Hostile Decoupling and Geoeconomics of Multinationals*

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Abstract

Multinational enterprises (MNEs) are known to bring advanced technologies to host economies, but can they also deliberately withdraw them during geopolitical conflict? I study this question in the context of the hostile decoupling of Western MNEs from Russia since 2022. These firms typically left behind their entire operations, including production facilities, equipment, and trained local staff and managers. At the same time, Russia legalized the unauthorized use of their technologies, placing the new local owners in a perfect position to continue producing the MNEs' products and services. However, I find that new local owners failed to do so, as evidenced by a significant change in their input and output composition relative to MNEs that remained under foreign management. This failure appears to be driven by missing core inputs previously supplied internally by foreign affiliates of the same MNE. These inputs were the only ones that proved difficult to substitute after the decoupling.

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1 Introduction

The international trade and investment are fragmenting along geopolitical lines, with a decline in trade between the US- and China-centered blocs relative to trade within these blocs (Gopinath et al., 2025). Since most developed countries belong to the same bloc as the US, a major comparative advantage of this bloc is access to more advanced technologies. At the same time, one of the key drivers of economic growth for developing countries within the China-led bloc is that they do not need to develop new technologies themselves. Instead, they can just catch up with technological leaders by adopting already developed improvements (Verhoogen, 2023).

According to theory, in the case of geopolitical escalation, one of the most impactful threats the US-led bloc can make is to withdraw the other bloc's access to its technology (Clayton et al., 2026). Yet little is currently known about whether such withdrawal can be achieved in practice. If not, the China-led bloc could continue using already copied technologies without paying for them. In that case, the US-led bloc would lose from carrying out its own threat. In this paper, I exploit the unique severing of economic linkages between Russia and most developed countries to estimate whether foreign technologies in Russia were preserved after this hostile decoupling.

Multinational enterprises (MNEs) are at the heart of this question. It is largely through them that technologies are transferred across countries (see Javorcik, 2004; Bloom et al., 2012; Guadalupe et al., 2012; Cravino and Levchenko, 2017; Alfaro-Urena et al., 2022, among others). In addition, they conduct the bulk of R&D activities[1], and their affiliates can account for a large share of host economies[2]. Moreover, MNE technologies are arguably the easiest to "steal" during a hostile decoupling. These long-established firms entered local economies years ago, installing their own equipment, training staff and management, and building relationships with key suppliers and customers in the region. When foreign headquarters withdraw, these factors of production remain, allowing new local owners to continue using them as before. This is far easier than copying a technology from a firm that has never moved its production to a local economy.

Usually, the new owners of former multinational affiliates are legally forbidden to continue using MNE technologies without paying for them, even if the equipment, staff, and other resources left behind make this technically feasible. In the event of geopolitical escalation, however, this is no longer true. Severing most economic linkages removes the local economy's incentive to protect the foreign headquarters' intellectual property. Bluntly put, the worst economic threats have already been carried out, leaving little room for further retaliation by foreign countries. Crucially, this key feature of geopolitical conflict makes the hostile decoupling of MNEs fundamentally different from their exit under normal circumstances. This is why previous studies – conducted in contexts where

[1]While domestic US firms have only 3% of their employment in knowledge-intensive activities, the share of US multinationals ranges from 10 to 19% (Fort, 2023).

[2]They account for more than a quarter of the total employment and at least 40% of total sales in such diverse host countries as the Netherlands, Poland, and Sweden (Antràs and Yeaple, 2014).

international law is enforced – hardly offer any guidance on the effectiveness of such technology withdrawal.

In contrast, the decoupling of Western MNEs from Russia since 2022 provides the first opportunity to study this question in precisely the same context that is likely to recur in future geopolitical conflicts. Already in the first month of its invasion of Ukraine, the Russian government legalized the unauthorized use of Western technologies.[3] In line with this, many of the new local owners of former multinational affiliates have claimed that they continued producing exactly the same products and services as before but now without paying any royaltees abroad.[4]

Instead of just estimating changes in productivity, in this paper, I focus on more fundamental and important changes in technology. Namely, I estimate whether former multinational affiliates retained their ability to produce the same products and services as under foreign management. After all, it is much worse for a local economy to have to downgrade quality or lose access to some products entirely than to face a cost increase for existing products.

To capture a variety of changes in a firm's output, I analyze changes in its key inputs. To provide a simple example, if the former McDonald's in Russia continued to buy exactly the same fryers and potatoes as before, then it was likely using the same recipes and producing the same products. If, in contrast, the former McDonald's acquired air fryers instead of countertop deep fryers or replaced white potatoes with Russet ones (let alone switched to rice), then it likely used different recipes, which may have involved changes in quality or even the production of entirely different products. Thus, by focusing on input composition, I am able to detect meaningful changes in output (including its quality) even when product labels remain unchanged.

To construct the list of a firm's key inputs, I use Russian customs records. These records contain detailed 10-digit product codes for all international transactions. In fact, prior to 2022, an average multinational affiliate in Russia imported 178 distinct products, while some multinationals imported many thousands. The richness of these product descriptions allows me to estimate changes in the use of key inputs with high accuracy. Moreover, I focus only on multinational firms in this paper. They are well known to rely so heavily on imported inputs that MNEs account for most of international trade (see Antràs and Yeaple, 2014; Conconi et al., 2022). Finally, in the event of geopolitical conflict, it is foreign rather than domestic inputs that face the highest risk of being irrevocably lost to the local economy.

Further, to ensure that I analyze only those inputs that are truly essential for maintaining a firm's main business, I focus on so-called *core* products, defined as products imported each year

[3]Government decree No. 299 allowed the use of patents from sanctioning countries with zero compensation to the patents' owners. In addition, federal law No. 46 allowed imports of products without the permission of the trademark owner or official distributor.

[4]Perhaps the most famous example is McDonald's, where the same restaurants with the same menus and staff have reopened already in June 2022 (see Astrasheuskaya, "Russians get first taste of rebranded McDonald's", Financial Times). Similarly, here a new manager of former Danone's assets in Russia implied that only the names of the products and not their content were changed after Danone had left.

for several consecutive years. Turns out, these are only 40% of all imported products, but they account for 90% of total import value, confirming their key role. I combine this information with hand-collected dates of sales for each MNE that left the Russian market to implement a staggered difference-in-differences (DiD) methodology. Specifically, I compare the sets of core products used by former multinational affiliates under new ownership with those of affiliates that remained under foreign control.

My central finding is that former multinational affiliates substantially changed their business under the new local owners, as they imported significantly fewer core products. In particular, they stopped importing some entirely and reduced purchases of others. Moreover, I demonstrate that the missing core products could not have been fully substituted with domestic alternatives. At the same time, the decline in core inputs was accompanied by the emergence of *new* inputs – products not imported under previous MNE ownership. This indicates changes in output composition, rather than a mere reduction in quantity. I confirm this pattern using a subsample of exporters, for which detailed data on both output and input composition are available. New local owners of former multinationals produced fewer core products – those consistently produced under the previous MNE – and replaced them with products they had never produced before.[5]

I argue that my central finding is not driven by two potential sources of endogeneity in MNEs' decisions to exit Russia. First, the exiting MNEs were neither slower-growing nor less profitable than other MNEs, and there were no pre-trends in the use of core inputs before 2022. Thus, it is unlikely that these MNEs would have exited or reduced their core business in the absence of geopolitical conflict. Second, the exiting MNEs were not more vulnerable to general trade disruptions after 2022. Both treatment and control groups had similar exposure to trade with developed countries and China, and my main results do not change on a subsample of MNEs equally exposed to trade sanctions. There is also evidence of high local demand for the products of exiting MNEs, which is inconsistent with a Russian consumer boycott driving the estimated changes. Perhaps most importantly, exiting MNEs were not generally more vulnerable to large, uncertain shocks. On the contrary, they were more resilient during the onset of the Covid-19 pandemic in 2020. Therefore, it is unlikely that their local business in Russia would have been disproportionately disrupted after 2022, even without their decision to withdraw.

Lastly, I uncover the likely mechanism through which foreign headquarters prevented the unauthorized use of their technologies. By examining the names of foreign suppliers of imported core products, I can identify which transactions were conducted *in-house*, that is, between affiliates of the same MNE. If the supplier's name contains the MNE's short name, I classify it as an affiliate.

[5]Of course, a change in product code may happen between two fairly similar or very different codes. I leave this distinction to future research and instead focus on detecting all such changes. Note, however, that only sufficiently large changes in products result in a switch of 10-digit product codes. For example, all fully automatic front-loading washing machines with a total load of up to 6 kg fall under a single 10-digit code, as do all microprocessors produced with technology of no more than 32 nanometers.

For example, "samsung poland r&d" is treated as part of the global Samsung organization, while "panasonic industrial devices sales asia" is treated as part of the global Panasonic.

Before 2022, there was a substantial variation within each MNE: some imported core products were supplied exclusively in-house, while others came entirely from unrelated firms. I find a strong pattern: the higher a product's in-house share, the greater its decline in imports after transfer to new local owners. Strikingly, products with virtually no in-house involvement – those supplied almost entirely by external firms – fully recovered, showing no decline. Remarkably, only core products declined in imports, while non-core products fully recovered. And within core products, only those supplied in-house experienced a persistent decline. This suggests that the in-house share is not just one factor among many, but the key determinant of the observed gap in total imports.

The intuition behind this mechanism is straightforward. The decoupling of Western MNEs from Russia occurred in a highly hostile context: MNEs were often forced to sell their business at very low prices and stopped receiving payments for their technology. As a result, foreign headquarters had strong incentives to deny former affiliates the key inputs they controlled, particularly those supplied in-house. Crucially, my findings reveal that these inputs were the only ones that the new owners could not substitute. This may reflect the high degree of customization and specificity of these inputs or simply the proprietary know-how of foreign headquarters that they kept in-house to prevent leakage to competitors. One way or another, it was through these in-house core inputs that MNEs effectively prevented new Russian owners from operating the same business as before.

Literature. This paper contributes to several strands of the literature. First, the rapidly growing geoeconomics literature has developed theories of economic tools used to achieve geopolitical goals (e.g., Clayton et al., 2026; Broner et al., 2025; Thoenig, 2024). It has also estimated the reduced-form effects of trade sanctions (e.g., Egorov et al., 2025a; Babina et al., 2023; Chupilkin et al., 2023), which are among the most widely used geoeconomic tools, as well as the effects of geoeconomic threats (Egorov et al., 2026). To predict the effects of trade fragmentation, this literature has typically relied on quantitative models (e.g., Alvarez et al., 2023; Attinasi et al., 2025; Baqaee et al., 2024; Javorcik et al., 2024). However, to date, there are no reliable empirical estimates of the extent to which developing countries can "free-ride" on the major comparative advantage of developed countries in the event of geopolitical conflict. This paper provides the first empirical evidence on the limited ability of host economies to retain foreign technologies following hostile decoupling from foreign MNEs.[6]

Second, there is a large literature on multinational firms. Among other things, it examines

[6] Chupilkin et al. (2024) find that brands belonging to exiting MNEs continue to be imported to Russia through neutral countries. In contrast, I show that this is not the case for products used as inputs by former multinationals, resulting in changes to their technology.

how MNEs bring better technologies not only to their affiliates (e.g., Guadalupe et al., 2012; Cravino and Levchenko, 2017) but also to other local firms in host countries (e.g., Javorcik, 2004; Alfaro-Urena et al., 2022). Some studies have also highlighted the role of foreign headquarters in this process (e.g., Bloom et al., 2012; Guillouet et al., 2024). I complement this literature by showing that headquarters can not only facilitate the transfer of technologies across countries but also unilaterally restrict it, even when they are no longer protected by international law.

In addition, some studies have emphasized the role of hard-to-substitute inputs. Boehm et al. (2019) study the trade disruption between Japanese headquarters and their affiliates caused by the 2011 Tohoku earthquake. They show that a decline in imports from headquarters led to a one-for-one decline in affiliate output in the US. I complement this result by showing how headquarters can implement such a decline deliberately, rather than as a consequence of a natural disaster. Moreover, Nunn (2007) uses the product classification of Rauch (1999) to identify inputs that are highly specific to certain relationships, while Martin et al. (2025) develop a similar measure based on the duration of firm-to-firm relationships. I add to this literature by showing that the in-house share of shipments can be used instead. This measure can be constructed using firm names alone, and it strongly predicts which products are hardest to substitute in the event of a disruption.

Lastly, part of the literature has analyzed the incentives of MNEs to integrate their suppliers (e.g., Antràs, 2003; Antras and Helpman, 2004; Antràs and Chor, 2013; Alfaro et al., 2019). I contribute to this literature by providing empirical evidence on the extent of the additional control that vertical integration provides. In particular, I show that once institutional protection of intellectual property is removed, only a high share of intrafirm trade allows MNEs to prevent their technologies from being effectively "stolen" by their de facto competitors.

The paper is organized as follows. Section 2 describes the data and provides some preliminary analysis, including general background and methodology (Section 2.2), as well as a discussion of selection bias and identification (Section 2.3). All results are presented in Section 3. The central finding on the decline in imported core products is presented in Section 3.1. Section 3.2 provides additional evidence on the decline in total revenue for affected firms, their switch to new imported products, and changes in the structure of output for the subsample of exporters. In Section 3.3, I show that the sharp decline in in-house shipments is the likely driver of the main results. Section 3.4 uses nearest-neighbor matching to construct a sample of treated and control firms that are equally exposed to trade sanctions, along with several additional robustness checks. Section 4 concludes.

2 Data and Preliminary Analysis

In this section, I describe the data that I collect, clean, merge, and use. After that, I provide an overall background for the sale of former affiliates of MNEs in Russia, including the balance tests

between MNEs that stayed and those that exited. I also present some preliminary results that justify my empirical approach.

2.1 Data

Sale dates for foreign firms. I start with the list of the foreign-owned firms in Russia from Mylovanov et al. (2023). It contains the unique tax numbers of the largest foreign-owned legal entities registered in Russia, along with the names of their parent MNEs and the same exit status as in Sonnenfeld et al. (2022). It consists of just 3 categories: "stay", "leave", and "exited". The last category includes all foreign companies that have completed their exit from Russia. The second category includes companies that have announced their intention to exit but have not completed the process, while the "stay" category includes all remaining firms.

I complement this dataset with the list of dates of the sales of "exited" firms to their new owners. This information is manually searched online from available public sources. The most frequently used source is the official registry of all firms in Russia, where all changes in ownership must be registered. Thus, it often contains the exact dates and the identities of the previous and the new owners. However, after 2014, a law was passed that allowed certain firms not to disclose this information (for example, if such information would make them a target for sanctions). In such cases, dates were mostly taken from the news articles that reported these sales.

