited information."[34]

Uncertainty about existing sanctions. These quotes reveal another possible interpretation of our results. The drop in trade in many non-sanctioned products from sanctioning countries could be driven by the uncertainty about the implementation of the already *existing* sanctions rather than the uncertainty about possible *future* sanctions (cf. Manova, Novy, Sampson, and Tang, 2026).

While some uncertainty in implementation was definitely present, we nonetheless view it as less likely to be the main driver of our results. Consistent with the quotes above, it was often hard to tell whether a particular product was sanctioned or not. In large part, this may have been caused by the fact that most products were included in the sanction lists based on their text descriptions rather than some unique and more objective identifiers. It is important to note that in our empirical approach, we do not compare products that match such text descriptions perfectly with those that match them only loosely. Instead, we compare the exact same products (at least as classified by customs authorities) being shipped from different countries. Since it is much easier to determine the country of shipment than exact product characteristics, we believe that our results are more informative about the risk of future rather than already existing sanctions.

Endogenous sorting of trade flows into being sanctioned. Next, one should expect that products were chosen endogenously to be sanctioned. In particular, it is possible that sanctioning authorities consulted private lobbyists from their own countries when deciding which products to include in the sanctions lists. Thus, within the set of non-sanctioned varieties of sanctioned products, policymakers may select for sanctioning those varieties that have already experienced a larger decline in trade for reasons unrelated to sanctions.

This way of selecting products for the sanctions lists may explain why our estimates of antici-

[34]Similarly, Kolyandr (2025) singles out intermediaries: "It's true that even unsanctioned Russian fishing and fertilizer companies face higher transaction costs — not every port will accept Russian cargoes, insurers are hard to find, and companies have to use intermediaries."

pation effects are larger than those of uncertainty effects. However, this mechanism cannot explain why we find negative uncertainty effects. That is, why exports of the same product from one country would decline after another country sanctions that product. Moreover, most anecdotal evidence emphasizes this selection issue for sanctions on Russian exports rather than imports.[35]

In addition, there are three reasons why we view this mechanism as less likely. First, while some firms relied heavily on imports from Russia (which could naturally give rise to lobbying on the import side), for most firms exports to Russia accounted for only a very small share of their overall sales. As a result, access to the Russian market was vital for only a very small number of firms.

Second, if a firm asked not to impose certain sanctions, it might have put a target on its back for policymakers in charge of enforcing the existing sanctions. Quite the opposite, the general attitudes of the time were such that firms were willing to do more than was legally required of them. In particular, many firms voluntarily withdrew from the Russian market as a form of "self-sanction," even though they could have stayed.

Third, if one country decided not to include certain products in its sanctions list, it would have to justify this decision to other countries within the sanctioning coalition. Accepting pressure from firms in the home country would have made it more difficult for these policymakers to insist on certain sacrifices from other countries.

Perceptions of consumers in Russia. Finally, to provide an independent confirmation of our preferred interpretation of the main results, we conducted an online poll during the summer of 2026 among 500 Russian consumers selected to be nationally representative on age, gender, and city size. Specifically, we asked them about their experiences at the key moment of our analysis – around May 2022.[36] Indeed, 61% of respondents expected the list of sanctioned products to expand in the future. This shows that at least Russian consumers were aware of the risk of future sanctions.

In line with this, 60% of respondents can recall at least some products that they *correctly*

[35]For example, the EU excluded a Russian titanium company from its 7th sanctions list after Airbus emphasized the potential damage to Europe's aviation industry (https://www.aerotime.aero/articles/31695-eu-drops-sanctions-on-titanium-supplier-in-russia-report). There are similar stories about Russian gas and oil.

[36]All results along with the list of questions are in Appendix B.

predicted would be sanctioned in the future. Importantly, 42% can also recall some products that they *incorrectly* predicted would be sanctioned later. That is, they expected some future sanctions that were never imposed. Taken together, these answers reveal that, if no one else, then at least a considerable share of Russian consumers were making decisions in the presence of substantial uncertainty about future sanctions. Moreover, about 70% of respondents reported paying less attention to possible future sanctions in 2023 relative to 2022. This pattern of waning attention could help explain why our estimated uncertainty effects tend to diminish over time.[37]

Curiously, despite expecting some future sanctions, 62% of respondents do not recall anyone who stocked up on products that could become sanctioned in the near future, and only 15% personally stocked up on some of the products. Thus, this consumer behavior is consistent with our estimated negative rather than positive anticipation effects. Given that, just a few years earlier, in 2014, many Russian consumers did stock up in anticipation of rising prices on imported goods after a sharp devaluation (Charnavoki, 2019), this behavior may appear surprising. It is important to remember, however, that there were multiple concurrent shocks. In particular, many consumers may have simply expected their future income to decline. Together with the overall increase in economic uncertainty, this would have increased precautionary savings, thereby reducing overall spending.

Finally, only 14% of respondents selected changing the policy of the Russian government as the main goal of sanctions. Similarly, only 8% mentioned the potential to stir public discontent as a possible criterion in choosing which products to sanction. Thus, at least within Russian consumers, few people appear to have interpreted future sanctions as a strategic threat that is conditional on following a specific behavior.

6 Conclusion

Most sanctions on Russia were imposed during the first two months of the conflict and had large effects on the economy, as we have shown in Egorov et al. (2026). In this paper, we have focused

[37] Previously, we conjectured that, over time, agents accumulate more information and become better at predicting future sanctions, causing the uncertainty effects to diminish. While waning attention to sanctions provides an alternative explanation for this pattern in our estimates, it also relies on uncertainty about future sanctions driving the observed effects. Moreover, since we surveyed only consumers, our original conjecture may still hold for firms and intermediaries.

on the minority of sanctions that followed after the first two months of the conflict. We have shown that this further escalation of sanctions significantly reduced Russian imports, but that the risk of sanctions appears to have played an even greater role than the actual sanctions themselves.

It is important to note, however, that our results are based on a unique and unprecedented event. As such, they are not necessarily representative of all future episodes of sanctions. In this particular event, the risk of sanctions significantly amplified the direct effects of sanctions. However, it is also possible that excessive uncertainty may weaken this channel, as uncertainty about sanctions that could take many different forms may provide little actionable information for firms and consumers. We leave the study of such nonlinearities in the effects of sanction risk for future research.

