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Oil Laundering:
How did Russian oil circumvent the European Union's embargo? †

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Abstract

This paper examines whether the EU's 2022 embargo on Russian crude and refined oil unintentionally encouraged "oil laundering" through third-country refiners. After the ban, Russian crude prices fell, creating strong incentives for countries such as China, India, Turkey, Singapore, and the UAE to purchase discounted Russian oil, refine it, and legally re-export the resulting petroleum products to the EU. Using a gravity-model framework and event-study analysis, we show sharp and synchronized shifts in trade flows: Russian crude exports to laundromat countries surged dramatically after 2022, while EU imports of refined products from these same countries rose significantly in 2023 and 2024. These patterns suggest that Russian oil entered the EU indirectly through third-country refining. China and India appear to be the primary intermediaries. In contrast, other sanctioning countries such as the U.S., Canada, Australia, and Japan show no similar increase, and EU members exempt from the embargo also display no laundering-related import changes.

Key words: Russian oil, EU embargo, oil laundering, trade
JEL Classification: F13, F14, F51, Q41, Q48

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1. Introduction

Following Russia's invasion of Ukraine in February 2022, the European Union (EU) adopted sanction packages against Russia in June 2022 to ban seaborne imports of Russian crude oil into the EU countries from December 2022 and Russian refined oil products from February 2023.[1] Although the EU's embargo on Russian oil was implemented on an unprecedented scale to stifle Russia's war efforts, there is no clear evidence of a decline in Russia's war-fighting capability (Raghunandan et al., 2025). A series of news reports and descriptive analyses such as Thieriot et al. (2023), Itskhoki and Ribakova (2024), and Babina et al. (2026) indicate that Russian crude oil has been increasingly exported to third countries and subsequently re-exported to sanctioning EU members, typically after being processed into refined petroleum products. However, there is limited formal evidence of whether and how the EU's embargo led to oil laundering via laundromat countries.

In this paper, we empirically investigate the oil laundering hypothesis following the EU's embargo on Russian crude oil. Our central hypothesis is that Russian crude oil laundering operates through third-country refining. In response to Russia's invasion of Ukraine, the EU sharply curtailed direct imports of Russian crude and diversified its supply sources, which depressed the international price of Russian crude oil and created strong incentives for so-called laundromat countries to increase their purchases. By importing discounted Russian crude, these countries lower the cost of refined petroleum products, which are then re-exported to the EU, effectively allowing Russian oil to enter the European market through indirect channels. This circumvention exploits a loophole in EU sanctions: while direct imports of Russian crude are banned, refined oil products derived from Russian oil are not explicitly prohibited, enabling laundromat countries to legally export them to the EU. To investigate this hypothesis, we examine structural shifts in international trade patterns of crude oil and refined petroleum products following the EU's embargo. Specifically, the oil-laundering hypothesis yields two testable predictions: first, exports of Russian crude oil should rise significantly in laundromat countries with sufficient refining capacity of Urals crude oil; and second, the EU should simultaneously exhibit a marked increase in imports of refined petroleum products from these countries. If these shifts occur in synchrony, we interpret this as providing empirical support for the laundering of Russian oil through third-country refining.

To examine these predictions, we estimate a standard gravity model of international trade separately for crude oil and refined oil products. Specifically, we examine an event-time change

[1] For details, see Council regulation (EU) 2022/879 of 3 June 2022 amending Regulation (EU) No 833/2014 concerning restrictive measures in view of Russia's actions destabilising the situation in Ukraine and council decision (CFSP) 2022/884 of 3 June 2022 amending Decision 2014/512/CFSP concerning restrictive measures in view of Russia's actions destabilising the situation in Ukraine.

in the imports of crude oil from Russia to laundromat importers, which provides a statistical test of a significant shift in laundromats' imports from Russia. We then examine an event-time change in the imports of refined oil products from laundromat exporters into the EU market. This specification allows us to estimate a significant shift in EU imports of refined oil products from laundromat countries following the EU's embargo. Given that the EU's embargo led to oil laundering, we should observe no significant shift in these trade patterns before the embargo, but a significant shift subsequently. By estimating a gravity model, we identify trade circumvention after accounting for a wide range of unobserved determinants of crude and refined oil trade across exporters, importers, and periods.