Importantly, not all foreign firms that exited the Russian market were sold to new owners. Some firms were officially closed ("liquidated") by their initial owners, while others were sold and closed shortly thereafter. Since the main goal of my paper is not to analyze the probability of survival but rather to evaluate whether the same business can be continued *conditional* on survival, I exclude all closed firms from my sample. That is, I exclude all firms that are marked as closed in the registry or that did not report positive revenue in 2024. The majority of "exited" firms were sold and continued to operate under the new owners. The fact that new owners chose to continue operating existing firms, rather than transferring equipment and staff to other businesses, implicitly confirms their intention to run the same operations as before. Most new owners can be traced to individuals in Russia, while only a couple of firms were sold to owners from Turkey. All new owners are treated symmetrically in my analysis.

Definition of a firm. Typically, a single MNE would have multiple affiliates in Russia, all registered as separate legal entities with their unique tax numbers. For example, a Swedish furniture retailer IKEA used to have one legal entity in Russia that was in charge of retail operations, one that managed its real estate such as IKEA shopping centers, one entity in charge of its legal affairs, a couple in charge of local production, and so on. I aim to aggregate all such separate entities into a single economically meaningful "firm" because these are integral parts of the same business

managed from the same headquarters.

Most of the time, such groups of entities were sold together as a package to a single new owner, and thus, there is no question of how they should be aggregated. However, there are also some cases when a group of entities was split between several new owners. In the example of IKEA, its warehouse and distribution center were sold in November 2024 to a private businessman, its production facilities were sold to a Russian timber company in March 2023, while its malls were sold to Gazprom bank in September 2023, and so on. In this case, at least, it was clear that the single business of the former IKEA was split and divided across several unrelated businesses, and thus it should not be treated as the same firm after the sale. For example, it's possible that the new owners managed to preserve the same technology as before in its logistical hub but not in its production facilities, or vice versa.

Since the identities of the new owners are not always known[7], I use the date of a sale to decide on the boundaries of each firm. Specifically, if all entities belonging to a single MNE were sold within one or two months of each other, these entities are aggregated to a single "firm" in my analysis. In contrast, if there has been more than 2 months between the sales of different parts of the same MNE, then I treat these parts as separate "firms", both before and after the sale.[8]

I repeat my baseline analysis with two alternative definitions of firms in the robustness Section 3.4. One definition treats each entity (defined by a unique tax number) as a separate firm, the other treats each MNE as a separate firm (regardless of how it was sold and treated thereafter). The results are very similar.

Customs records. To analyze the performance of these firms before and after the change in ownership, I link their identities to the Russian customs data using the unique tax identifiers of all entities within a firm. The customs data contains detailed information about the universe of all international trade transactions that involve Russia over the period of 2012–2023. It's described in detail and verified in Egorov et al. (2025a)[9]. It contains detailed 10-digit codes for products imported and exported by firms located in Russia[10], along with the country of shipment, weight in kilograms, and value in dollars. This daily data is then aggregated to the monthly frequency.[11]

[7]Even when they are known, it's impossible to tell whether two different owners are a part of the same local business group based on the publicly available data.

[8]To finish the example above, 6 Russian entities that belonged to IKEA were split into 4 distinct firms by the dates of their sales. Two of these firms were closed by 2024, leaving two distinct IKEA firms in my final sample.

[9]See also Babina et al. (2023) and Chupilkin et al. (2023) among others.

[10]There was a change in product classification in 2022. As in Egorov et al. (2025a), I keep track of the same product codes before and after this change by following Pierce and Schott (2012). Specifically, I use synthetic codes that join together all split or merged product codes, resulting in a somewhat smaller total number of unique product codes.

[11]I also aggregate the exact dates of sale to the monthly frequency, using the 15th of the month as the cutoff date. E.g., I count the dates from February 16 to March 15 as "March" when it comes to sales data. In customs data, March 1–31 count as "March".

For each transaction, the customs records also contain the brands of the shipped products (if available) and the name of the foreign firm that sent/received this shipment for Russian imports/exports. Both variables are available as text only, and thus, a LLM by DeepSeek was used to make this text comparable across different entries. Specifically, it identified the key words that describe the foreign firm, removed extra words (which often include address or a name of an intermediary or other extra information), translated everything into English (original entries are in multiple languages), and corrected misspellings.[12] This standardized text was then used to identify unique foreign firms. As a result, an average non-Russian firm has 4.4 different original names/spellings, while some firms have thousands of different original entries. The text describing brand names was treated similarly.

In-house transactions. For the resulting sample of MNEs, some transactions are identified as *in-house* if both an importer and an exporter of a single transaction are a part of the same MNE. This is identified based on the names of two firms. Specifically, if the keywords for a name of a global MNE are present somewhere in the name of a foreign firm, then such a firm is considered a part of the same MNE. Typical examples include foreign firms with standardized names like "samsung asia", "samsung data systems india", "samsung electronics magyar", "samsung poland r&d", "самсунг электроникс", all of which are considered a part of a global MNE called Samsung. In contrast, transactions with firms called "whitestone" or "panasonic industrial devices sales asia" are not marked as in-house when their Russian partner is a part of Samsung.

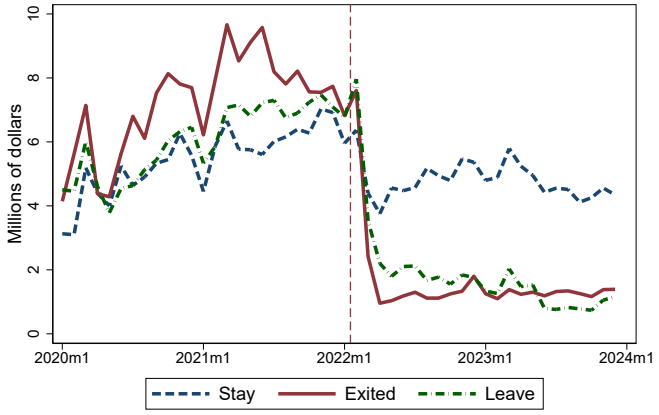
Of course, this is a very crude measure of in-house transactions. Obviously, not all firms within the same MNE have to bear the name of their parent. Thus, this name-based measure should be interpreted only as the lower bound for the actual volume of in-house transactions. It's also possible that not all firms with a specific word in their names belong to the single parent company with the same name. This, however, is unlikely to be the case in practice since my sample is restricted only to quite large global MNEs, most of which take protection of their brands very seriously. As such, they regularly sue some copycat firms that try to imitate global brands with their local names (e.g., "abibas" imitating "adidas"). Thus, it's highly unlikely that a global MNE would not only tolerate its own copycat but also that it would directly transact with it.

Additional datasets. Finally, I complement my analysis with two additional datasets. As in Egorov et al. (2025a), I use firm-level annual accounting data, which is collected and made public by the Federal Tax Authority. For each year and for each tax number, it reports such basic statistics as total revenue, total costs, profits, and a few others. It is available for 2017–2024. I also use data on trade sanctions from Egorov et al. (2025b). It reports which product codes were

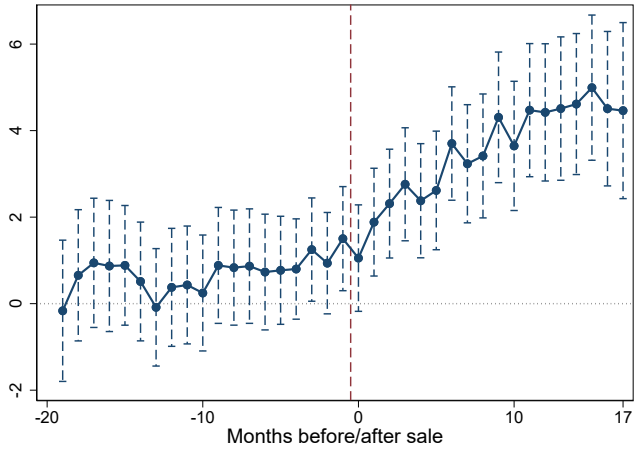
[12]For example, "SAMSUNF ELECTRONICS CO., LTD", "SAMSUNG ELECTRONICS CO. LTD C/O DHL GLOBAL FORWARDING(HONG KONG) LTD", "ГРУЗОВОЙ ТЕРМИНАЛ ЧОП-ТРАНС- ПО ПОРУЧ.SAMSUNG ELECTRONICS MAGYAR ZRT", etc., all became simply "samsung electronics".

Figure 1: "Winding down" of MNEs prior to their sale

(a) Average monthly imports by exit status



(b) Imports of "exited" relative to "leave"



Notes: Panel (a) shows the average monthly imports of MNEs by their exit status. Category "stay" includes 438 firms, "leave" includes 190 firms, and "exited" includes 200 firms.
Panel (b) plots the estimated coefficients β_e from equation 1. They show the log of imports of "exited" MNEs relative to those who chose to "leave", both before and after the sale of "exited" MNEs. Each coefficient is estimated relative to the pre-war months (which form the omitted category). The last 3 point estimates for months 18-20 are omitted as outliers with very few observations in the "exited" group. The logarithms add 1 to the argument's value to avoid missing values. The bars represent 95% confidence intervals. Standard errors are clustered at the firm level.

sanctioned by which country, and thus it enables me to control for the share of sanctioned imports in my analysis.

2.2 Control Group and Core Products

Control group. The first major fact to be noted about the exiting MNEs is that they typically froze their business immediately at the start of the war at the end of February 2022, and it remained "wound down" up to the month when the new owners took control. Figure 1a illustrates this fact with the average monthly imports of all MNEs by their exit status. Of course, the war, sanctions, and all other concurrent shocks have negatively affected imports of all firms, and that's why there is a sizeable drop in imports of even those MNEs that chose to stay in the Russian market. However, the drop in imports for firms that chose to leave and that later actually sold their business is roughly similar to each other. Moreover, both of these are much more dramatic than the drop for "stayers", reaching monthly levels quite close to zero. Such a sharp drop at the very beginning of 2022 is consistent with the fact that almost all MNEs that made an explicit announcement on whether they are leaving or staying did so in the very first months of the conflict, leaving virtually no variation in the timing of this decision to exploit.

In contrast, there is a substantial variation in the timing of the actual sale of exiting MNEs. In fact, out of 200 exiting MNEs reflected in Figure 1a, there was at least one sale in each month

during the period of April 2022 – August 2025, with 73% of all sales happening before 2024. The average monthly imports from Figure 1a hide the rapid recovery in economic activity for those former MNEs that already started to operate under the new ownership. To reveal this recovery, I estimate the following equation with a staggered DiD design:

$$y_{it} = \sum_{e} \beta_e \times \mathbb{1}(t = E_i + e) \times \mathbb{1}(t \geq t_0) + \tau_i + \eta_t + \varepsilon_{it}, \tag{1}$$

where y_{it} is log of imports (1 is added to avoid missing values) of firm i at month t, and E_i denotes the month of exit for firm i ($E_i = \infty$ for the MNEs who were not sold), so that β_e are the event study coefficients that show the effect on the sold firms separately for each month before and after the sale. Firm fixed effects τ_i remove all time-invariant variation from this estimation, and month fixed effects η_t (e.g., for April 2022) control for all the shocks common to all MNEs. Finally, the omitted category is the entire pre-war period (t_0 is March 2022), so that β_e are always estimated relative to the entire period of January 2020–February 2022.[13]

Figure 1b plots coefficients β_e estimated from regression 1 based on the subsample of MNEs who chose to "leave" and who "exited" (excluding "stay" category). Thus, it reveals the effects of the sale relative to those MNEs that intended to sell but had not done it yet. In fact, there was a rapid recovery in imports right after (if not even some time before) the new owners took control of former affiliates of foreign MNEs. First of all, these estimates verify that the hand-collected dates of the sale of each firm do in fact reflect the points of time when the new owners took control of the "wound down" business and started to operate it again. In addition, such immediate recovery in the first months after the sale is indicative of an attempt to operate the same business as before, without some long-term restructuring process or additional large-scale investment before the business could be reopened.

More importantly, Figures 1a and 1b together illustrate that neither the MNEs who chose to "leave" nor the "exiters" prior to their exit can serve as an appropriate control group for the "exiters" that have already sold their business. The simple fact is that both of these groups appear to be in a "shut-down" mode with barely any economic activity present. Thus, the only meaningful control group for the estimation of the changes in the technology associated with the new ownership can be composed of the MNEs who chose to "stay". For this reason, from now on, I exclude MNEs that chose to "leave" from my analysis.

Core products. Next, I zoom in on my main dependent variable of interest – share of imported core products. Large firms tend to import a large number of products each year, with a substantial turnover in their composition from one year to another. To focus only on those imported products that are likely crucial for maintaining business, I focus on the so-called *core* products for each firm,

[13] Pre-trends prior to the war are estimated separately and reported in Figure 2a.

defined as the set of products imported by this firm each year during 2017–2019.[14]

The motivation behind this definition is straightforward. Perhaps the most important feature that defines a firm and makes it different from the others is the kind of activity that this firm does, which, to a large extent, can be revealed by the inputs it uses. To provide a simple example, the chocolate bar "Snickers" used to be called "Marathon" at some point, and it's a safe bet that now it's produced with different equipment than back in 1930s. It's also safe to assume that the wrapper for the chocolate bar now is produced from different materials than in the 1930s. So, a lot of things have changed throughout its history. And yet the core product remained unmistakably the same, made with the same core ingredients (milk chocolate, nougat, caramel, peanuts). Thus, out of a large number of products that each firm imports, I aim to single out those that are critical to maintain the core business of a firm. I do this by looking at the products that have to be imported *every* year without exception.

In particular, in my baseline sample of 540 multinational firms, the median (average) firm imported 118 (178) distinct 10-digit products during 2017–2019. Out of this total number of products, only 40% (this is both the median and the mean) were the core products, that is, they were imported 3 years in a row. Yet, this minority of products accounted for 97% (89%) of all imports by value for the median (average) firm. Simply put, a clear minority of products is responsible for most imports. It is another confirmation that these are precisely the products that form the foundation of the firm's business.

2.3 Selection Bias and Identification

Selection issues. My main results are based on the comparison between "exiters" and "stayers". Clearly, each firm endogenously decided whether to exit the Russian market. It's highly unlikely that so many multinational firms would have decided to quit this market in 2022 anyway, even in the absence of the war. It's worth keeping in mind that the subsample of multinational affiliates represents the most successful firms within Russia, and while exits sometimes happened in the previous years, it was extremely rare for this group of firms. Instead, it's much more likely that the exit could be driven by the firms that would have preferred to stay in the absence of the war, but could no longer profitably continue their business in the presence of all the sanctions and other concurrent adverse shocks. This is arguably the main reason for a *negative* selection in the decision to exit.

In contrast, perhaps the most successful MNEs saw their business thriving globally, in most markets where they were present. The greater the global success of an MNE, the smaller is the

[14] A new product classification was introduced in 2017. I therefore define core products using data from 2017 onward, so as not to reduce the total number of distinct codes by constructing synthetic codes that combine 3 different classifications: pre-2017, 2017–2021, and post-2022. In robustness Section 3.4, I verify that my baseline results remain unchanged when I define core products as those imported each year during 2017–2021 or 2020–2021.