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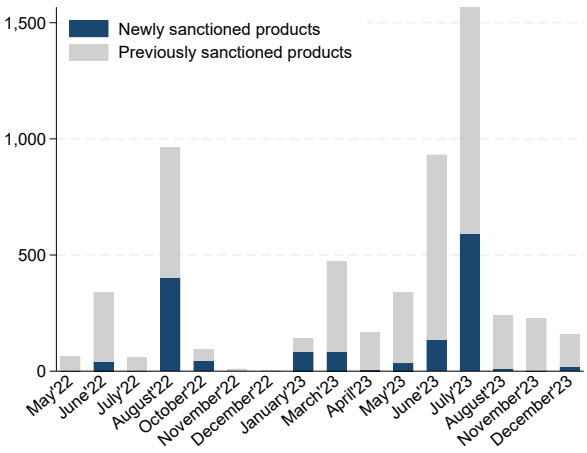
Appendix

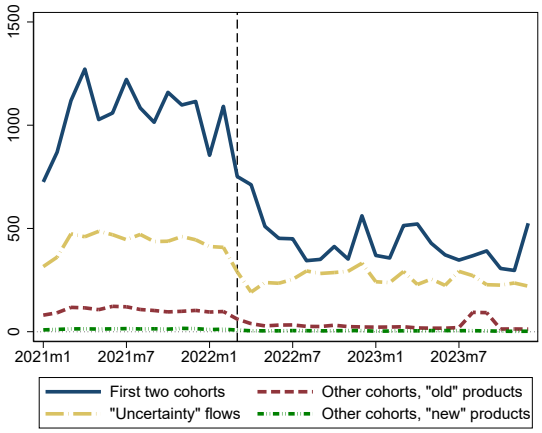
A Appendix Figures & Tables

Figure A.1: Cohorts of sanctions, their number of trade flows and total weight

Panel A: Number of sanctioned trade flows by cohort, since May 2022

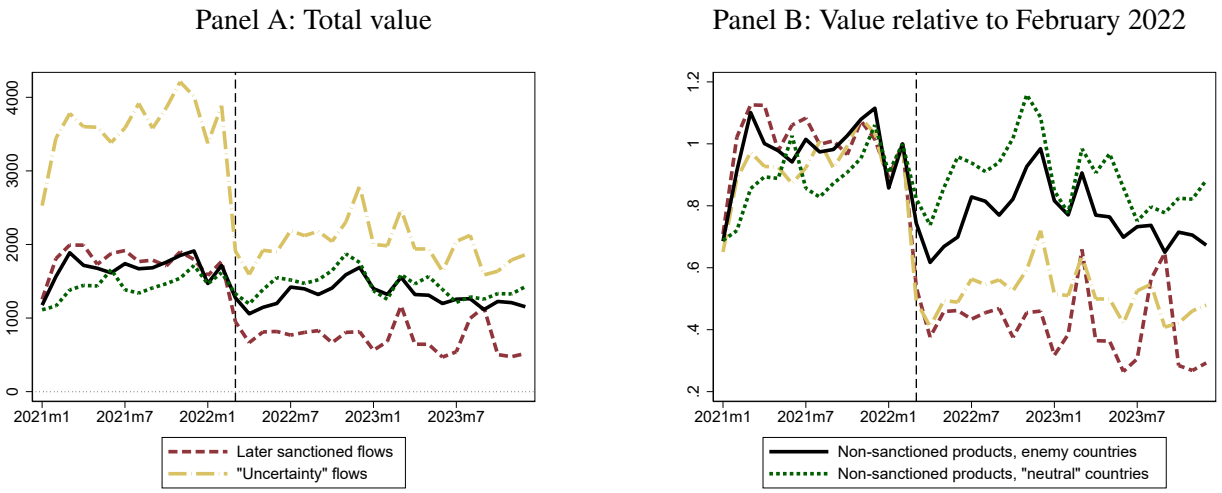


Panel B: Total weight of various trade flows



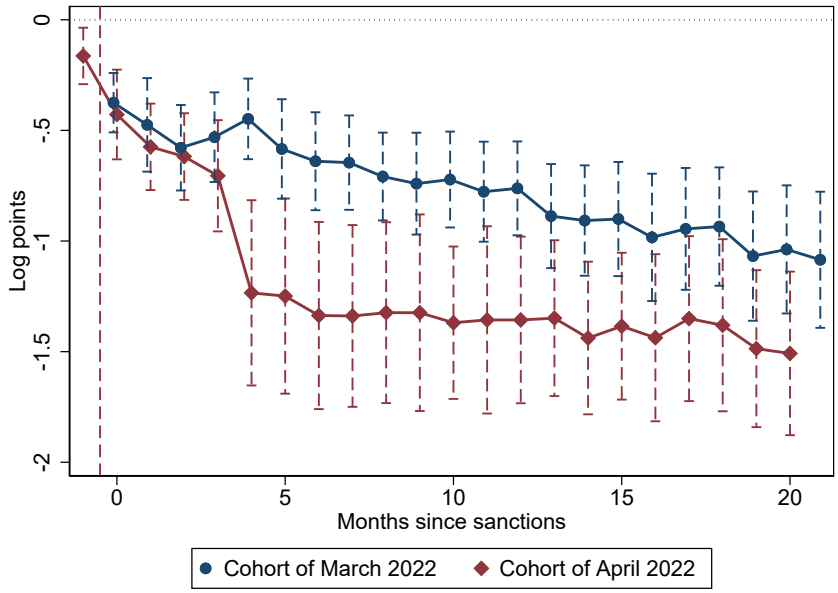
Notes: Panel A shows the total number of sanctioned country-product varieties in each month (cohort) after the first two. These trade flows are further separated into two groups: those with products previously sanctioned by any other country and those with products sanctioned for the first time in the current month.
Panel B plots the total value of 4 types of trade flows over time. First, the blue line shows the country-product varieties sanctioned in March and April 2022. Next, country-product varieties sanctioned after April 2022 are further divided into two groups: varieties of previously sanctioned products (the red line) and varieties of newly sanctioned products (the green line). The latter varieties belong to countries that have been among the first to sanction these products. These three lines together contain all varieties sanctioned during 2022 and 2023. In addition, we also plot the non-sanctioned imports from sanctioning countries for sanctioned products, that is, products sanctioned at least by one country by the end of 2023 ("uncertainty" flows, the yellow line). The composition of each group of varieties does not change over time. The vertical line marks the start of sanctions in March 2022.

Figure A.2: Various trade flows, raw data



Notes: This figure plots the value of various trade flows. The red line shows the country-product varieties sanctioned after April 2022. The yellow line plots the non-sanctioned imports from sanctioning countries for sanctioned products ("uncertainty" flows). The black line plots imports of products from sanctioning countries that were not sanctioned by any country. (Imports sanctioned in March and April 2022 are omitted from this Figure.) Similarly, the green line shows imports of non-sanctioned products from all countries except for sanctioning and friendly ones. Panel A plots the raw data in millions of USD, while Panel B normalizes each line by its value in February 2022. The vertical line marks the start of sanctions in March 2022.