The event-study analysis shows that crude oil imports from Russia into laundromat countries remained stable prior to the invasion but surged dramatically afterward, rising by 271% in 2022, 5,360% in 2023, and 10,894% in 2024. While this surge occurred from 2022, this result shows formal econometric evidence of extraordinary reorientation in Russian crude oil following Russia's invasion. Meanwhile, EU imports of refined petroleum products from laundromat countries exhibit no significant changes before the invasion, but sharp increases of 105% in 2023 and 59% in 2024 following the implementation of the EU's embargo. The synchronized timing of these shifts supports the hypothesis that sanctions unintentionally facilitated the laundering of Russian crude oil through third-country refining, allowing refined oil products derived from discounted Russian oil to enter the European market via indirect channels.

While laundromat countries are defined as China, India, Turkey, Singapore, and the UAE, we investigate exporter heterogeneity in their exports of refined oil products to the EU market. We find that China and India may have played a prominent role in the laundering of Russian crude oil following the EU's embargo. Notably, EU imports of refined petroleum products began to increase largely from China in 2022—a year marked by the energy crisis. By contrast, EU imports from India showed a marked increase in 2023 and 2024, coinciding with the enforcement of the EU's embargo. Thus, China and India emerged as key intermediaries in the laundering channel for Russian oil.

We also investigate the oil laundering hypothesis for other non-EU countries that imposed embargoes for Russian crude and refined oil products: the U.S., Canada, Australia, and Japan. We examine whether other sanctioning countries would increase refined oil product imports from laundromat countries at a similar time. We find no evidence that other sanctioning countries engage in roundabout imports of refined oils made from Russian crude oil via third countries. In addition, we conduct placebo tests by exploiting the fact that EU members such as Czechia, Hungary, and Slovakia are exempt from the EU's embargo because these countries were allowed to continue importing Russian crude oil via the southern branch of the Druzhba pipeline (Levi et al., 2025).[2] By classifying EU importers into sanctioning and non-sanctioning importers, we find that the non-sanctioning countries did not significantly increase imports of refined oil products from laundromat countries during the embargo period, as compared with the significant increase of refined oil products in sanctioning EU members.

The rest of this paper is organized as follows. Section 2 discusses the literature on trade circumvention and economic sanctions and highlights our contributions. Section 3 provides background on the EU's embargo on Russian oil. Section 4 discusses an oil laundering hypothesis and describes an empirical framework to estimate a structural shift in oil trade. Section 5 presents data sources and a descriptive analysis of import shifts in crude oil and refined petroleum products for the EU and laundromat countries. Section 6 presents the estimation results. Finally, Section 7 concludes.

2. Literature Review

This paper contributes to the rapidly growing literature on the post-2022 sanctions on Russian oil and the trade reorientation and circumvention strategies that followed. A central theme in this literature is that the combination of the EU embargo and the G7 price cap reshaped global crude oil and product flows. Prior work examines a range of mechanisms, including effective demand, transport cost, and incentives to route, blend, and re-document cargoes.

More broadly, the economics and political-science literature emphasize the dramatic rise of sanctions since 1950 and a shift from comprehensive trade embargoes toward more targeted instruments (financial, travel, and "smart" trade sanctions), while also highlighting the need to reconcile economic-impact metrics with political-success criteria (Morgan et al., 2023). An important enabling input for empirical work is the Global Sanctions Data Base (GSDB). Syropoulos et al. (2024) introduce Release 3, extending coverage to 1950–2022 and adding a unilateral-versus-multilateral indicator that facilitates gravity-based quantification of heterogeneous trade effects. In a companion overview of recent advances, Egger et al. (2024) synthesize new theory, data, and quantification strategies, underscoring active debates about effectiveness, enforcement, and measurement. These contributions motivate our focus on sector-specific (energy) sanctions and on circumvention channels that operate through vertically integrated supply chains, where restrictions on upstream crude can be undermined by downstream transformations and re-exporting.

On policy design, Johnson et al. (2023) explain how the "price cap" differs from a conventional price ceiling: rather than controlling a consumer price, the mechanism conditions access to Western maritime services (shipping, insurance, finance, and brokering) on compliance

[2] While the EU granted Bulgaria an exemption from the embargo of Russian crude oil until the end of 2024, Bulgaria officially ceased all imports of Russian crude oil on March 1, 2024.

attestations that the purchase price of Russian oil is at or below the cap. This framework clarifies how the coalition sought to reduce Russian export revenues while sustaining global supply, and why enforcement hinges on auditing and documentation across complex supply chains. An important empirical contribution is Kilian et al. (2025), who quantify the impact of the EU embargo and the price cap on Russian export prices. They show that the embargo induced a large discount on Urals crude oil: a substantial portion of this discount is attributed to higher shipping costs as exports were diverted to more distant destinations, with an additional role for increased buyer bargaining power. Spiro et al. (2025) synthesize evidence on the EU import embargo and the G7 price cap and emphasize that the embargo likely generated the first-order reduction in Russian oil income by increasing transport costs and creating a buyer's discount, while the price cap operated mainly through transport-service restrictions rather than through a binding price ceiling.