Table 1: Balance tests between "exiters" and "stayers", 2017–2019

	"Exiters"	"Stayers"	Difference	St. error
Revenue, bln rubles	20.30	9.96	10.33***	3.42
Profits-to-revenue, % points	4.16	3.91	0.25	0.83
Revenue growth rate, annual, % points	35.00	22.29	12.71	21.04
Imports, mln dollars	94.07	71.01	23.06	22.38
# of foreign suppliers of core products	50.02	29.94	20.08***	6.52
# of core imported products	101.56	67.89	33.66***	10.17
Share of core products in all products	0.40	0.40	0.001	0.018
Share of core imports in total imports	0.86	0.90	-0.045**	0.018
Share of in-house imports in core imports	0.59	0.66	-0.074**	0.035
Share of to-be-sanctioned imports	0.56	0.45	0.11***	0.03
Share of imports from China	0.076	0.087	-0.011	0.017
Share of imports from sanctioning countries	0.84	0.81	0.03	0.02
Share of branded products in imports	0.81	0.84	-0.028	0.025
Number of firms	165	375		

Notes. Columns "exiters" and "stayers" display averages for each variable during 2017–2019 for each group of firms. The next two columns show the coefficients and robust standard errors from a corresponding regression with a constant and with a dummy for the exit status. Core imports mean the total value of all imported core products. $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$. For the same statistics based on 2020–2021 data, see Table A1.

share of Russia in its global sales, all else being equal. Thus, it made sense for the most successful firms to abandon the Russian market so that they didn't endanger the rest of their global sales due to consumer boycotts or additional scrutiny by the authorities of the sanctioning countries. These are perhaps the main reasons for a *positive* selection in the decision to exit.

To figure out which of the selection mechanisms dominated the exit of MNEs from the Russian market, Table 1 presents the balance tests between "exiters" and "stayers". The first thing that emerges from this Table is that the "exiters" were, on average, significantly larger than the "stayers": they had more revenue, more suppliers, and more imported core products. This fact, if anything, is slightly indicative of the positive selection in the exit decision. However, and it's perhaps the main striking feature of this Table, they were not too different otherwise. In particular, larger firms also had more imported products overall, and thus the two groups had the same share of core products within the imported products. They appear to import products of similar quality, as proxied by the share of branded products in total imports. Remarkably, the two groups appear to be similarly profitable, they had the same annual growth rates, and they were similarly exposed to China and to the developed countries that would later impose sanctions.

Inevitably, there are also some differences between the two groups. First, the share of core products in the total imports by value was a bit smaller for "exiters". This is perhaps to be expected, as larger firms tend to be more diversified, and thus they seem to import beyond their core necessities to a greater extent. Second, "exiters" also had a smaller share of their core imports

that were supplied in-house, that is, from a foreign supplier but seemingly within the same MNE. Third and most importantly, "exiters" appeared to be more exposed to the future trade sanctions. This is the largest, and so far the only evidence for the negative selection in the exit decision.[15] Though all of these differences between the two groups are statistically significant, it's nonetheless surprising how economically modest they are. Thus, even though there is evidence for endogenous selection of firms into two groups, it hardly seems to be the case that these issues were the main reason behind each firm's decision, at least based on these observables. Moreover, it's equally hard to tell whether the positive or the negative bias dominated.[16]

Pre-trends. To further check that "staying" and "exiting" firms were not on different trends prior to the conflict, I follow the recent DiD literature (Borusyak et al., 2024) and estimate the following pre-trend equation on a pre-treatment subsample of observations:

$$y_{it} = \sum_t \alpha_t \times \mathbb{1}(E_i < \infty) + \tau_i + \eta_t + \varepsilon_{it}, \quad t < t_0, \tag{2}$$

where indicator $\mathbb{1}(E_i < \infty)$ equals 1 for "exiters" and 0 for "stayers", and only observations before March 2022 (t_0) are included in the sample (February 2022 is the omitted category). Coefficients α_t then reveal whether there are any significant differences between "exiters" and "stayers", once firm and time fixed effects (τ_i and η_t) are removed.

Figure 2a displays the results for two dependent variables. The blue line shows the differences in the total monthly imports, and it includes months with no trade so that it reflects both the intensive and the extensive margins. The red line shows the differences in my main variable of interest, the share of all core products imported in the current month. This second specification is estimated only on the months with positive imports so that it reflects product composition conditional on positive imports.[17] Clearly, there were no significant differences between "exiters" and "stayers" prior to the conflict. This means that, perhaps predictably, there is no evidence that the future "exiters" were already struggling to maintain their business prior to the conflict.

The greater challenge to identification arises from the fact that the former multinational firms are simultaneously treated with multiple shocks: a change in ownership as well as all the aggregate shocks that have happened since the start of the war in 2022. Of course, the effects of these shocks are absorbed by the time fixed effects η_t in all of my specifications. It's also worth repeating that my sample does not include all Russian firms. Instead, it's composed only of multinational affiliates,

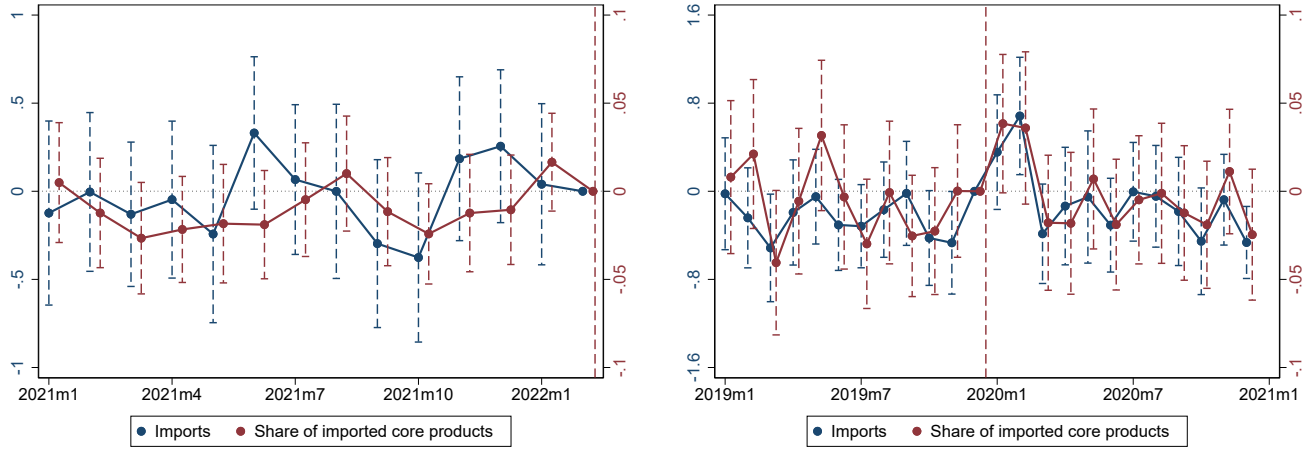
[15] Robustness check in Section 3.4 verifies that my main results continue to hold on a subsample of treated and control firms with similar exposure to sanctions.

[16] Table A1 in the Appendix reports the same statistics but based on 2020–2021 data. They remain largely similar.

[17] The other cases, namely the intensive margins for the total imports and imported core products, look mostly similar. The results are available upon request.

Figure 2: Pre-trends of "exiters" relative to "stayers"

(a) Pre-trends prior to the war in March 2022 (b) The response to the Covid-19 pandemic



Notes: This figure plots estimated pre-trend coefficients α_t from equation 2 for the log of imports (1 added to avoid missing values) and for the share of imported core products (for observations with non-zero imports only). These coefficients reflect the differences for "exiters" relative to "stayers". The left y-axis shows the log-points for specification with imports, while the right y-axis is for the share of imported core products. Panel (a) shows the pre-trends prior to the outbreak of the war in 2022, where February 2022 is the omitted category. Panel (b) shows the estimates from a non-staggered DiD specification that focuses on the effects of the Covid-19 pandemic, where December 2019 is the omitted category. The bars represent 95% confidence intervals. Standard errors are clustered at the firm level.

that is, a highly selective group of firms that are much more similar to each other than to other firms within Russia. Thus, time fixed effects η_t control for the effects of aggregate shocks that are common to all multinationals within Russia (and which may differ sharply for domestic firms).

However, it's possible that some firms are more resilient to external shocks than others. Then, different firms, even within the group of multinationals, would respond differently to the same set of shocks. Clearly, the conflict that started in 2022 was an unprecedented shock with large aggregate effects and huge uncertainty at the beginning. Just because all "exiters" scaled back and froze their business immediately since March 2022, I can not test whether the two groups of firms responded differently to the same aggregate shocks while both were managed from the foreign headquarters. Thus, I can not test directly whether one group was more resilient to this particular event before the change in ownership.

Nonetheless, I exploit the data on the outbreak of the Covid pandemic just two years prior to the start of the war in Ukraine. Arguably, it was also an unprecedented shock with large aggregate effects and huge uncertainty at the beginning. While there are clearly many differences between the two events, it must be the case that firms that are less resilient to disruptions in general should have been affected more by both shocks. Thus, Figure 2b displays the differences between "exiters" and "stayers" estimated on a different time period, with December 2019 serving as the omitted category.

In the aggregate, the start of 2020 saw a sharp reduction in total imports both for "exiters"

and "stayers". But as Figure 2b reveals, this reduction was, if anything, smaller for "exiters". The same applies to the share of imported core products. Thus, while all multinational firms in Russia suffer from the same aggregate shocks, the Covid-19 episode suggests that if there is a significant difference across two groups, then it's the "exiters" who are *more* resilient than the "stayers", and not vice versa.

This is consistent with the notion that it's the most successful MNEs that decided to leave Russia since 2022, that is, with a positive selection. This conclusion is also supported by anecdotal evidence. First, according to a poll made by an independent media located outside of Russia[18], Russian consumers eagerly await the return of "exited" MNEs after the end of the war. Second, the new managers of former multinational affiliates in Russia frequently stress that they continue to produce the same products and services as before.[19] These two facts together show that the demand for the products of "exiters" is still very high within Russia.[20] Third, there are reports that "stayers" frequently see increases in their profits in Russia, once the competition from "exiters" was removed.[21] It points to the fact that "exiters" leave the Russian market *despite* profitable opportunities there, as opposed to leaving due to shrinking business.

Overall, the positive selection may bias my main results in the next section, but this bias works against my findings. Thus, if anything, I only underestimate the effects of the change in ownership on the share of imported core products.

3 Results

In this Section, I begin by presenting the central results on the persistent gap in the imported core products. I then provide additional evidence supporting the idea that technology changes drive my main results, rather than domestic substitution or scaling down. After that, I suggest the key mechanism underlying these results and discuss the corresponding evidence. I end this Section with several robustness checks.

3.1 Decline in Imported Core Products

As shown in Section 2.2, exiting firms have greatly reduced their overall economic activity immediately since March 2022. This fact makes it impossible to estimate the effects of a change in

[18] Available at https://novayagazeta.eu/articles/2025/05/06/nevozvrashchentsy.

[19] For the example of French yogurts by Danone, see https://www.interfax.ru/interview/980147.

[20] In principle, it's possible that Russian consumers would boycott some MNEs because of the sanctions imposed by policymakers from their origin countries. Table 1 shows that both "stayers" and "exiters" have similar exposure to sanctioning countries. The anecdotal evidence above further suggests that there was no significant boycott by Russian consumers. Lastly, the notion of Russian boycott is also inconsistent with rerouting of banned Western products through third countries (Egorov et al., 2025a; Chupilkin et al., 2023).

[21] E.g., https://www.economist.com/business/2024/02/29/western-multinationals-russian-dilemmas.

ownership based on a subsample of exiting firms only, that is, by comparing outcomes just before and after this change. Therefore, I compare the exiting firms with those MNEs who chose to stay in the Russian market (or "exiters" with "stayers" for short). Specifically, I estimate staggered DiD equation (1), where I use various dependent variables in place of y_{it}.

Of course, there are many possible reasons why a firm may stop buying some of its inputs. It can be caused by the changes in world prices, the changes in the local demand for the firm's products, restrictions on direct payments and delivery of goods to and from sanctioning countries, and so on. Time fixed effects η_t control for all such changes that are common across "exiters" and "stayers". As Section 2.3 showed, the two groups of firms appeared to be surprisingly balanced in their import exposure to various countries. To make this point even stronger, Figure A1 in the Appendix shows not just the averages across the two groups, but their entire distributions of country exposure, which look remarkably similar. Therefore, the time fixed effects should absorb all country-level shocks across the two groups. However, these groups do differ in their exposure to trade sanctions, and I verify that these differences do not drive my results in robustness Section 3.4.

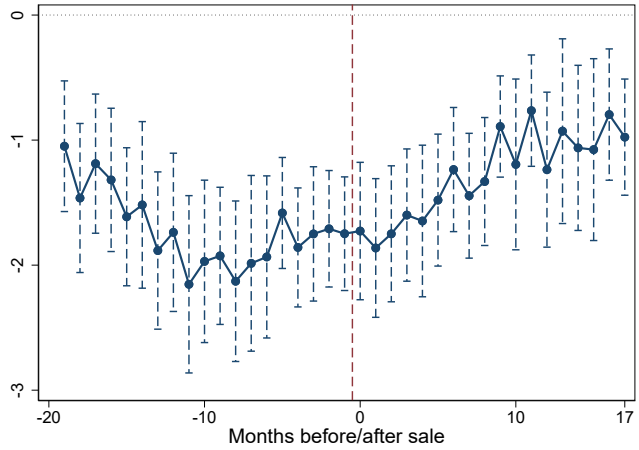
Figure 3a shows the effect of new ownership on total imports. Observations with no imports are omitted, so the estimates reflect the intensity of economic activity *conditional* on some activity being present. As in the rest of the paper, the main focus is on whether the same business can be maintained conditional on survival, leaving the effects on the probability of survival outside of the scope of this analysis. The omitted category is the entire pre-war period, January 2020–February 2022, which is why all coefficients are estimated relative to this period.

The large and negative estimates before the sale of a former MNE reflect the "winding down" of business relative to the multinational firms that decided to stay in the Russian market. But this Figure clearly shows that there is a substantial recovery in the total imports that starts around the month when the new owners take control. Importantly, this recovery is not complete. A year and a half after the sale, the total monthly imports are still around 62% (-0.98 log-points) below the total imports of an average "stayer". Thus, the estimates after the sale within Figure 3a show the gap from the MNEs that the new Russian owners could not close once they took control of the assets (often along with personnel and the management) of a former MNE.