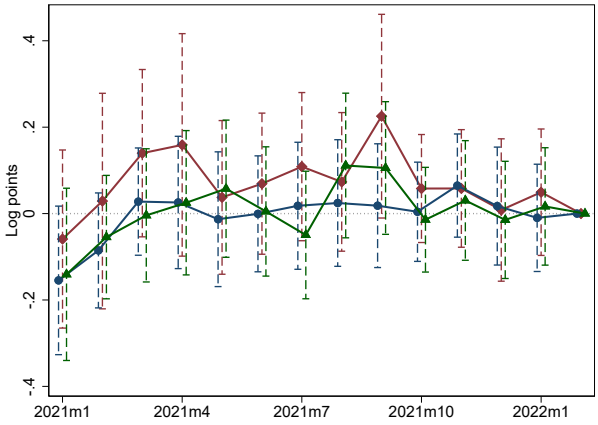
Figure A.3: The effects of sanctions and their anticipation, log of weight, the first two cohorts



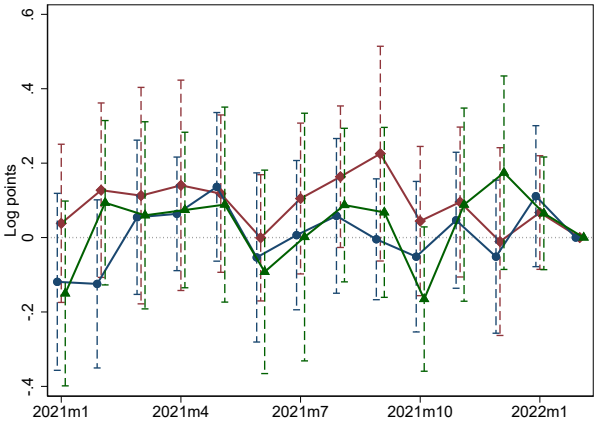
Notes: This figure presents the estimated anticipation and treatment effects for the sanctioned trade flows, β_{et}, from equation (2). Specifically, the figure plots the estimated β_{et} for the first two cohorts of sanctions. The x-axis shows the number of months before and after the trade flow falls under sanctions, where each coefficient is estimated relative to the pre-war months (which form the omitted category). We interpret coefficients to the left from the date of sanctions as anticipation effects and to the right as the direct effects of sanctions. The figure uses the total import net weight of a given product from a given country in a given month as an outcome. The logarithms add 1 to the argument's value to avoid missing values. The bars represent 95% confidence intervals. Standard errors are two-way clustered at the country and product levels.

Figure A.4: Pre-trends prior to the start of the conflict, log of weight

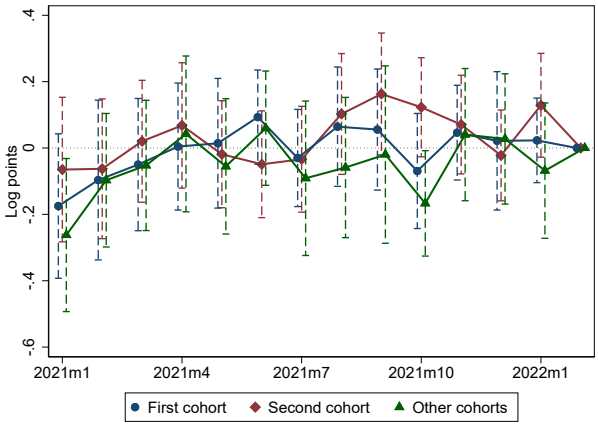
Panel A: Anticipation effects



Panel B: Rerouting effects



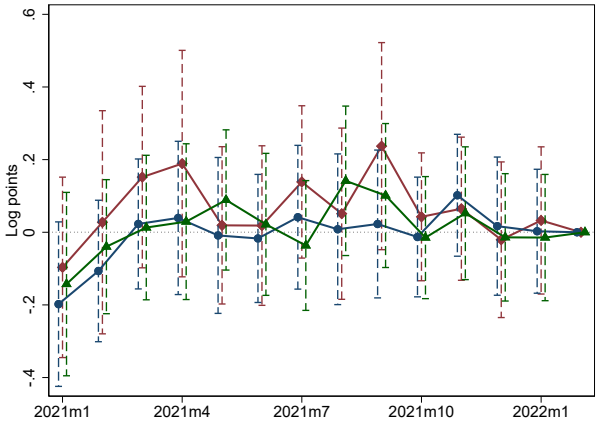
Panel C: Uncertainty effects



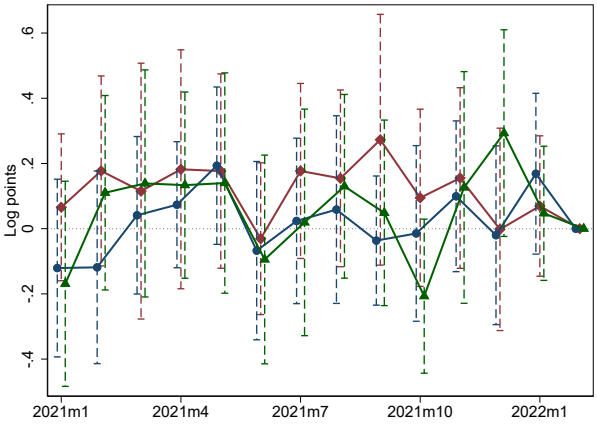
Notes: This figure presents the dynamic DiD estimates of equation (3), which assess the pre-trends in each cohort of each type of trade flows relative to the untreated trade flows prior to March 2022 (February 2022 serves as the baseline period). Panel A presents the results for sanctioned trade flows, Panel B – for imports of sanctioned products from friendly countries, and Panel C – for non-sanctioned imports of sanctioned products from sanctioning countries. In each panel, the first two lines show coefficients for the first two cohorts, while the last line shows the average for all of the remaining cohorts, weighted by the number of observations in each cohort. The figure uses the total import net weight of a given product from a given country in a given month as an outcome. The logarithms add 1 to the argument's value to avoid missing values. The bars represent 95% confidence intervals. Standard errors are two-way clustered at the country and product levels.