Babina et al. (2026) use newly assembled Russian customs data and present transaction-level evidence on export prices, volumes, and revenues around the embargo and the price-cap implementation. They document a sharp decline in Russian oil export revenues in early 2023, driven by lower volumes, lower global prices, and wider discounts. They report patterns consistent with systematic non-compliance in some market segments, underscoring the role of enforcement and evasion. In addition, recent policy and descriptive work highlight how circumvention can occur through third countries and refined products. Partsvania (2025) discusses the EU's efforts to close loopholes that allow refined products produced from Russian crude in third countries to enter Western markets under new customs codes and origins, and reviews enforcement challenges related to shadow fleets, port logistics, and re-documentation. This policy debate directly motivates the "laundering via refining" channel analyzed in this paper.

Taken together, the literature suggests that post-2022 oil sanctions operate through intertwined price, logistics, and compliance channels, and that third-country refining can provide a legally and logistically plausible route for sanction circumvention.[3] Our contribution is to provide formal, trade-based evidence consistent with a laundering mechanism. First, we provide the first formal econometric evidence that the EU's embargo on Russian crude oil unintentionally facilitated laundering through third-country refining. The synchronized surge in Russian crude flows to laundromat countries and refined-product exports back to the EU indicates an active circumvention channel. Second, we show substantial heterogeneity among intermediaries: while most laundromat countries increased crude imports from Russia, only China and India substantially expanded refined-product exports to the EU. Other sanctioning countries (U.S., Canada, Japan, Australia) did not exhibit similar patterns, and non-sanctioning EU members

[3] Sanctions also induce covert circumvention strategies such as "dark shipping": tankers disabling automatic identification system transceivers (Fernández-Villaverde et al., 2025).

(Czechia, Hungary, Slovakia) show no increase in refined-product imports—confirming the embargo as the causal driver. Taken together, we improve our understanding of sanctions in vertically integrated supply chains by showing that upstream-only restrictions may be undermined unless downstream products or traceability mechanisms are also regulated.

3. The European Union's Sanctions against Russian Oil

Following Russia's invasion of Ukraine in February 2022, the EU progressively expanded energy-related sanctions against Russia. The cornerstone measures for oil were (i) an embargo on seaborne imports of Russian crude oil into the EU from 5 December 2022 and of refined petroleum products from 5 February 2023, and (ii) the G7/EU price-cap regime applied to Russian seaborne exports to third countries, which are implemented for crude oil in December 2022 and for petroleum products in February 2023.[4] Under the price-cap framework, access to key Western maritime services is conditional on documentation that the purchase price is at or below the cap, which was designed to keep Russian oil flowing to global markets while reducing the revenue per barrel (Johnson et al., 2023).

These developments created strong incentives for third-country refiners and traders to arbitrage discounted Russian crude into refined products that can be shipped under new origin designations. Partsvania (2025) emphasizes that a key enforcement challenge is to prevent refined products derived from Russian crude from entering EU markets through third countries, and discusses recent EU efforts to tighten anti-circumvention measures. Our focus on refining-based "laundering" channels is directly aligned with current policy concerns about the effectiveness and enforceability of oil sanctions.

The tightening of restrictions during 2024–2025—particularly those aimed at so-called "shadow fleet" tankers and re-export activities—further illustrates the dynamic, iterative nature of the sanction regime. As Russia increasingly relied on a large fleet of aging, non-transparent vessels operating outside Western insurance and classification systems, the EU and G7 moved to limit the sale of such ships, enhance due diligence requirements, and impose penalties on entities facilitating deceptive shipping practices such as flag-hopping, automatic identification system manipulation, and falsified cargo documentation. Restrictions on re-exports of dual-use goods and advanced technology were also strengthened, reflecting concerns that illicit supply chains were enabling Russia to sustain military production despite formal prohibitions.

[4] The U.S. policy increasingly incorporated secondary pressure on third countries. In August 2025, the U.S. announced sharply higher tariffs on Indian imports—explicitly linked to India's continued purchases of discounted Russian oil—to induce alignment with Western energy sanctions. Similarly, the U.S. expected that Japan would phase out or terminate imports of Russian natural gas.

4. Empirical Framework

This section examines various forms of oil laundering, with particular attention to the hypothesis that Russian oil may bypass the EU embargo by undergoing refining in third countries. To assess this channel of oil laundering, we present an empirical model of international trade designed to test whether observed structural shifts in global trade patterns align with the laundering hypothesis.