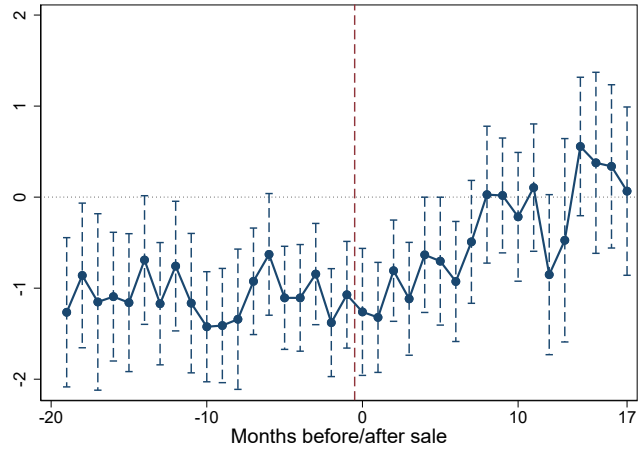
Moreover, Figure 3b shows that this gap can not be explained by the imports of non-core products. In fact, it takes less than a year for the new owners to completely catch up with the "stayers" on the volume of non-core imports. This Figure also suggests that it's not the case that the new owners simply decided to uniformly scale back their operations. Instead, it appears that the imports of some inputs are much easier to recover than the imports of other inputs. Crucially, there is no remaining gap in the non-core imports. It means that the *only* imports that the new owners have difficulty bringing back to their "normal" volumes are precisely the imports of core products. Those products that had to be imported every year prior to the war and that arguably define a firm, making it and its products distinct from all others.

Figure 3: Partial recovery of the imports by former MNEs, intensive margin

(a) Log of total imports



(b) Log of imports of non-core products



Notes: This Figure plots estimated β_e from equation (1). Panel (a) uses the log of total imports as the dependent variable, while panel (b) uses the log of imports of non-core products only. Observations with zero imports are dropped from the sample, so that only the effects on the intensive margin are estimated. The sample consists of 165 "exiters" and 375 "stayers". The y-axis shows the logpoints. Each coefficient is estimated relative to all of the pre-war months (which form the omitted category). The last 3 point estimates for months 18-20 are omitted as outliers with very few observations in the "exited" group. The bars represent 95% confidence intervals. Standard errors are clustered at the firm level.

Figure 4 further makes this point by presenting the central result of this paper – the lack of recovery in the imports of core products within former multinational affiliates. In Figure 4a, I focus on the extensive margin of this adjustment, so that the dependent variable y_{it} is the share of all core products of firm i that are still being imported in month t. To make sure that I capture changes in the composition of imported products rather than just a decline in the overall economic activity, I estimate this specification on a subsample of observations with positive imports.

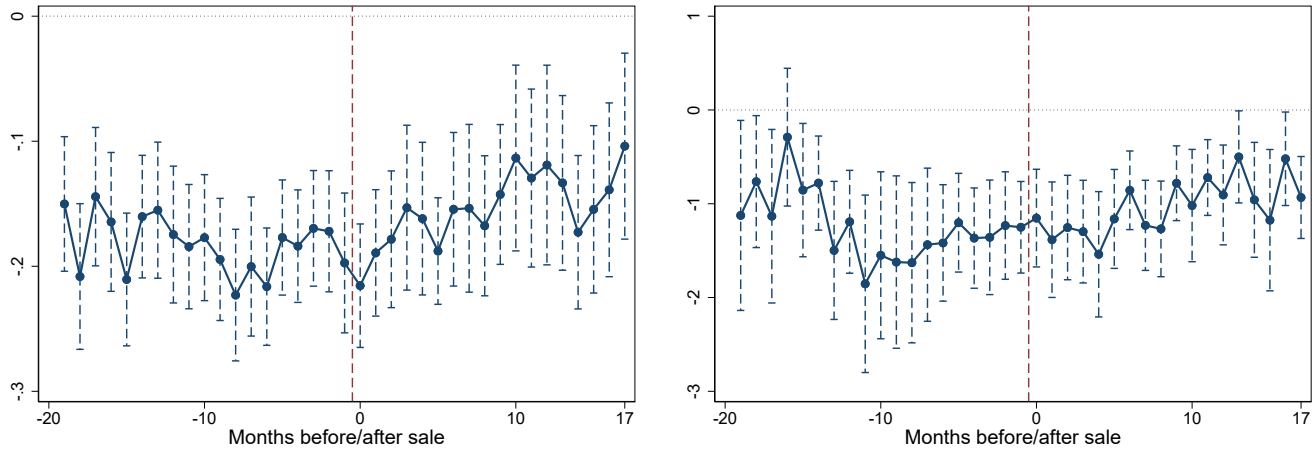
Clearly, the monthly share of imported core products may differ from one month to another for entirely benign reasons. Specifically, international trade is inherently "bulky", meaning that it is often dominated by a few large transactions. This means that the entire annual stock of a certain input can be bought just within one month, making it completely unnecessary to buy all core inputs in each month of the year. Consistent with this, Figure A2a in the Appendix shows that prior to 2022, each MNE used to import around 50-60% of all of its core products every month. Moreover, this monthly share used to be quite stable across time with a drastic reduction only at the start of the war, when even "stayers" were forced to import fewer core products in any single month. Figure 4a estimates the remaining difference between "exiters" and "stayers" that can be attributed to the sale to new owners (and can not be explained by firm and time fixed effects).

Specifically, prior to the sale, "exiters" imported around 20 percentage points fewer core products than the "stayers". Keeping in mind that on average, "stayers" kept importing only 30% of their core products in any single month since 2022 (see Figure A2a), this can be interpreted as a reduction by roughly 2/3. More importantly, there is some recovery in the number of imported

Figure 4: Lack of recovery in the imports of core products by former MNEs

(a) Extensive margin: share of imported core products

(b) Intensive margin: log of imports of continuing core products



Notes: This Figure plots estimated β_e from equation (1). Panel (a) uses the share of all core products currently imported as the dependent variable, while panel (b) uses the log of the value of those core products that continue to be imported at least once after the sale (and after the start of the war for "stayers"). The y-axis in panel (a) shows changes in shares (so that -0.1 means a decline of 10 percentage points), while the y-axis in panel (b) shows the log-points. Only firm-month observations with positive imports are kept in the sample. The sample consists of 165 "exiters" and 375 "stayers". Each coefficient is estimated relative to all of the pre-war months (which form the omitted category). The last 3 point estimates for months 18-20 are omitted as outliers with very few observations in the "exited" group. The bars represent 95% confidence intervals. Standard errors are clustered at the firm level.

core products once the new owners took control of "exiters", but the gap from the "stayers" has never become smaller than 10 percentage points. Again, this can be interpreted that the former multinational affiliates are operating at most at 2/3 of their full capacity in this regard (30% for "stayers" vs 30-10% for "exiters").[22] The bottom line is that each month, the new owners of former multinationals simply import significantly fewer core products than "stayers".

Figure 4b shows that this is only half of the story. In particular, for each firm, I define *continuing* core products as the subset of core products that have been imported at least once after the sale (the start of the war) for "exiters" ("stayers"). Then, I use the log of imports of all continuing core products in each month as the dependent variable y_{it} in regression (1). Once again, I focus only on firm-month observations with a positive value of imported continuing core products so that here I can estimate only the intensive margin of this part of the total imports. In fact, one full year after the sale of a former multinational, its imports of those core products that still continue to be supplied under the new ownership are 60% (-0.91 log-points) smaller than that of "stayers". This means that there is a substantial gap in imports even for those core products that are still being supplied to the former multinationals.

[22]To put these numbers into a different perspective, a naive comparison with the raw data displayed in Figure A2a suggests that this remaining 10% gap is roughly of the same magnitude as the fall in imported core products experienced at the start of the Covid-19 pandemic in the first months of 2020 by all MNEs in Russia.

In a nutshell, Figure 4 has revealed that the new owners buy fewer core inputs, with some inputs being completely abandoned (Figure 4a) and others being bought in smaller volumes (Figure 4b). It is in this sense that the new local owners can not operate former multinationals in exactly the same way as the foreign headquarters that they have replaced. Overall, it is highly suggestive of a substantial change in the products and services that the former multinationals can offer.

3.2 Supportive Evidence

In this Section, I rule out several alternative explanations for the results above. In particular, I show that exiting MNEs do not fully substitute missing core imported inputs with domestic alternatives and do not simply reduce their product range. I also present the direct evidence of changes in the composition of produced products for a subsample of exporters.

Domestic substitution. It's important to acknowledge that I observe the changes only in the *foreign* inputs of any given firm. Despite the fact that the multinational affiliates, in general, are very large firms that account for most of the international trade (see Antràs and Yeaple, 2014; Conconi et al., 2022, among others), it is nonetheless possible that the core products missing from their *imports* were completely substituted by the same products produced within Russia.

To check this possibility, I turn to the accounting data on firms registered in Russia, and in particular, on their total revenue.[23] This revenue includes both domestic sales and export revenue. If missing core inputs were successfully substituted, then we should see a substantial recovery in revenue after the new local owners took control of the former multinational affiliates. If, on the other hand, there was absolutely no domestic substitution, then the recovery in total revenue should not exceed that of the total imports displayed in Figure 3a.

Unfortunately, the data on revenue is available only at an annual frequency, making a detailed staggered DiD analysis impossible. Still, I estimate the following non-staggered DiD equation:

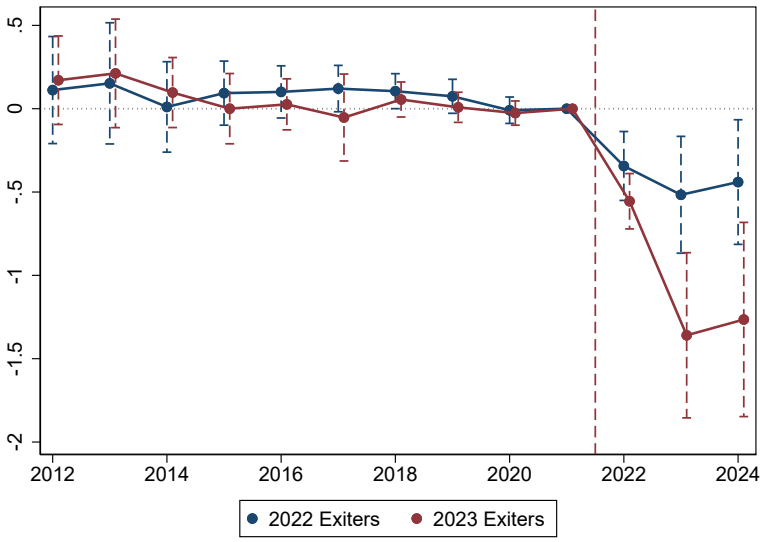
$$y_{it} = \sum_t \gamma_t \times Exit_i^T + \delta_i + \zeta_t + \epsilon_{it}, \tag{3}$$

where y_{it} is the log of revenue for firm i in *year* t, and indicator $Exit_i^T$ equals 1 if firm i was sold in year T and 0 otherwise. As before, δ_i and ζ_t are firm and time fixed effects. 2021 serves as the omitted category.

I estimate equation (3) twice. Each time the control group consists of all "stayers", but in my two subsamples, the treatment group consists of all "exiters" sold in 2022 ($T = 2022$) and all

[23] The evidence in this section is very similar to Boehm et al. (2019), who have shown that the output of American affiliates of Japanese MNEs fell one-for-one with declines in imports after the 2011 Tohoku earthquake in Japan. As a result, they have estimated a relationship between imported and domestic inputs that is close to Leontief.

Figure 5: Change in total revenue in former MNEs



Notes: This Figure plots estimated γ_t from regression (3) separately on two subsamples, where the set of "stayers" is complemented with the former MNEs that exited either in 2022 or in 2023. There were 58 "exiters" in each year, and thus the two subsamples together include 116 "exiters" and 370 "stayers". The dependent variable is the log of total revenue (both domestic and export), but no observations are omitted since all of the firms in the sample report positive revenues in each year. The bars represent 95% confidence intervals. Standard errors are clustered at the firm level.

"exiters" sold in 2023 ($T = 2023$).[24] I report the estimated set of γ_t from these two regressions jointly in Figure 5.

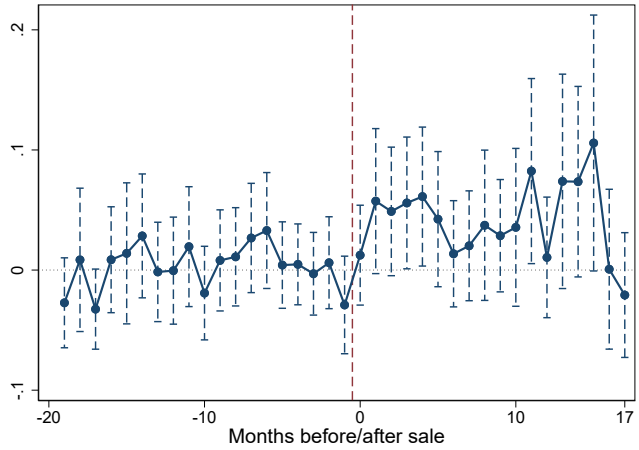
Three major observations emerge from Figure 5. First, consistent with my previous findings, there is a sharp drop in revenue for the "exiters" (reflecting "winding down" of business) during and prior to the year when they eventually changed ownership. Second, the results on revenue are also consistent with the general recovery of economic activity under the new local owners. So, in each year, the revenue for 2022 "exiters" is higher than that for 2023 "exiters" simply because the former started their recovery earlier. There is also an increase in revenue for both groups in 2024 relative to 2023.

Third and most importantly, even by 2024, none of the "gaps" in the total revenue of former MNEs relative to the "stayers" were closed. Strikingly, by the start of 2024, 2022 "exiters" already had more than one year under the new owners, a period when their imports were increasing. Yet, their total revenue in 2024 was still about 36% (-0.44 log-points) smaller than that of comparable "stayers". Overall, the estimated drop in revenue for 2022 "exiters" is smaller than the estimated drop in the total imports from Figure 3, while the similar drop for 2023 "exiters" is noticeably larger. Thus, it's quite possible that at least some of the former MNEs managed to find alternative domestic suppliers for their missing core inputs. However, the extent of such domestic substitution was clearly not enough to completely compensate for the loss of all missing core inputs, resulting in a substantial gap in revenue from the "stayers" even two years after the sale.

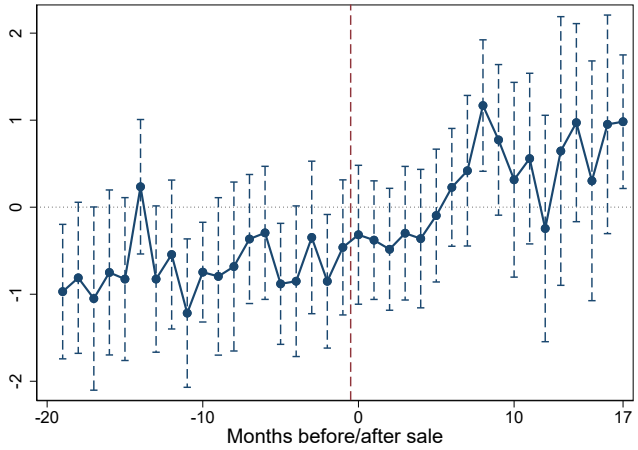
[24] MNEs sold in 2024–2025 are excluded from this regression.