Figure A.5: Pre-trends prior to the start of the conflict, log of value

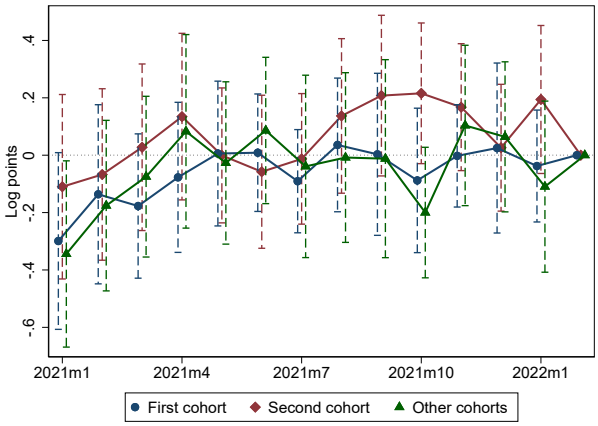
Panel A: Anticipation effects



Panel B: Rerouting effects



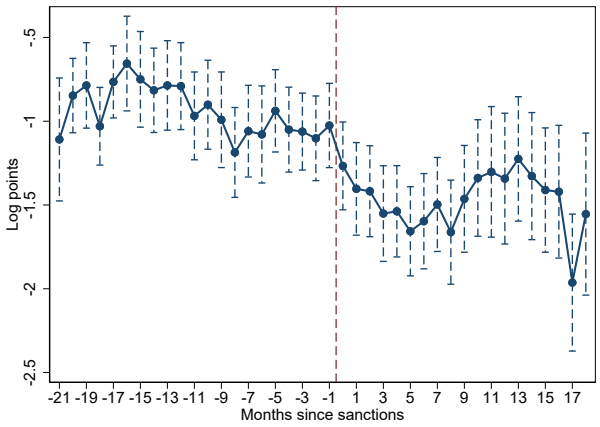
Panel C: Uncertainty effects



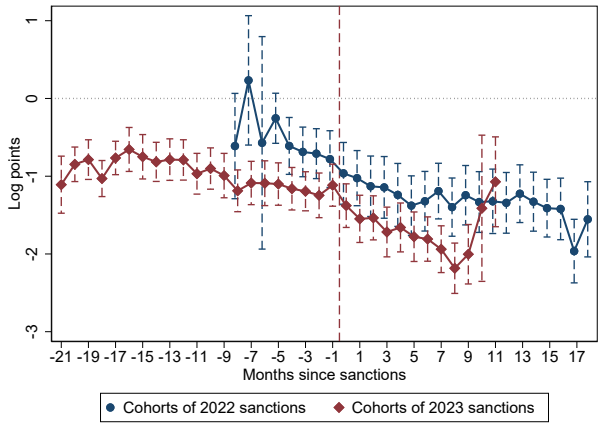
Notes: This figure presents the dynamic DiD estimates of equation (3), which assess the pre-trends in each cohort of each type of trade flows relative to the untreated trade flows prior to March 2022 (February 2022 serves as the baseline period). Panel A presents the results for sanctioned trade flows, Panel B – for imports of sanctioned products from friendly countries, and Panel C – for non-sanctioned imports of sanctioned products from sanctioning countries. In each panel, the first two lines show coefficients for the first two cohorts, while the last line shows the average for all of the remaining cohorts, weighted by the number of observations in each cohort. The figure uses the total import value of a given product from a given country in a given month as an outcome. The logarithms add 1 to the argument's value to avoid missing values. The bars represent 95% confidence intervals. Standard errors are two-way clustered at the country and product levels.

Figure A.6: Anticipation effects, log of value

Panel A: Sanctions and their anticipation effects



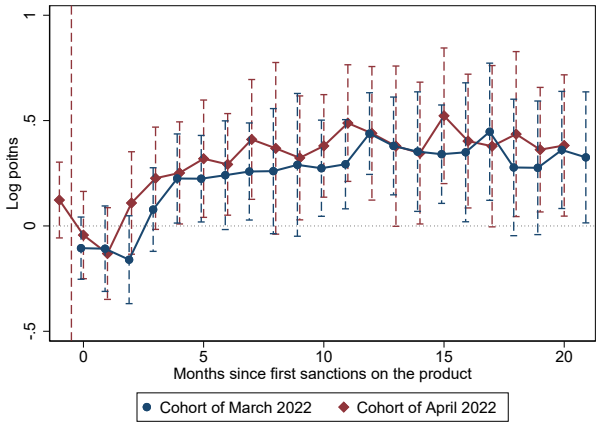
Panel B: Early vs late cohorts



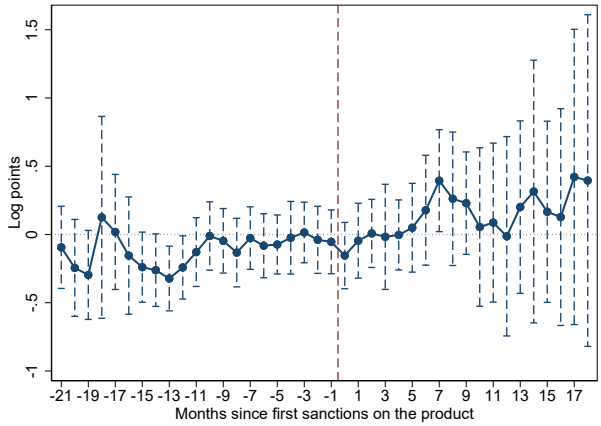
Notes: This figure presents the estimated anticipation and treatment effects for the sanctioned trade flows, β_{et}, from equation (2). Panel A plots the average of the estimated β_{et} for all the cohorts of sanctions e except the first two (each cohort is weighted by the number of its observations). In Panel B, the red line shows the average for all cohorts of sanctions in 2023, while the blue line shows the average for all sanctions imposed between May and December 2022. The x-axis shows the number of months before and after the trade flow falls under sanctions, where each coefficient is estimated relative to the pre-war months (which form the omitted category). We interpret coefficients to the left from the date of sanctions as anticipation effects and to the right as the direct effects of sanctions. The figure uses the total import value of a given product from a given country in a given month as an outcome. The logarithms add 1 to the argument's value to avoid missing values. The bars represent 95% confidence intervals. Standard errors are two-way clustered at the country and product levels.

Figure A.7: Rerouting effects, log of weight

Panel A: The first two cohorts



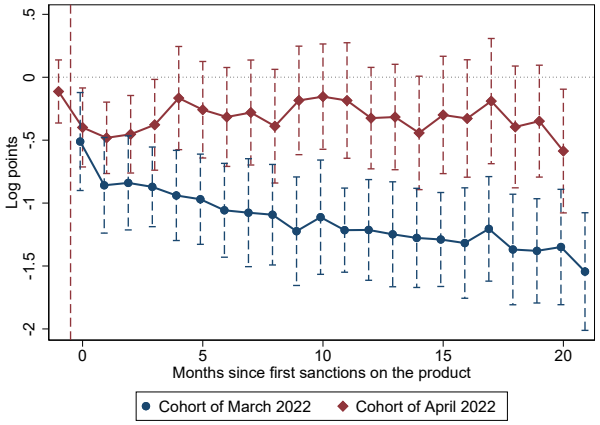
Panel B: The remaining cohorts



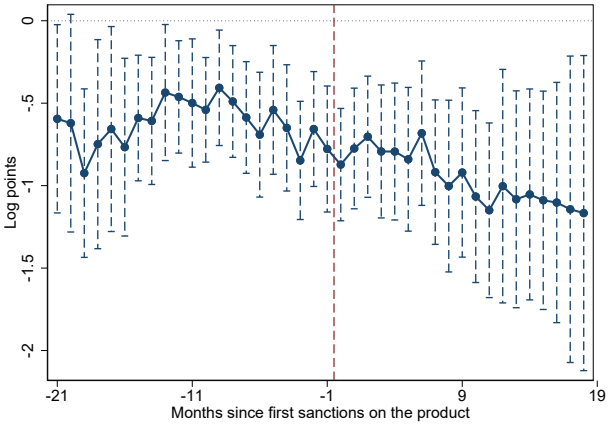
Notes: This figure presents the estimated rerouting effects for the import flows of sanctioned products from friendly countries, γ_{et}, from equation (2). Specifically, Panel A plots the estimated γ_{et} for the first two cohorts separately, while Panel B plots the average for the remaining cohorts, where each cohort e is weighted by the number of its observations. The x-axis shows the number of months before and after the first sanctions on a particular product, where each coefficient is estimated relative to the pre-war months (which form the omitted category). The last point estimate for 19 months after the start of sanctions is omitted. The figure uses the total import net weight of a given product from a given country in a given month as an outcome. The logarithms add 1 to the argument's value to avoid missing values. The bars represent 95% confidence intervals. Standard errors are two-way clustered at the country and product levels.