4.1. Oil Laundering Hypothesis

Our central hypothesis is that Russian crude oil laundering operates through third-country refining. Following Russia's invasion of Ukraine, the EU sharply curtailed direct imports of Russian crude oil and diversified its supply sources. This shift depressed the international price of Russian crude oil, creating a strong incentive for laundromat countries to increase their purchases. As these countries import discounted Russian crude oil, the cost of refined oil products derived from it also falls. These refined oil products are then exported to the EU, effectively allowing Russian oil to enter the European market through indirect channels. This circumvention exploits a loophole in the EU sanctions: while direct imports of Russian crude were banned, refined oil products *made from* Russian oil were not explicitly prohibited, enabling laundromat countries to legally export them to the EU.

We investigate the hypothesis of Russian oil laundering by examining structural shifts in international trade patterns of crude oil and refined petroleum products. The hypothesis yields two testable predictions. First, following Russia's invasion of Ukraine and the EU's embargo, exports of Russian crude oil should rise significantly in laundromat countries with adequate capacity to refine Russian Ural crude oil. Second, during the same period, the EU should exhibit a marked increase in imports of refined petroleum products from these laundromat countries. If these shifts in trade patterns occur with synchronized timing, they provide empirical support for the laundering of Russian oil through third-country refining.

For the purposes of our hypothesis, we define laundromat countries as markets that have simultaneously increased their imports of Russian crude oil and exports of refined petroleum products following Russia's invasion of Ukraine. Drawing on the descriptive analysis by the Centre for Research on Energy and Clean Air (Thieriot et al., 2023), we focus on five countries that meet this criterion: China, India, Turkey, Singapore, and the UAE. In their study, these countries are identified based on Kpler shipment-tracking data, which trace crude oil flows and indicate trade patterns in these five markets consistent with the laundering mechanism described in our hypothesis.

Before outlining the empirical strategy, it is important to acknowledge several limitations. First, oil laundering can take multiple forms—including ship-to-ship transfers, falsified customs documentation to obscure the origin of crude oil, and transshipment of crude and refined oil products through third-party countries. These practices may not be fully captured in publicly available database on international trade such as UN Comtrade, making it difficult to precisely quantify the extent of laundering activities linked to laundromat countries.

Second, our hypothesis assumes that laundromat countries import Russian crude oil for refining and subsequently export the resulting petroleum products to the EU. However, trade data do not contain information on whether refined oil products imported into the EU are processed using Russian crude oil or other legitimate sources. Laundromat countries may consume Russia-derived products domestically while exporting refined oil products made from non-Russian crude. For example, media news reports that Saudi Arabia has become the major importer of Russian crude oil, despite being a major crude oil exporter itself. Saudi Arabia imports Russian crude oil for its domestic use, such as transportation, whereas it exports its own crude oil to Western countries, particularly the EU.[5] As such, our analysis cannot explicitly detect the illicit blending of sanctioned and legitimate oil streams, nor can it directly trace the origin of refined oil products at the molecular level.

4.2. Empirical Model

To empirically investigate the hypothesis of Russian oil laundering, we estimate a standard gravity model of international trade separately for crude oil and refined oil products. First, we examine an event-time change in the imports of crude oil from Russia to laundromat importers by estimating the following model for exporter *i*, importer *j*, and year *t*:

$$E_{ijt} = \exp\left(\alpha + \sum_{k\neq -1} \beta_k RU_i \cdot LD_j \cdot \mathbf{1}(t = 2022 + k) + \pi_{ij} + \kappa_{it} + \theta_{jt}\right) \cdot \varepsilon_{ijt}, \tag{1}$$

where E_{ijt} is the export value of crude oil—goods in HS code 2709—from exporter *i* to importer *j* in year *t*. RU_i is a dummy variable that takes on unity for Russia, and zero otherwise. LD_j is a dummy variable that takes on unity for laundromat importer *j*, and zero otherwise. To define pre- and post-invasion periods, we use a time dummy variable for *k* periods relative to the year 2022; the year 2021 is the reference period. π_{ij} is exporter-importer fixed effects; κ_{it} and θ_{jt} are time-varying exporter and importer fixed effects, respectively. This combination of fixed effects should account for a wide range of unobserved determinants of crude oil trade across countries and help to identify a structural shift in the crude oil trade between Russia and laundromat countries resulting from the EU's embargo. ε_{ijt} is an error term. Since the standard OLS estimator may be biased in the presence of heteroscedasticity in exports, we use Poisson pseudo-maximum likelihood (PPML) estimation.