Figure 6: Increase in imports of new products by former MNEs

(a) Share of new products in imported products



(b) Log of imports of new products



Notes: This Figure plots estimated β_e from equation (1). Panel (a) uses the share of new products within all currently imported products as the dependent variable, while panel (b) uses the log of the value of all new products. In both panels, firm-month observations with no imports (or with no imports of new products, respectively) were omitted. The y-axis in panel (a) shows changes in shares (so that 0.1 means an increase of 10 percentage points), while the y-axis in panel (b) shows the log-points. The sample consists of 165 "exiters" and 375 "stayers". Each coefficient is estimated relative to all of the pre-war months (which form the omitted category). The last 3 point estimates for months 18-20 are omitted as outliers with very few observations in the "exited" group. The bars represent 95% confidence intervals. Standard errors are clustered at the firm level.

Scaling down. So far, the presented evidence points to persistent gaps between former and current multinational affiliates, whether in the core part of imports (Section 3.1) or in total revenue (Figure 5). It is possible that these gaps reflect *not* changes in core business and technology within former multinationals, but rather a general decline in economic activity. Clearly, it's impossible to produce *all* products and services without changes in technology when some core inputs are missing. However, it remains possible that former multinationals dropped some products from their output while continuing to produce others. In this case, they may offer a smaller *range* of products – possibly in smaller quantities than before – but they would not necessarily need to change their technology in order to produce the same products differently or to offer alternative products and services.

I argue against this possibility in two steps. First, I show that the recovery in the total imports of former multinationals was driven to a substantial degree by the imports of *new* products. Thus, even if these firms are producing the same products and services as before, they do this with a substantially different technology than before, simply because they use completely different inputs.

To demonstrate this, for each MNE, I first construct a set of all 10-digit product codes imported during 2017–2019. From 2020 onwards, I define *new* products for firm i as all products absent from this set – that is, products not imported even once during 2017–2019. This approach allows me to conduct an analysis similar to my central Figure 4, but focusing on new rather than core products.

Specifically, Figure 6a reports the monthly share of new products in all imported products measured by the number of products. Importantly, there are no significant differences in this share between "exiters" and "stayers" before the new owners took control of "exiters". However, immediately in the first months after a change in ownership, former multinational affiliates started to import noticeably more new products than those multinationals that were still being managed by foreign headquarters.

Figure 6b plots the changes in the log of the total value of all imported new products.[25] Consistent with "winding down", "exiters" tended to import less of new products prior to a sale, just as they imported less of all products (Figure 3a). After the change in ownership, imports recovered, and within less than a year, former multinationals imported significantly more new products (by value) than the "stayers", at least in some months. If the new owners had simply caught up with the "stayers", this would have already implied a significant shift in the structure of their imports, since a substantial gap remained in continuing core products (Figure 4b). Consequently, new products would have represented a larger share of total imports. Remarkably, the new owners went beyond this benchmark, importing even more new products than the "stayers", thereby skewing the structure of imports further toward new products.

Together, both panels of Figure 6 provide evidence that is inconsistent with the mere scaling down of the business of former multinationals without significant changes within their surviving operations. Instead, the evidence clearly shows that some missing core inputs were replaced by entirely new inputs, and that the import structure of "exiters" has changed substantially. Of course, all firms innovate and evolve over time; however, the results above indicate that former multinationals changed significantly more than current ones, and these changes cannot be explained by firm or time fixed effects. Moreover, these changes clearly coincide in timing with the change in ownership.

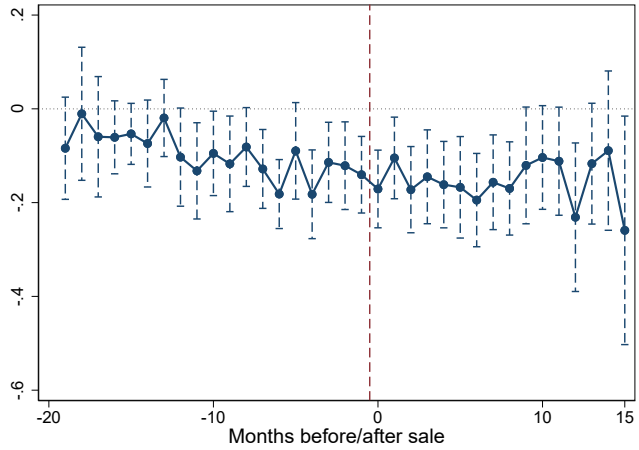
In my second step, I present the direct evidence on the output for a subsample of firms. Some multinational affiliates in Russia used to service not only the internal Russian market but also some of the neighboring markets, thereby serving as export platforms. After their sale to the new local owners, many of such export platforms continued to ship a variety of products abroad.[26] Thus, for a subsample of firms, I observe detailed information on the produced products as well as imported inputs. Similar to my previous analysis, for each MNE, I define *core* and *new* exported products. Specifically, a core exported product for firm i is a product exported by the same firm in each year during 2017–2019. A new exported product for firm i is a product that was not exported by the same firm even once during the entire period of 2017–2019.

[25] Note that this measure reflects both the increase in the number of new products (extensive margin) and the increase in quantities for already present products (intensive margin).

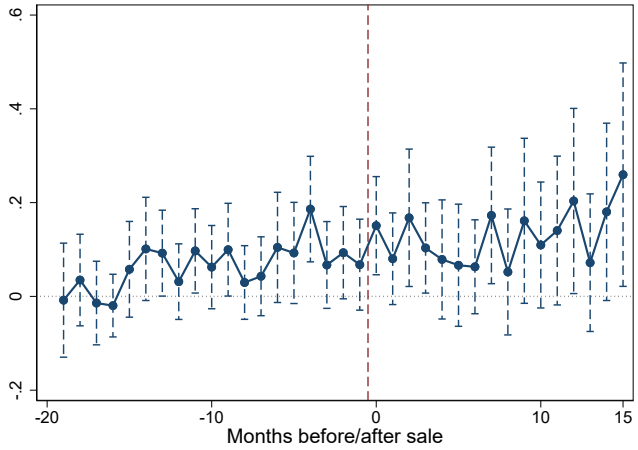
[26] Within the subsample of exporters, the median (mean) "exiter" exported 20 (54) distinct products during 2017–2019, while the median (mean) "stayer" exported 10 (30) distinct products. In general, there are fewer exported products than imported products, and thus all the associated estimates become considerably noisier.

Figure 7: Changes in the structure of products exported by former MNEs

(a) Share of core products in exported products



(b) Share of new products in exported products



Notes: This Figure plots estimated β_e from equation (1). Panels (a) and (b) use the shares of core and new products, respectively, within all currently exported products as the dependent variable. In both panels, firm-month observations with no exports were omitted. Y axes show changes in shares (so that 0.1 means an increase of 10 percentage points). The underlying subsamples consist of 102 "exiters" and 167 "stayers" for panel (a) (restricted to exporters with exports in each year during 2017–2019) and of 144 "exiters" and 317 "stayers" for panel (b) (restricted to exporters with any exports in 2017–2019). Each coefficient is estimated relative to all of the pre-war months (which form the omitted category). The last 5 point estimates for months 16-20 are omitted as outliers with very few observations in the "exited" group. The bars represent 95% confidence intervals. Standard errors are clustered at the firm level.

Figure 7a confirms that the reduction in core imported inputs (Figure 4a) led to fewer produced core products. Some decline in the range of produced products had already occurred during the "winding down" period, but this decline intensified after the sale. In sharp contrast to the previous results, there was virtually no recovery in *produced* core products. Specifically, in each month, former multinationals exported between 10 and 20% fewer core products than comparable "stayers". As Figure A3 in the Appendix shows, "stayers" exported on average between 30 and 40% of core products each month during the war. These estimates therefore indicate a very sizeable relative drop in the product range among former multinationals. In addition, Figure 7b shows a simultaneous increase in the share of new exported products. In fact, the estimated effects in the two panels of Figure 7 are roughly comparable in magnitude but opposite in sign, suggesting a simple replacement of some core products with new ones.

Thus, Figure 7 provides direct evidence on technological changes for a subsample of exporters within former multinationals, ruling out the possibility that missing core inputs led merely to scaling down without such changes. Instead, the new local owners faced a large number of missing core inputs and were therefore forced to alter the way their business operated, including dropping some previously produced products and replacing them with new ones. This implies that certain technological processes within MNEs were effectively lost when their connection to the foreign headquarters was severed.

3.3 Mechanism

In this Section, I describe the likely mechanism behind the estimated technological changes. That is, I reveal why the new local owners failed to keep producing the same products after acquiring the entire former affiliates of MNEs, complete with equipment, staff, management, and no legal restrictions forbidding production of the same products as before.

The suggested mechanism is extremely simple. I argue that many of the core inputs were not bought on the open market from other firms but rather supplied "in-house", that is, within the same MNE. Specifically, MNEs had not based all of their production within Russia. Instead, many core inputs were supplied from foreign affiliates of the same MNEs. Thus, when a decision on exit was made, it was easy for the foreign headquarters to cut the supply of those core inputs that were supplied in-house. They had as much incentive to do so as they have incentives to prosecute copycat firms trying to live off their brand. Similarly, it was hard for the new local owners to find substitutes for these in-house core inputs.[27]

To illustrate this mechanism, I consider heterogeneity within the set of all imported core products. During 2017–2019, some of these products were completely supplied in-house (that is, from foreign affiliates of the same MNE), while others didn't seem to have any in-house supplier. I exploit this variation in my analysis. Specifically, I divide all core products into several groups based on their in-house import share back in 2017–2019.[28] Then, for each such group, I use the share of currently supplied core products in all core products of that group as a dependent variable in regression (1). In other words, I repeat my central result for the share of imported core products in Figure 4a separately for different groups of core products. Figure 8a presents these estimates.

The results are striking. The higher the in-house share of imports back in 2017–2019, the more dramatic the fall in imports during the "winding down" period and the more pronounced the lack of recovery thereafter. Remarkably, core products with an in-house share below 5% have recovered completely, whereas products with an in-house share above 95% have barely recovered. In fact, there is a clear monotonicity with respect to in-house share at nearly every point in Figure 8a. Figure A4a in the Appendix further breaks the middle group into two smaller groups, showing similar monotonicity across them.

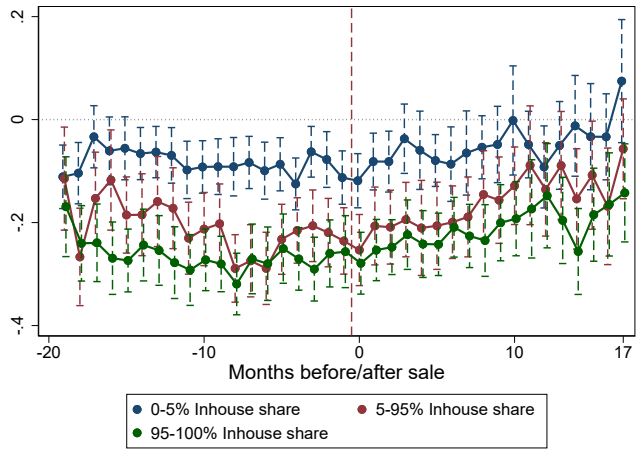
Figure 8b supplements these results by showing the raw averages for the share of in-house transactions in total imports by value. Prior to 2022, around 70% of total imports (by value)

[27] It's possible that some of these inputs were made using proprietary know-how that other firms cannot replicate. Alternatively, these inputs may have been highly specialized for specific production characteristics, requiring a lot of time for other firms to reproduce them accurately. Due to increasing returns to scale, it's also possible that no other firm could supply these highly specialized inputs at a sufficiently low price. These alternatives cannot be distinguished based on the available data.

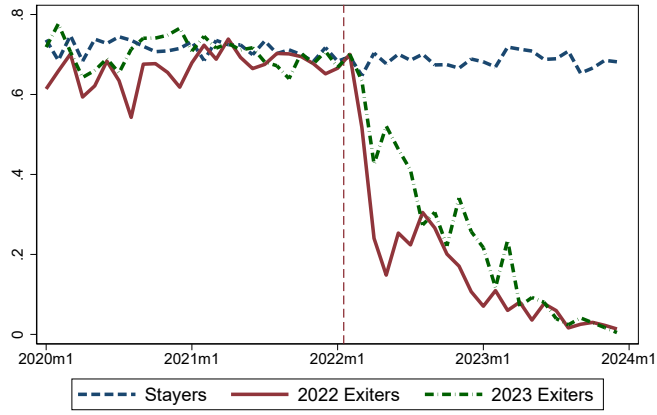
[28] Specifically, 25% of all core products from all MNEs had an in-house share of no more than 5%, 22% had a share between 5 and 95%, and 53% had a share above 95%. Much of this variation arises across different products within the same firm. In fact, 67% of MNEs had some core products with an in-house share of no more than 5%, 70% had products with a share between 5 and 95%, and 82% had products with a share above 95%.

Figure 8: Role of in-house transactions in imports of core products

(a) Share of imported core products by product group



(b) Share of in-house imports in total imports by exit status



Notes: Panel (a) plots estimated β_e from equation (1). All core products are divided into 3 groups based on the 2017–2019 share of in-house imports in total imports of each core product. For each group of core products, the monthly share of currently imported core products of this group in the total number of core products of this group is computed. Then, such a share is used as a dependent variable. So, panel (a) plots estimates from 3 such regressions. The y-axis shows changes in shares (so that -0.1 means a decline of 10 percentage points). Only firm-month observations with positive imports are kept in the sample. The sample consists of 165 "exiters" and 375 "stayers". Each coefficient is estimated relative to all of the pre-war months (which form the omitted category). The last 3 point estimates for months 18-20 are omitted as outliers with very few observations in the "exited" group. The bars represent 95% confidence intervals. Standard errors are clustered at the firm level.
Panel (b) plots the average monthly share of in-house imports in total imports for all firms within each status. All "exiters" that were sold after 2023 are not included in this panel, while the averages for 2022 and 2023 "exiters" are plotted separately. Firm-month observations with no imports are not included in the calculation of averages.

for all MNEs were supplied in-house. For those MNEs who remained in the Russian market, this share remained remarkably constant throughout 2022 and 2023. For the "exiters", however, this share has collapsed to practically zero. Figure A4b in the Appendix confirms that there is a sharp collapse in this share immediately after the sale, and it never recovered.

Overall, the results from Figure 8b are hardly surprising. MNEs who decided to leave the Russian market were essentially forced to sell their business at very low non-market prices. They did so in a country where the recently adopted set of laws encouraged the new local owners to produce exactly the same products and services as before, with exactly the same technology, thereby completely robbing foreign headquarters of their intellectual property rights. Because of that, foreign headquarters clearly had no incentives to continue supplying anything to their former affiliates.