Figure A.8: Uncertainty effects, log of value

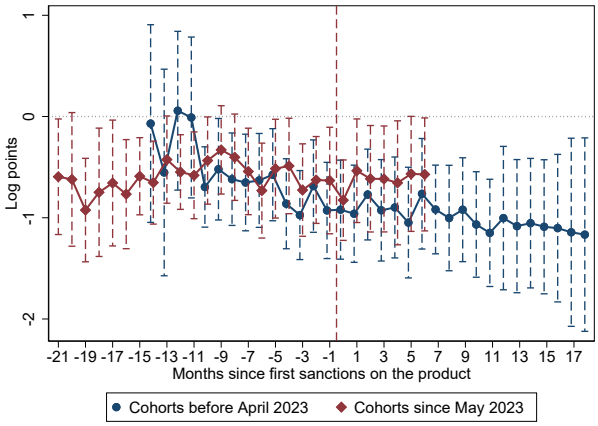
Panel A: The first two cohorts



Panel B: The remaining cohorts

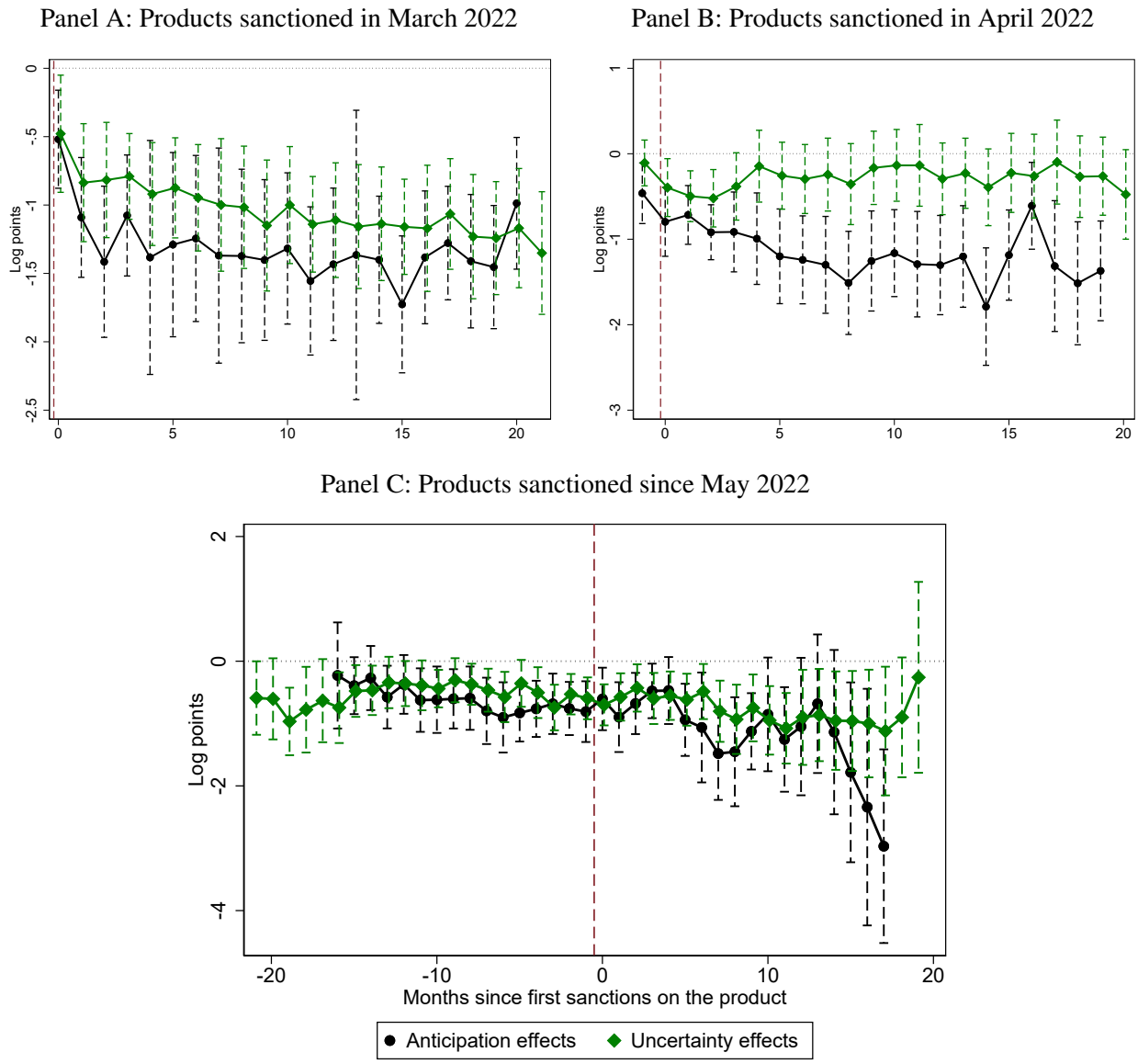


Panel C: Early vs late cohorts



Notes: This figure presents the estimated uncertainty effects, δ_{et}, from equation (2). Specifically, Panel A plots the estimated δ_{et} separately for the first two cohorts, while Panel B plots the average across the remaining cohorts, with each cohort e weighted by the number of observations. In Panel C, the red line shows the average for all cohorts of sanctions since May 2023, while the blue line shows the average for all sanctions imposed between May 2022 and April 2023. The x-axis shows the number of months before and after the first sanctions on a given product, with each coefficient estimated relative to the pre-war months, which form the omitted category. The last point estimate for 19 months after the start of sanctions is omitted. The figure uses the total import value of a given product from a given country in a given month as the outcome variable. We add one before taking logarithms to avoid missing values. The bars represent 95% confidence intervals. Standard errors are two-way clustered at the country and product levels.

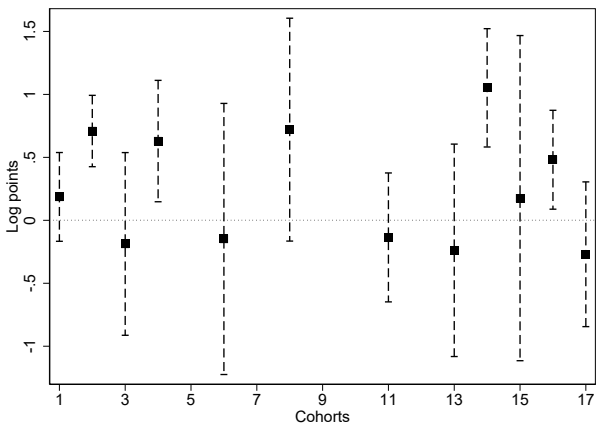
Figure A.9: Anticipation and uncertainty effects, log of value



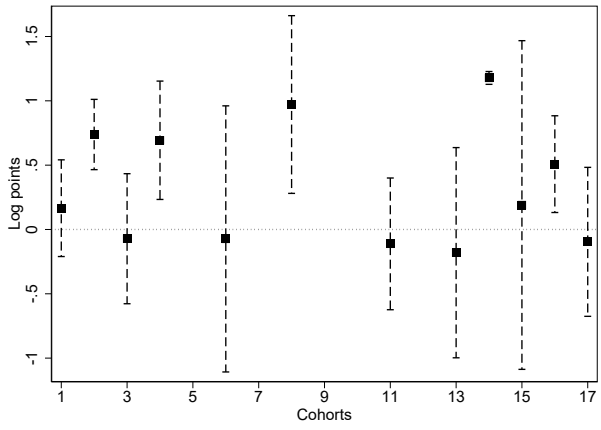
Notes: This figure presents the estimated anticipation and uncertainty effects, δ_{et}^{L} and δ_{et}^{N}, from equation (4). Specifically, Panels A and B plot the estimated estimated effects for the first and second cohorts respectively, while Panel C plots the average across the remaining cohorts, with each cohort e weighted by the number of observations. The x-axis shows the number of months before and after the first sanctions on a given product, with each coefficient estimated relative to the pre-war months, which form the omitted category. The figure uses the total import value of a given product from a given country in a given month as the outcome variable. We add one before taking logarithms to avoid missing values. The bars represent 95% confidence intervals. Standard errors are two-way clustered at the country and product levels. The estimation is based on 4,467,153 observations, covering 186 countries and 7,841 products.

Figure A.10: The difference between anticipation and uncertainty effects, by cohort, log of weight

Panel A: Single staggered DiD regression



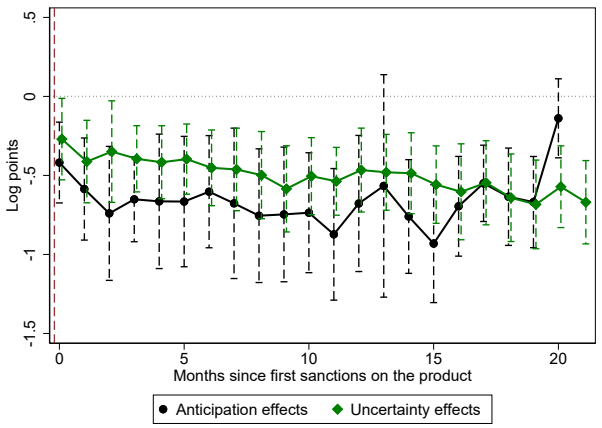
Panel B: Multiple non-staggered DiD regressions



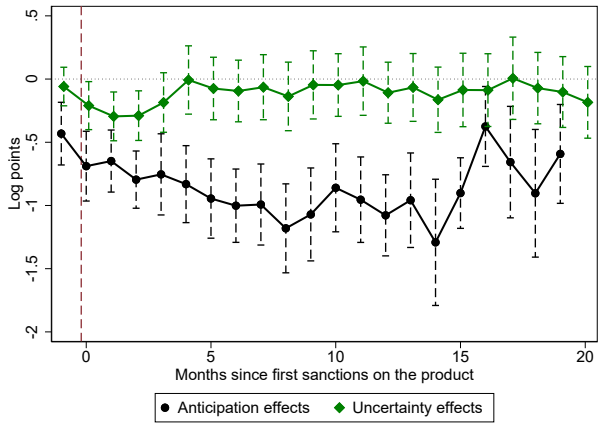
Notes: This figure presents the estimated difference between anticipation and uncertainty effects. Panel A is based on equation (4), while Panel B is based on estimating multiple non-staggered DiD regressions (5). For each cohort e, the difference is calculated as $\delta_{et}^{N} - \delta_{et}^{L}$, averaged over all time periods, where each time t is weighted by the number of underlying observations. The x-axis shows the cohort of first sanctions on a product. The figure uses the total import net weight of a given product from a given country in a given month as an outcome. The logarithms add 1 to the argument's value to avoid missing values. The bars represent 95% confidence intervals. Standard errors are two-way clustered at the country and product levels.

Figure A.11: Anticipation and uncertainty effects, non-staggered DiD regressions, log of weight

Panel A: Products sanctioned in March 2022

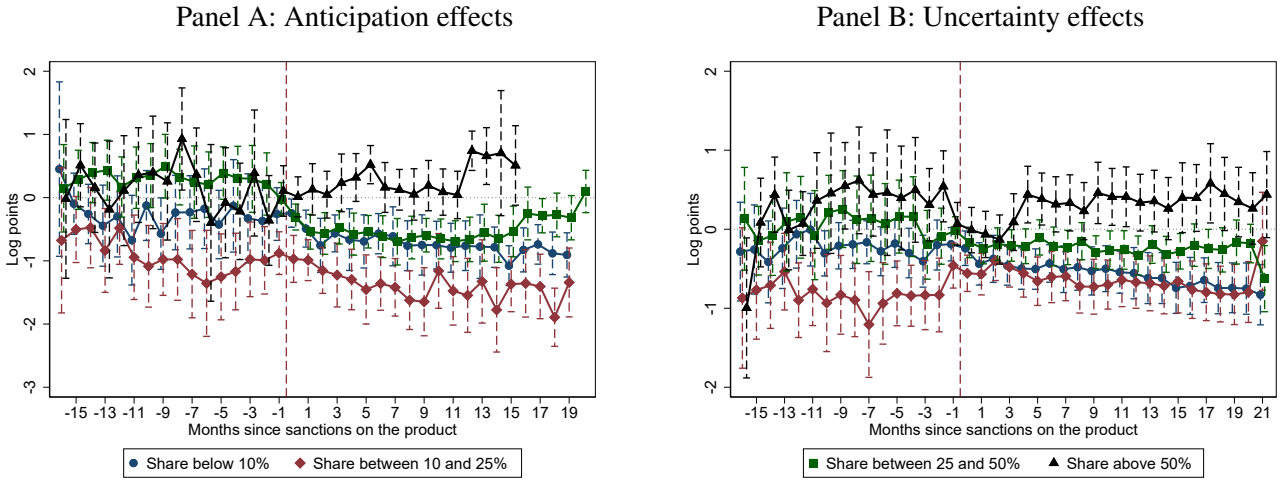


Panel B: Products sanctioned in April 2022



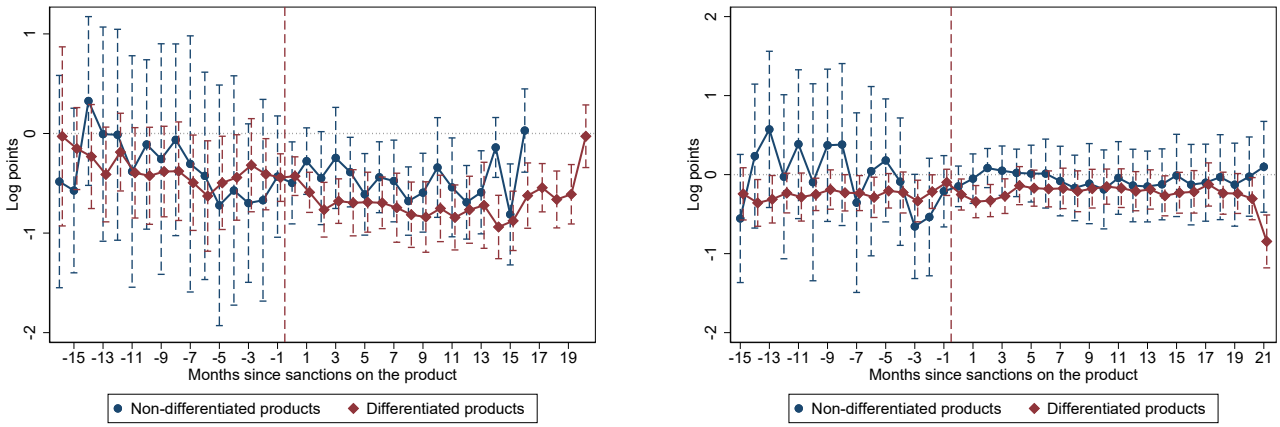
Notes: This figure presents the estimated anticipation and uncertainty effects, δ_{et}^{L} and δ_{et}^{N}, from two separate non-staggered DiD regressions (5). Panels A and B plot the estimated effects for the first and second cohorts, respectively. The x-axis shows the number of months before and after the first sanctions on a given product, with each coefficient estimated relative to the pre-war months, which form the omitted category. The figure uses the total import net weight of a given product from a given country in a given month as the outcome variable. We add one before taking logarithms to avoid missing values. The bars represent 95% confidence intervals. Standard errors are two-way clustered at the country and product levels.