The surprising part of Figure 8 rests entirely in panel (a). It reveals a remarkably strong connection between the apparent substitutability of each core product and its 2017–2019 in-house share. Within just a couple of months after the sale, the difference between the "stayers" and the "exiters" in imports of core products with low in-house share became insignificant. In contrast, the same difference for core products with high in-house share has remained large and significant

even a year and a half after the sale. Thus, it appears that the main reason why the new local owners could not continue their business "as usual" is the large share of in-house transactions that seemingly kept MNEs' technology safe from being copied without the headquarters' permission.

3.4 Robustness

In this Section, I tie up the remaining loose ends by conducting several robustness checks.

Exposure to sanctions. Recall from Table 1 that "exiters" were more exposed to future trade sanctions than the "stayers". Specifically, 56% of their 2017–2019 imports would be subject to trade sanctions imposed since 2022, compared with 45% for "stayers". Although this difference is statistically significant, it seems unlikely that an 11% difference could account for the more than 60% gap in total imports shown in Figure 3a.

Still, to check for this possibility and especially to verify the robustness of my central results in Figure 4, I balance the treatment and control group on their exposure to future sanctions, that is, on the share of 2017–2019 imports that would be subject to sanctions since 2022. Specifically, I take 116 "exiters" who sold their business in 2022 and 2023. For each such firm, I take 2 closest neighbors from 375 "stayers" based on the firm-level sanctions exposure. As a result, I end up with 165 "stayers" in the control group. Figure A5 in the Appendix shows the distribution of exposure to future sanctions both for my original sample and for this newly constructed balanced sample. The new distribution is very similar across "exiters" and "stayers" as a direct result of the balancing (nearest-neighbor matching).[29]

Furthermore, Table A2 in the Appendix reports balance tests across two groups on a new balanced sample in exactly the same way as Table 1. While the control group was chosen based on the sanctions exposure only, the rest of the variables appear to be reasonably balanced as well. Most importantly, there are no significant differences in the country exposure for the treatment and control groups. As before, the "exiters" are significantly larger than the "stayers", but otherwise there are hardly any differences.[30]

Figure 9 replicates my central Figure 4 on this balanced subsample, and the results are very similar, both for the extensive and the intensive margins of adjustment. This implies that the exposure to sanctions can not explain the lack of recovery in imports of core products by the new local owners of former multinational affiliates.

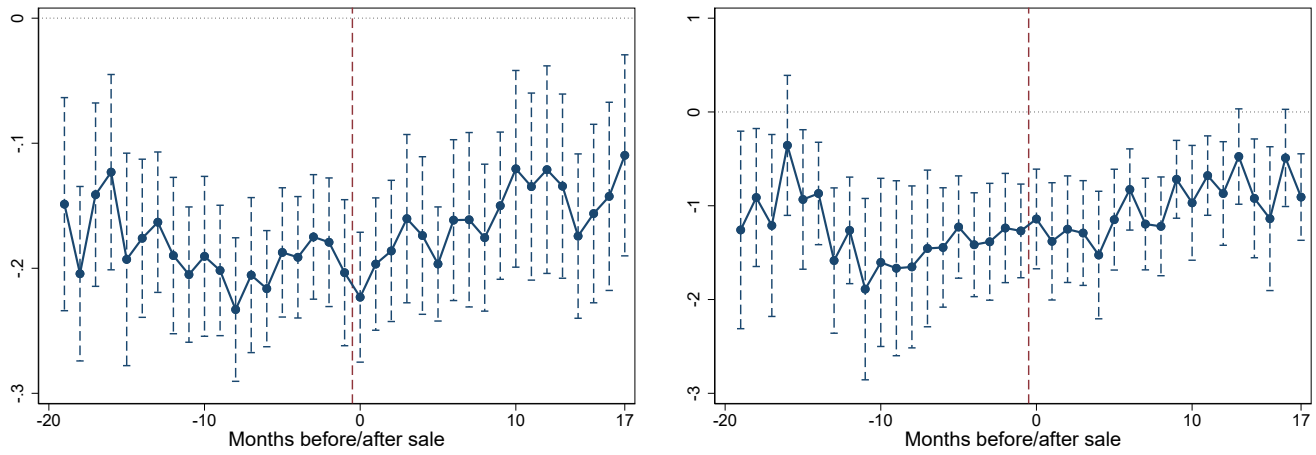
[29] Two groups were balanced on the share of their total imports that would be sanctioned. Once this share is balanced, the share of to-be-sanctioned *core* imports also becomes balanced, at 52% for both treatment and control groups.

[30] The share of in-house imports in core products is even larger for "stayers", but this does not appear to pose a major problem for my analysis. Following the discussion of the mechanism in Section 3.3, if anything, this difference suggests that the effects of an exit would have been even larger for the control group had it been treated.

Figure 9: Lack of recovery in the imports of core products by former MNEs, balanced sample

(a) Extensive margin: share of imported core products

(b) Intensive margin: log of imports of continuing core products



Notes: This Figure plots estimated β_e from equation (1). Panel (a) uses the share of all core products currently imported as the dependent variable, while panel (b) uses the log of the value of those core products that continue to be imported at least once after the sale (and after the start of the war for "stayers"). The y-axis in panel (a) shows changes in shares (so that -0.1 means a decline of 10 percentage points), while the y-axis in panel (b) shows the log-points. Only firm-month observations with positive imports are kept in the sample. The sample consists of 116 "exiters" and 165 "stayers", which are chosen to balance the exposure to future sanctions with the "exiters". Each coefficient is estimated relative to all of the pre-war months (which form the omitted category). The last 3 point estimates for months 18-20 are omitted as outliers with very few observations in the "exited" group. The bars represent 95% confidence intervals. Standard errors are clustered at the firm level.

To take this argument even further, I next make a distinction between core products sanctioned at least by one country vs core products not sanctioned by any country. Within my balanced sample of firms, I compute a share of imported non-sanctioned core products (in the total number of non-sanctioned core products) and the log of imports of non-sanctioned continuing core products. After that, I repeat the same analysis as in Figures 9 and 4. It's worth emphasizing that this regression design controls for the effects of sanctions twice. First, only non-sanctioned core products are used in all of the calculations, and thus there is no *direct* effect of sanctions. Second, this is done on a subsample of firms with similar overall exposure to sanctions. This way, I make sure to exclude the *indirect* effect of sanctions through the rest of the imports.

Figure A6 in the Appendix plots the results. There overwhelming majority of all core products were sanctioned at least by one country[31], and that's why these estimates are considerably noisier than before, especially for the intensive margin. Still, at least the point estimates are not too different from Figures 9, which confirms the lack of recovery in core imports for the subset of non-sanctioned core products.

[31]In the balanced sample, the share of sanctioned products within all core products is 84% for "exiters" and 81% for "stayers" (the difference is insignificant at 10% level).

Rerouting under misreported product codes. In my main results in Section 3.1, I document a persistent decline in imported core products among former affiliates of MNEs. Although the same pattern holds for a subset of non-sanctioned products (see Figure A6), it remains possible that some core products were misreported under different product codes to circumvent trade sanctions. Moreover, Chupilkin et al. (2024) estimate that, although imports of brands associated with exiting MNEs initially declined more than those of other brands, this effect was later offset by increased rerouting of these brands through neutral countries. To address this concern, I repeat my analysis at the brand level rather than the product level to ensure that the same core inputs were not imported under different product codes.

It's quite challenging to identify all brands of a particular MNE based on their names alone, since a single MNE typically owns many different brands.[32] Therefore, I focus instead on all brands of imported core products supplied in-house. Importantly, this includes brands not only from the same MNE but also from any other firm, as long as they were supplied in-house by the MNE in question. Specifically, for each firm, I define the list of *core* brands as all brands in the in-house imports of core products during 2017–2019. Similarly, a continuing core brand is any core brand imported at least once since 2022 (under the new ownership) for "stayers" ("exiters"). I then repeat my analysis at the core-brand level rather than the core-product level. In this way, all rerouted imports identified in Chupilkin et al. (2024) should still appear as continuing core brands in this analysis.

Figure A7 in the Appendix plots the estimated coefficients for the share of imported core brands and for the log of imports of continuing core brands. The results are even stronger than those in my baseline Figure 4. Notably, there is virtually no recovery in imports of core brands, neither along the extensive nor the intensive margin. Thus, Chupilkin et al. (2024) appear to capture the rerouting of *final* products of exiting MNEs, consistent with strong demand from Russian consumers.[33] In contrast, I show that there was no rerouting of *inputs* of exiting MNEs. Both results are consistent with the incentives of foreign headquarters. In particular, they have little incentive to prevent their final products from entering Russia, since they continue to earn full profits from these shipments. By contrast, supplying core inputs would allow new local owners to free-ride on proprietary technology, thereby reducing these profits.

Alternative definitions of core products. In my baseline analysis, I define core products as products imported each year during 2017–2019. This choice enables me to test for the heterogeneity in sensitivity of my treatment and control groups to major shocks such as the Covid-19 pandemic in Figure 2b. Here, I show that my results remain robust to alternative definitions of core products.

[32]For example, 3M owns Post-it, Scotch, Command, Nexcare, Filtrete, Meguiar's, and Peltor, among many others.

[33]See the discussion at the end of Section 2.3 for more details.

As a more conservative approach, I define core products as those that were still imported despite the Covid-19 pandemic. Thus, I restrict this definition to those products that were imported each year during 2017–2021. Note that each definition changes not only which products are considered to be core but also the sample of firms. In particular, this definition restricts my sample to those MNEs that imported each year during 2017–2021. As a less strict and more up-to-date definition, I define core products as those that were imported both in 2020 and in 2021.

In my baseline sample, the average firm had 78 core products (see Table 1). In contrast, the more conservative definition of core products results in an average of 65 products, while the more liberal definition expands the set of core products to an average of 86 products. I replicate my central Figure 4 for each definition, and report results in Figure A8 in the Appendix. Neither definition of core products changes the results in a significant way.

Alternative definitions of a firm. In my baseline analysis, I treat parts of the same MNE sold separately as different firms, both before and after the sale. Here, I verify that my central results remain robust to two alternative ways to define a firm.

As a first option, I exclude from my baseline sample all MNEs that were split during their sale. As a result, all firms in Russia are defined by the name of their pre-2022 MNE. Note that this is a firm definition with the highest level of aggregation possible (and the smallest sample size). I repeat my analysis on this subsample, and report the results in the upper half of Figure A9 in the Appendix.

As a second option, I consider the opposite of the first option. Namely, I define each firm by the way it is registered in Russia (or, the same, by its unique tax number in Russia). This way, each MNE may own more than one importing firm in Russia: the average number of importing firms per MNE is 1.33, while the maximum is 12. This option is the complete opposite of the previous one because it's the lowest level of aggregation at which data on imports is still available (correspondingly, the sample size increases from 540 firms to 644[34]). I repeat my baseline analysis, but cluster standard errors not only at the firm level but also at the MNE level (across all firms that used to be part of the same MNE prior to 2022). The results are in the bottom half of Figure A9 in the Appendix.

Overall, my central findings barely change under either definition of a firm.

4 Conclusion

In this paper, I have shown how MNEs can deliberately withdraw access to their technologies from a former host country, even when they no longer have protection under international law.

[34]There were 719 importing firms that belonged to the 540 MNEs in my baseline sample. However, only 644 firms imported every year during 2017–2019, and thus core products can be defined only for this subsample.

Specifically, they can cut off the supply of those core inputs that were previously supplied mostly in-house – that is, within the same firm of a global MNE. These inputs may have been highly specialized or produced using technology unavailable to other firms. In either case, the new local owners of former multinational affiliates were unable to switch to alternative suppliers, resulting in the complete loss of these inputs from their production. Instead, they replaced them with new inputs that were not imported under the previous foreign headquarters' management. As a result, the former affiliates used a different set of inputs, produced a different set of products, and had significantly lower revenue than multinational affiliates that remained under the management of foreign headquarters.

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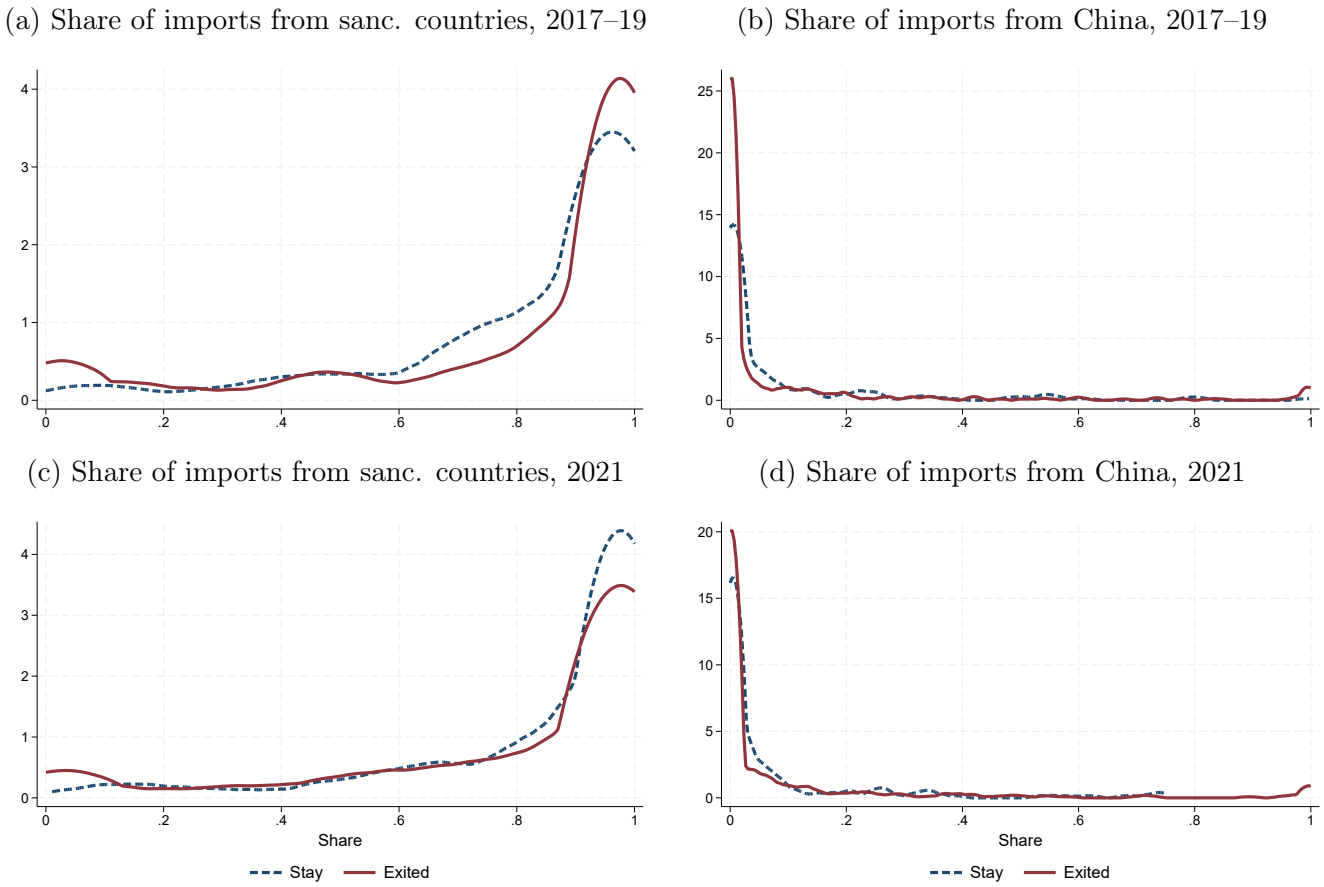
A Appendix

Table A1: Balance tests between "exiters" and "stayers", 2020–2021

	"Exiters"	"Stayers"	Difference	St. error
Revenue, bln rubles	24.90	12.68	12.21***	4.05
Profits-to-revenue, % points	6.29	5.13	1.16	0.89
Revenue growth rate, annual, % points	27.46	25.71	1.75	3.83
Imports, mln dollars	99.97	73.82	26.15	23.38
# of foreign suppliers of core products	65.14	39.48	25.66***	8.25
# of core imported products	93.70	63.39	30.31***	9.40
Share of core products in all products	0.45	0.45	0.001	0.020
Share of core imports in total imports	0.83	0.88	-0.052**	0.021
Share of in-house imports in core imports	0.59	0.64	-0.055	0.036
Share of to-be-sanctioned imports	0.57	0.45	0.12***	0.03
Share of imports from China	0.074	0.089	-0.015	0.017
Share of imports from sanctioning countries	0.84	0.80	0.04*	0.02
Share of branded products in imports	0.78	0.83	-0.045*	0.027
Number of firms	165	375		

Notes. Columns "exiters" and "stayers" display averages for each variable during 2020–2021 for each group of firms. The next two columns show the coefficients and robust standard errors from a corresponding regression with a constant and with a dummy for the exit status. Core imports mean the total value of all imported core products. $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$. For the same statistics based on 2017–2019 data, see Table 1.