Figure A.12: Anticipation and uncertainty effects, by share of final consumption, log of weight



Notes: This figure estimates the heterogeneity of the anticipation and uncertainty effects with respect to the product-level share of final consumption in total imports (measured based on 2021 data). The smaller this share, the higher is the share of imported intermediate goods within a product. We use this share to divide all products into four groups and estimate equation (6). Panels A and B plot the estimated anticipation and uncertainty effects, respectively. Different lines plot the estimated effects for products with different share of final consumption. Each line plots the averages across all cohorts, with each cohort weighted by the number of observations. The x-axis shows the number of months before and after the first sanctions on a given product, with each coefficient estimated relative to the pre-war months, which form the omitted category. The figure uses the total import net weight of a given product from a given country in a given month as the outcome variable. We add one before taking logarithms to avoid missing values. The bars represent 95% confidence intervals. Standard errors are two-way clustered at the country and product levels. The estimation is based on 4,449,457 observations, covering 186 countries and 7,705 products.

Figure A.13: Anticipation and uncertainty effects, by product differentiation, log of weight

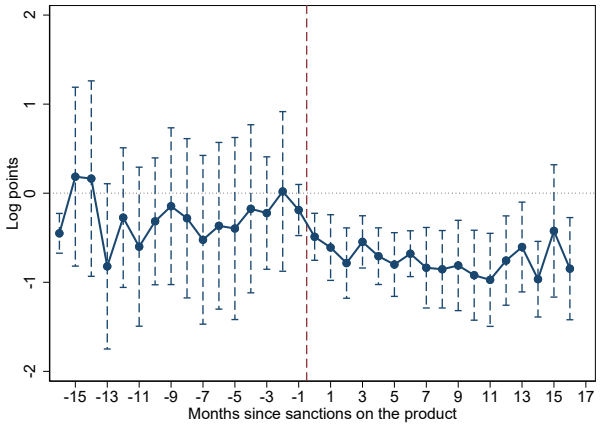


Notes: This figure estimates the heterogeneity of the anticipation and uncertainty effects with respect to differentiated and non-differentiated products based on equation (6). Panels A and B plot the estimated anticipation and uncertainty effects respectively. The blue (red) lines plot the effects for the non-differentiated (differentiated) products. Each line plots the averages across all cohorts, with each cohort weighted by the number of observations. The x-axis shows the number of months before and after the first sanctions on a given product, with each coefficient estimated relative to the pre-war months, which form the omitted category. The figure uses the total import net weight of a given product from a given country in a given month as the outcome variable. We add one before taking logarithms to avoid missing values. The bars represent 95% confidence intervals. Standard errors are two-way clustered at the country and product levels. The estimation is based on 4,317,898 observations, covering 186 countries and 7,580 products.

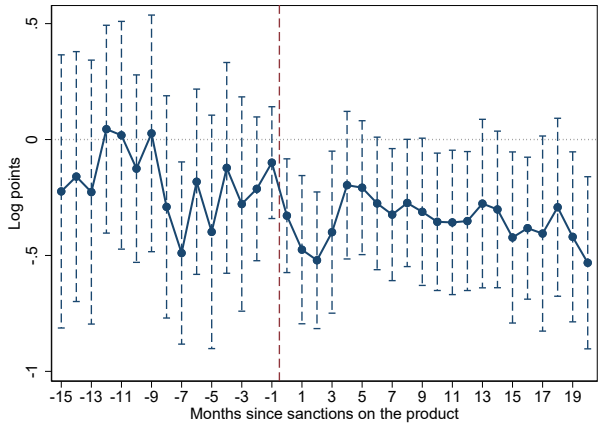
Figure A.14: Anticipation and uncertainty effects, intensive vs extensive margins, log of weight