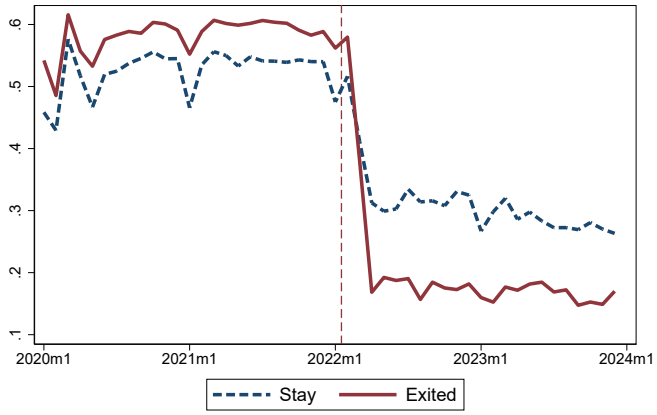
Figure A1: Country exposure in imports by exit status



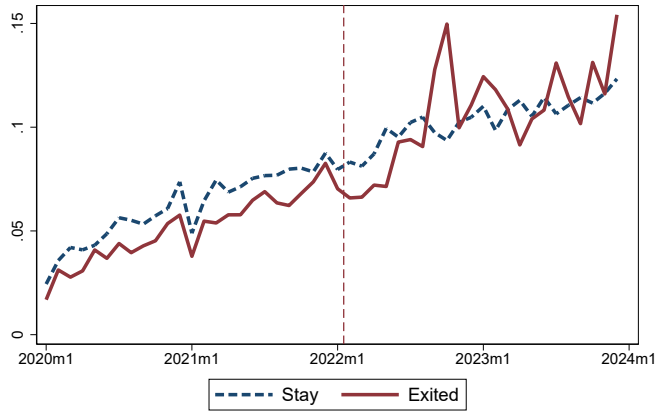
Notes: This Figure plots the distribution of the share of imports from two groups of countries for 165 "exiters" and 375 "stayers". Panels (a) and (b) show the averages for 2017–2019, while panels (c) and (d) show the data for 2021. Panels (a) and (c) show the distribution of the share of imports from sanctioning countries (EU, US, UK, Taiwan, South Korea, Switzerland, Australia, Canada, Japan), while panels (b) and (d) show the same for China (Hong Kong included).

Figure A2: Average shares of core and new imported products

(a) Share of core products in imported products



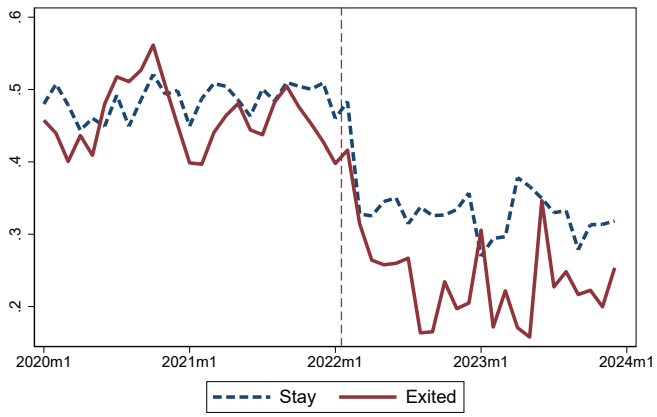
(b) Share of new products in imported products



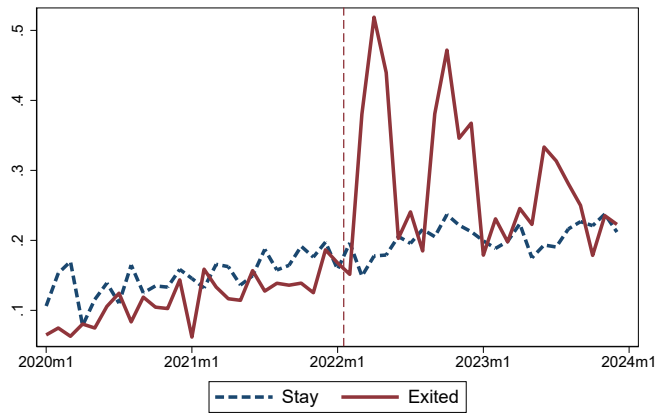
Notes: This Figure shows the monthly share of all core and new products being imported in a given month, averaged across all firms within the same exit status. Firm-month observations with no imports are dropped, so that the displayed averages are conditional on importing core products. The sample consists of 165 "exiters" and 375 "stayers".

Figure A3: Average shares of core and new exported products

(a) Share of core products in exported products



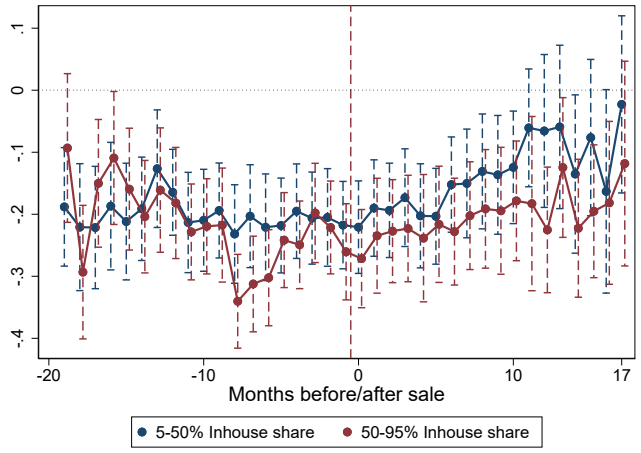
(b) Share of new products in exported products



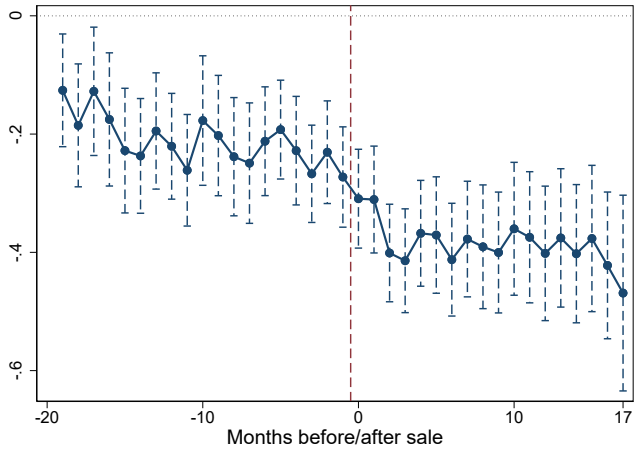
Notes: This Figure shows the monthly share of all core and new products being exported in a given month, averaged across all firms within the same exit status. Firm-month observations with no exports are dropped, so that the displayed averages are conditional on exporting. The sample consists of 102 "exiters" and 167 "stayers" for panel (a) (restricted to exporters with exports in each year during 2017–2019) and of 144 "exiters" and 317 "stayers" for panel (b) (restricted to exporters with any exports in 2017–2019).

Figure A4: Additional results on the share of in-house imports

(a) Share of imported core products by product group



(b) Share of in-house imports in total imports,



Notes: Panels (a) and (b) plot estimated β_e from equation (1). The y-axis shows changes in shares (so that -0.1 means a decline of 10 percentage points). Only firm-month observations with positive imports are kept in the sample. The sample consists of 165 "exiters" and 375 "stayers". Each coefficient is estimated relative to all of the pre-war months (which form the omitted category). The last 3 point estimates for months 18-20 are omitted as outliers with very few observations in the "exited" group. The bars represent 95% confidence intervals. Standard errors are clustered at the firm level.
In panel (a), all core products are divided into 2 groups based on the 2017–2019 share of in-house imports in total imports of each core product. For each group of core products, the monthly share of currently imported core products of this group in the total number of core products of this group is computed. Then, such a share is used as a dependent variable. So, panel (a) plots estimates from 2 such regressions.
In panel (b), the dependent variable is the share of in-house imports in total imports.

Table A2: Balance tests between "exiters" and "stayers", 2017–2019, balanced sample

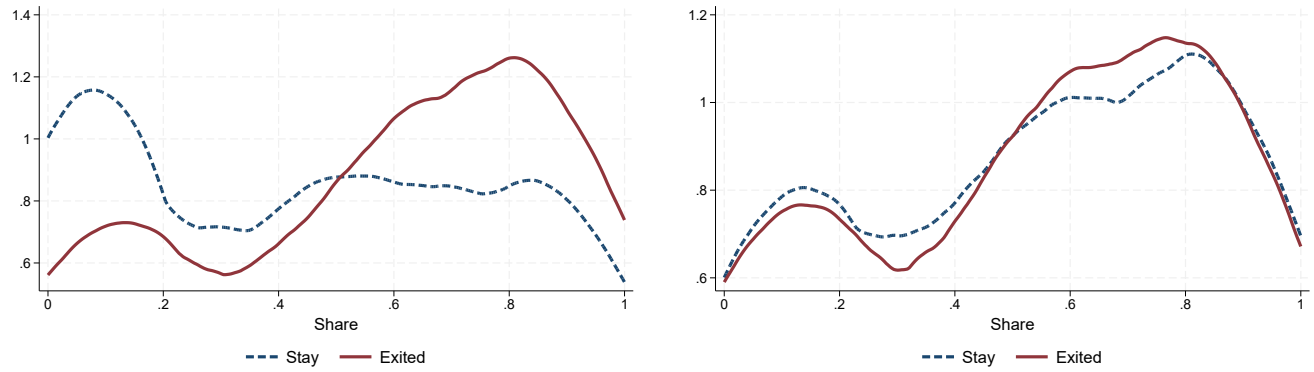
	"Exiters"	"Stayers"	Difference	St. error
Revenue, bln rubles	22.50	7.38	15.13***	4.20
Profits-to-revenue, % points	5.30	3.91	1.39	1.02
Revenue growth rate, annual, % points	41.53	29.55	11.98	31.79
Imports, mln dollars	105.75	60.90	44.85	30.52
# of foreign suppliers of core products	54.78	30.72	24.05***	8.81
# of core imported products	107.22	57.52	49.70***	12.62
Share of core products in all products	0.41	0.37	0.040*	0.022
Share of core imports in total imports	0.87	0.89	-0.027	0.025
Share of in-house imports in core imports	0.57	0.70	-0.134***	0.044
Share of to-be-sanctioned imports	0.54	0.53	0.007	0.04
Share of imports from China	0.068	0.051	0.017	0.017
Share of imports from sanctioning countries	0.84	0.86	-0.02	0.03
Share of branded products in imports	0.83	0.82	0.008	0.033
Number of firms	116	165		

Notes. Columns "exiters" and "stayers" display averages for each variable during 2017–2019 for each group of firms. The next two columns show the coefficients and robust standard errors from a corresponding regression with a constant and with a dummy for the exit status. Core imports mean the total value of all imported core products. $^{*}p < 0.10$, $^{**}p < 0.05$, $^{***}p < 0.01$

Figure A5: Exposure to future trade sanctions by exit status

(a) Share of to-be-sanctioned imports, original sample

(b) Share of to-be-sanctioned imports, balanced sample

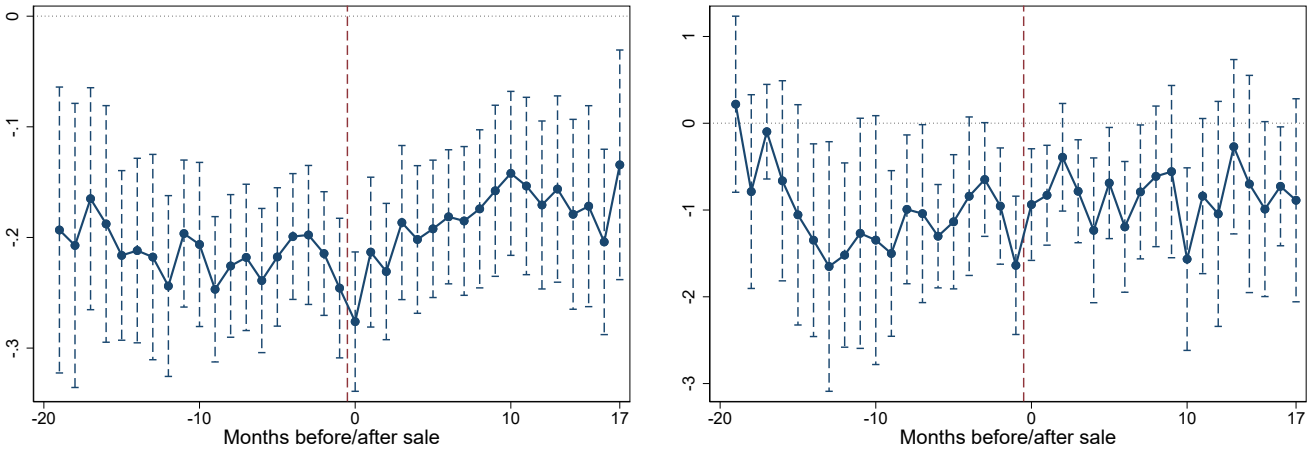


Notes: This Figure plots the distribution of the share of 2017–2019 imports that would be subject to sanctions since 2022. One observation consists of one firm. Panel (a) is based on 165 "exiters" and 375 "stayers", while panel (b) is based on 116 "exiters" and 165 "stayers".