Intensive margin

Panel A: Anticipation effects

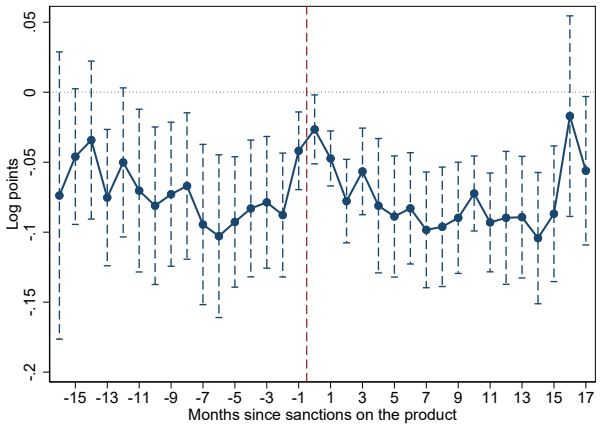


Panel B: Uncertainty effects

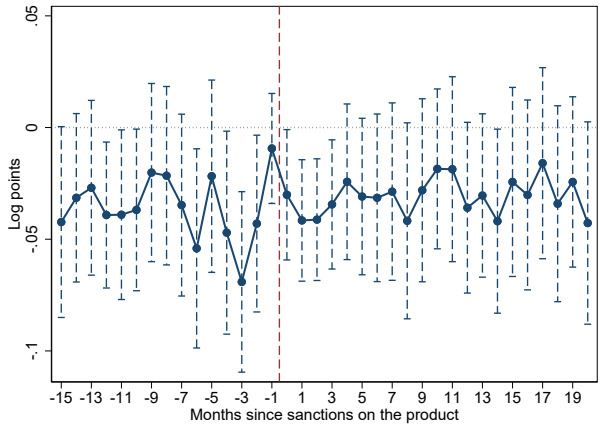


Extensive margin

Panel C: Anticipation effects

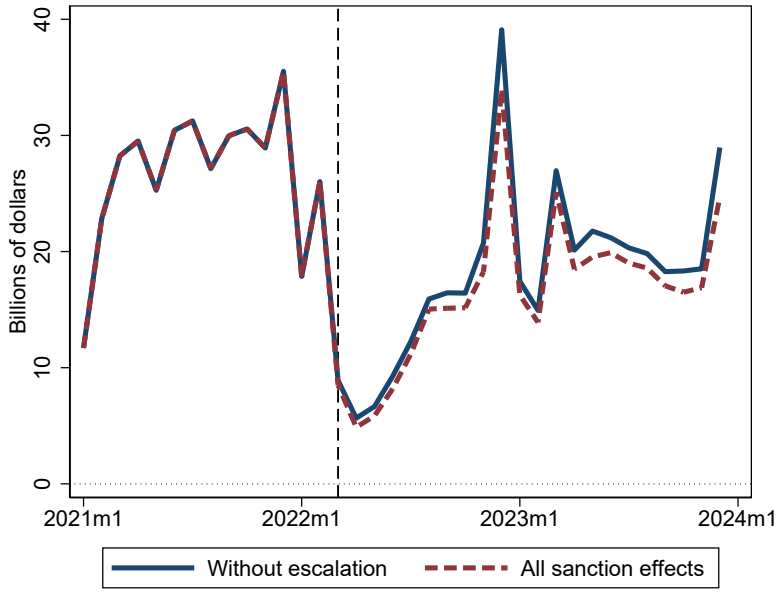


Panel D: Uncertainty effects



Notes: This figure estimates the anticipation and uncertainty effects from equation (4) separately for the intensive and extensive margins. Specifically, Panels A and B replace the dependent variable in equation (4) with log of weight, thereby excluding all observations with zero trade flows. In turn, Panels C and D replace the dependent variable with a dummy variable for positive trade flows. Panels A and C plot the estimated anticipation effects, while Panels B and D plot the estimated uncertainty effects. Each line plots the averages across all cohorts, with each cohort weighted by the number of observations. The x-axis shows the number of months before and after the first sanctions on a given product, with each coefficient estimated relative to the pre-war months, which form the omitted category. The bars represent 95% confidence intervals. Standard errors are two-way clustered at the country and product levels. The intensive (extensive) margin estimation is based on 1,213,405 (4,467,153) observations, covering 150 (186) countries and 6,035 (7,841) products.

Figure A.15: Counterfactual aggregate Russian imports



Notes: This figure shows two counterfactual paths of aggregate Russian imports calculated in Section 5.2. The red line shows the aggregate predicted values in the presence of all sanction effects, while the blue line shows the counterfactual with no escalation of trade sanctions after April 2022. This escalation includes all cohorts of sanctions after April 2022, rerouting effects, anticipation and uncertainty effects.

Table A.1: The Average Estimates for Various Effects of Sanctions

	(1)	(2)	(3)	(4)	(5)	(6)
	Sanction effects β_{et}		Rerouting effects γ_{et}		Uncertainty effects δ_{et}	
	Before sanctions	After sanctions	Before 1st sanctions	After 1st sanctions	Before 1st sanctions	After 1st sanctions
Estimates for weight	-0.614***	-0.811***	-0.097	0.063	-0.291***	-0.350***
	(0.064)	(0.079)	(0.087)	(0.164)	(0.099)	(0.111)
Estimates for value	-0.989***	-1.434***	-0.072	0.179	-0.607***	-0.867***
	(0.108)	(0.126)	(0.125)	(0.271)	(0.144)	(0.183)

Notes: This table reports average estimates from regression (2). Specifically, the estimates are averaged over all time periods and over all cohorts except the first two, with each estimate weighted by the number of underlying observations. Columns (1), (3), and (5) report averages for periods before the event ($t < e$), while columns (2), (4), and (6) report averages for periods after the event ($t \geq e$). The event is defined as the imposition of sanctions on a trade flow, E_{gc}, in columns (1)–(2), and as the first sanctions on a product, E_g^{first}, in columns (3)–(6). The outcome variable is the logarithm of the total import weight (value) of a given product from a given country in a given month in the first (second) row of the table. We add one before taking logarithms to avoid missing values. Standard errors, reported in parentheses, are two-way clustered at the country and product levels. The estimation is based on 6,840,972 observations, covering 186 countries and 8,586 products. * p<0.1, ** p<0.05, *** p<0.01.

Table A.2: Change in Total Russian Imports due to Escalation of Sanctions after April 2022, estimated on the intensive margin of trade only

Change due to...	Value, bln USD	Weight, bln kg
anticipation of sanctions	-2.49	-0.17
sanctions themselves	-4.01	-0.11
anticipation of rerouting	-0.44	-0.08
rerouting itself	-0.38	-0.20
uncertainty in sanctions	-14.56	-2.32
All effects combined	-21.87	-2.88

Notes: This table aggregates the reduced-form estimates to calculate their implications for the aggregate Russian imports over the period of March 2022 - December 2023. The two columns are based on the estimates from equation (2), where the dependent variable y_{gct} is the value and weight, respectively. All observations with zero value or weight were dropped from the estimation. The last line shows the change in Russian imports due to the presence of all effects together, while the other lines break down this total effect into five separate sources: $\hat{\beta}_{et}$ $t < e$, $\hat{\beta}_{et}$ $t \geq e$, $\hat{\gamma}_{et}$ $t < e$, $\hat{\gamma}_{et}$ $t \geq e$, and $\hat{\delta}_{et}$ $\forall t$ from (2). The calculation of the first four effects is made for all cohorts of sanctions after the first two.

B Poll questions and results

Fielded in Russian. Response frequencies in parentheses. The sample size is 500. Respondents are balanced by age, sex, and city size to be representative of the Russian population.

1. After the first wave of sanctions — that is, around May 2022 — did you expect that the list of goods banned from import into the Russian Federation would continue to be extended?

   (a) Yes (61%)

   (b) No (19%)

   (c) Don't know/recall (19%)

2. How many goods were there for which you expected future difficulty in purchasing due to possible sanctions, where your fears were subsequently confirmed?

   (a) Many (20%)

   (b) I remember only a few examples (40%)

   (c) There were none (24%)

   (d) Don't know/recall (16%)

3. How many goods were there for which you expected future difficulty in purchasing due to possible sanctions, but which, as far as you know, never came under sanctions?

   (a) Many (12%)

   (b) I remember only a few examples (30%)

   (c) There were none (30%)

   (d) Don't know/recall (28%)

4. In 2022, did you or your acquaintances try to buy up, in advance, goods that might soon disappear from sale or sharply rise in price because of future sanctions?

   (a) Yes, both I and my acquaintances (13%)

   (b) Only I (2%)

   (c) Only my acquaintances (16%)

   (d) I recall no one who did (62%)

   (e) Don't know/recall (7%)

5. Did your interest in possible future sanctions change in 2023 relative to 2022?

   (a) Followed even more actively (5%)

   (b) As actively as in 2022 (12%)

   (c) Less actively (18%)

(d) Stopped following (52%)

(e) Don't know/recall (13%)

6. What, in your view, was the main goal of the "unfriendly" countries when introducing new sanctions?

   (a) Change the policy of the Russian government (14%)

   (b) Damage Russia's military potential (5%)

   (c) Damage Russia's economic potential (51%)

   (d) Express disagreement with Russia's actions (14%)

   (e) Own answer (3%)

   (f) Don't know/recall (14%)

7. Name up to three reasons for how, in your opinion, the "unfriendly" countries chose the goods they placed on their sanctions lists. (Open-ended, below most popular answers)

   (a) Don't know (31%)

   (b) Popular / high-demand consumer goods (22%)

   (c) Goal: damage the economy (14%)

   (d) Goods Russia cannot produce itself (14%)

   (e) Energy / raw-material exports, state revenue (12%)

   (f) High-tech goods, technology denial (9%)

   (g) Goal: political pressure / end the war (8%)

   (h) Dual-use / military-relevant goods (8%)

   (i) Goal: stir public discontent (8%)