Figure A6: Lack of recovery in the imports of core products by former MNEs, balanced sample and non-sanctioned products only

(a) Extensive margin: share of non-sanctioned imported core products

(b) Intensive margin: log of imports of non-sanctioned continuing core products

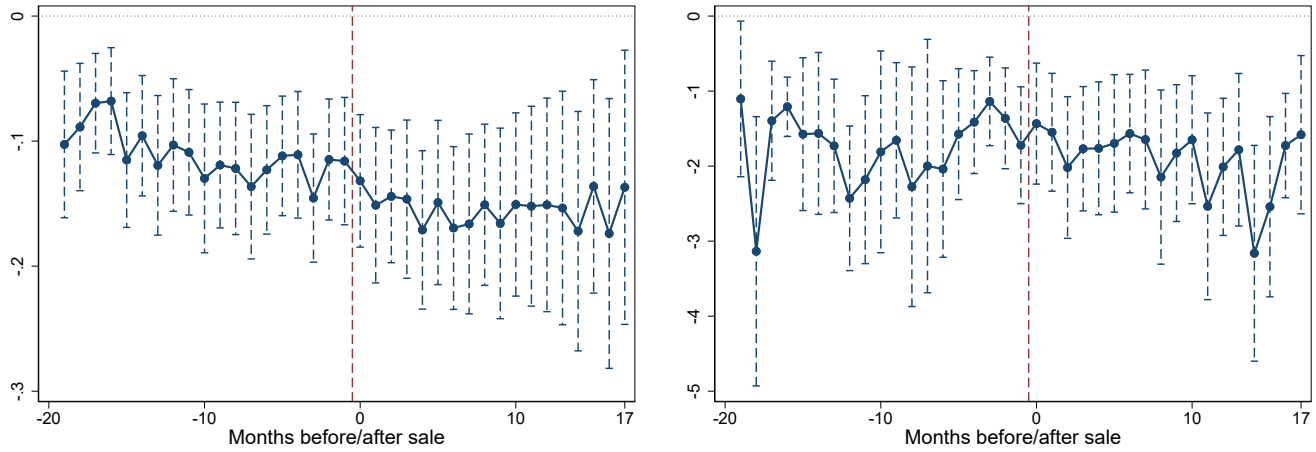


Notes: This Figure plots estimated β_e from equation (1). Panel (a) uses the share of non-sanctioned core products currently imported in all non-sanctioned core products as the dependent variable, while panel (b) uses the log of the value of those non-sanctioned core products that continue to be imported at least once after the sale (and after the start of the war for "stayers"). The y-axis in panel (a) shows changes in shares (so that -0.1 means a decline of 10 percentage points), while the y-axis in panel (b) shows the log-points. Only firm-month observations with positive imports are kept in the sample. The sample consists of 116 "exiters" and 165 "stayers", which are chosen to balance the exposure to future sanctions with the "exiters". Each coefficient is estimated relative to all of the pre-war months (which form the omitted category). The last 3 point estimates for months 18-20 are omitted as outliers with very few observations in the "exited" group. The bars represent 95% confidence intervals. Standard errors are clustered at the firm level.

Figure A7: Lack of recovery in the imports of core brands by former MNEs

(a) Extensive margin: share of imported core brands

(b) Intensive margin: log of imports of continuing core brands

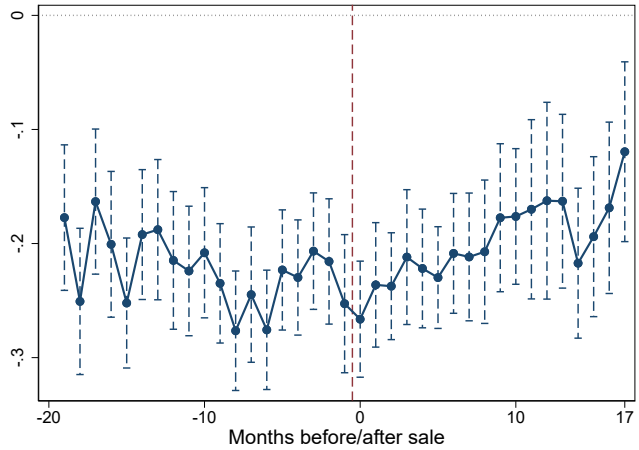


Notes: This Figure plots estimated β_e from equation (1). Panel (a) uses the share of all core brands currently imported as the dependent variable, while panel (b) uses the log of the value of those core brands that continue to be imported at least once after the sale (and after the start of the war for "stayers"). The y-axis in panel (a) shows changes in shares (so that -0.1 means a decline of 10 percentage points), while the y-axis in panel (b) shows the log-points. Only firm-month observations with positive imports are kept in the sample. The sample consists of 165 "exiters" and 375 "stayers". Each coefficient is estimated relative to all of the pre-war months (which form the omitted category). The last 3 point estimates for months 18-20 are omitted as outliers with very few observations in the "exited" group. The bars represent 95% confidence intervals. Standard errors are clustered at the firm level.

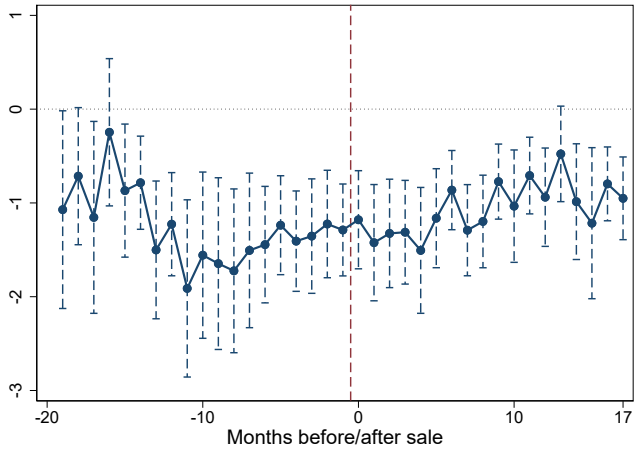
Figure A8: Lack of recovery in the imports of core products by former MNEs, alternative definitions of core products

I) Core products as those imported each year during 2017–2021

(a) Extensive margin: share of imported core products

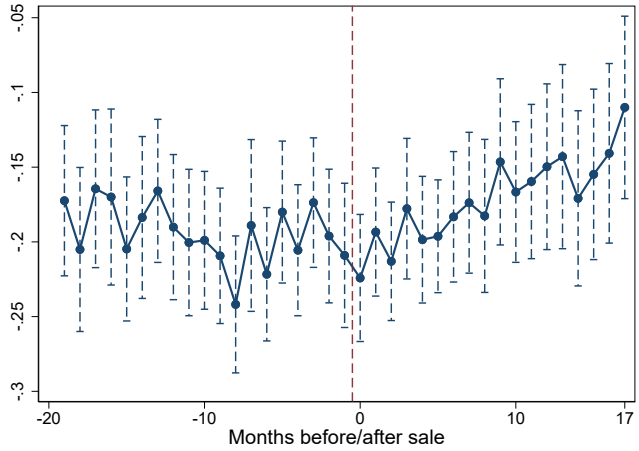


(b) Intensive margin: log of imports of continuing core products

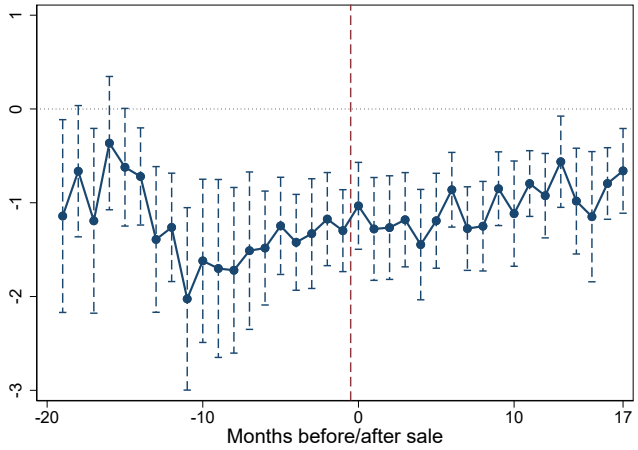


II) Core products as those imported each year during 2020–2021

(c) Extensive margin: share of imported core products



(d) Intensive margin: log of imports of continuing core products

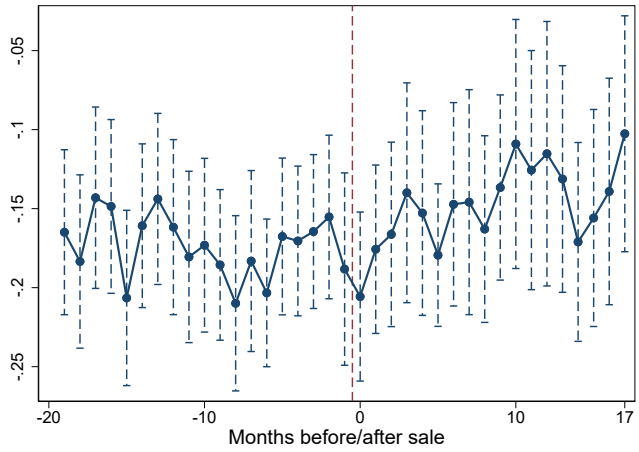


Notes: This Figure replicates Figure 4 under two alternative core product definitions. Specifically, this Figure plots estimated β_e from equation (1). Panels (a) and (c) use the share of core products currently imported in all core products as the dependent variable, while panels (b) and (d) use the log of the value of those core products that continue to be imported at least once after the sale (and after the start of the war for "stayers"). The y-axes in panels (a) and (c) show changes in shares (so that -0.1 means a decline of 10 percentage points), while the y-axes in panels (b) and (d) show the log-points. Only firm-month observations with positive imports are kept in the sample. In the upper part I of the Figure, core products are defined as products imported each year during 2017–2021. The sample of corresponding firms consists of 162 "exiters" and 372"stayers". In the bottom part II of the Figure, core products are defined as products imported both in 2020 and in 2021. The sample consists of 177 "exiters" and 410 "stayers". Each coefficient is estimated relative to all of the pre-war months (which form the omitted category). The last 3 point estimates for months 18-20 are omitted as outliers with very few observations in the "exited" group. The bars represent 95% confidence intervals. Standard errors are clustered at the firm level.

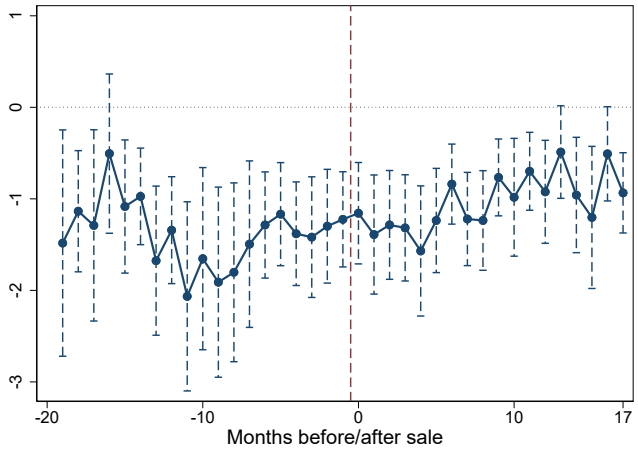
Figure A9: Lack of recovery in the imports of core products by former MNEs, alternative firm definitions

I) Subsample of firms defined at the MNE level

(a) Extensive margin: share of imported core products

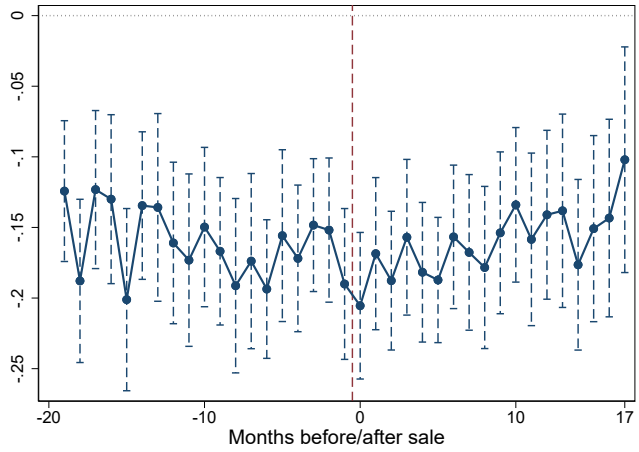


(b) Intensive margin: log of imports of continuing core products

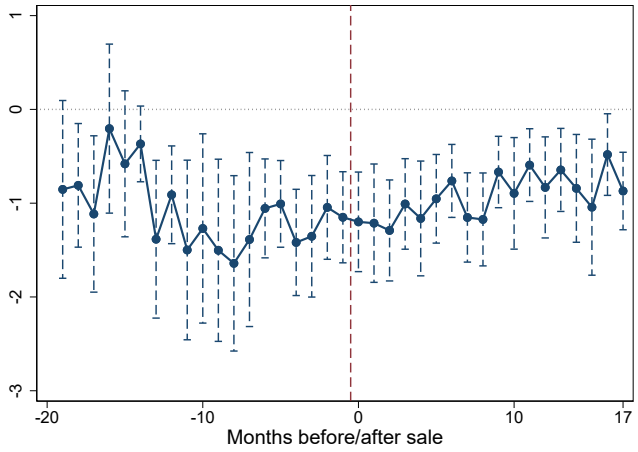


II) Firms defined by the unique tax number

(c) Extensive margin: share of imported core products



(d) Intensive margin: log of imports of continuing core products



Notes: This Figure replicates Figure 4 under two alternative firm definitions. Specifically, this Figure plots estimated β_e from equation (1). Panels (a) and (c) use the share of core products currently imported in all core products as the dependent variable, while panels (b) and (d) use the log of the value of those core products that continue to be imported at least once after the sale (and after the start of the war for "stayers"). The y-axes in panels (a) and (c) show changes in shares (so that -0.1 means a decline of 10 percentage points), while the y-axes in panels (b) and (d) show the log-points. Only firm-month observations with positive imports are kept in the sample. In the upper part I of the Figure, "exiters" with multiple dates of sales were dropped from the sample. As a result, the sample consists of 151 "exiters" and 375 "stayers". In the bottom part II of the Figure, the same MNEs are broken down into individual firms as defined by their unique tax numbers in Russia. As a result, the sample consists of 195 "exiters" and 449 "stayers". Each coefficient is estimated relative to all of the pre-war months (which form the omitted category). The last 3 point estimates for months 18-20 are omitted as outliers with very few observations in the "exited" group. The bars represent 95% confidence intervals. In the upper part I of the Figure, standard errors are clustered at the firm level, while in the bottom part II of the Figure, they are clustered at the MNE level (that may consist of multiple firms).