[5] See the article "Saudi Arabia, U.A.E. Scoop Up Russian Oil Products at Steep Discounts" by *The Wall Street Journal* on April 17, 2023.

The coefficient β_k is of main interest and shows a structural difference in crude oil imports from Russia to laundromat importer j for k periods before or after the year 2021. Pre-invasion coefficients β_k for $k < 0$ can capture a pre-invasion trend in crude oil trade between Russia and laundromat importers. Post-invasion coefficients β_k for $k > 0$ show a post-invasion trend in crude oil trade between Russia and laundromat importers. If imports of crude oil from Russia to laundromat importers substantially increase for oil laundering motives during the post-invasion period, we predict that the post-invasion coefficients are positive in sign. Meanwhile, the pre-invasion coefficients would not be statistically different from zero.

It should be noted that the coefficients β_k are estimated by comparing a change in crude oil trade between Russia and laundromat importers with a change in crude oil trade among other trading partners. These comparison group includes the EU market with a substantial decline in imports of crude oil from Russia following the Russian invasion. As a result, the inclusion of the EU market in the sample may lead to overestimating a structural increase in crude oil trade between Russia and laundromat countries. We address this issue in two ways. First, we estimate equation (1) by excluding the European importers from the sample. Second, we control explicitly for crude oil imports from Russia in the EU market: we control for a dynamic change in trade between Russia and the EU market by including the variables, $\sum_{k\neq-1}\mu_k RU_i \cdot EU_j \cdot \mathbf{1}(t = 2022 + k)$, where EU_j is a dummy variable that takes on unity for the EU importer j, and zero otherwise.[6]

Since a sudden inflow of crude oil from Russia into laundromat countries is only a partial aspect of oil circumvention, we also examine whether the EU market substantially increase an import of refined petroleum products from laundromat countries with a sharp increase in crude oil import from Russia in a synchronized timing. We examine this prediction by estimating the following model for exporter i, importer j, and year t:

$$E_{ijt} = \exp\left(\gamma + \sum_{k\neq-1} \delta_k LD_i \cdot EU_j \cdot \mathbf{1}(t = 2022 + k) + \lambda_{ij} + \varphi_{it} + \rho_{jt}\right) \cdot e_{ijt}, \qquad (2)$$

where E_{ijt} is the export value of refined petroleum products—goods in HS code 2710—from exporter i to importer j in year t. LD_i is a dummy variable that takes on unity for laundromat exporter i, and zero otherwise. λ_{ij} is exporter-importer fixed effects; φ_{it} and ρ_{jt} are time-varying exporter and importer fixed effects, respectively. These fixed effects control for a wide variety of unobserved determinants of refined oil trade across countries. e_{ijt} is an error term.

The coefficients δ_k show a structural difference of import in refined oil products from laundromat exporter i into the EU market for k periods before or after the year 2021. Pre-invasion coefficients δ_k for $k < 0$ reflect a pre-invasion trend in trade of refined oil products between

[6] We include 28 EU members before the January 31, 2020, when the United Kingdom formally left the EU following the Brexit referendum.

laundromat exporters and the EU importers. Post-invasion coefficients δ_k for $k > 0$ suggest a post-invasion trend in trade of refined oil products between laundromat exporter i and EU importers. If laundromat exporters were to increase the export of refined oil products made in Russia to the EU market for oil laundering motives during the post-invasion period, we predict that the post-invasion coefficients are positive in sign. Meanwhile, the pre-invasion coefficients should not be statistically different from zero.

As discussed for the case of crude oil, the coefficients δ_k are estimated by comparing a trade between laundromat exporters and the EU importers with a trade among other trading partners. The latter includes an export of refined oil from Russia in the EU market, which substantially declined following the Russian invasion. Including these trade flows in the comparison group could lead to overestimating an increase in trade between laundromat exporters and the EU market. Thus, we estimate equation (2) by excluding Russia from the sample or by explicitly accounting for a dynamic change in exports from Russia to the EU market.

5. Data Description

5.1. Data Source

Our analysis relies on trade data from the UN Comtrade database, using import statistics reported by destination countries to construct a panel dataset covering the period 2018–2024. We focus on product-level data at the 4-digit level of the Harmonized Commodity Description and Coding System (HS) in HS codes 2709 and 2710.[7] Specifically, HS 2709 covers crude oils derived from petroleum and bituminous minerals. These unrefined oils serve as feedstocks for fuel production (e.g., gasoline, diesel, jet fuel), petrochemical synthesis (e.g., ethylene, propylene), lubricants, and other industrial applications. HS 2710 includes refined petroleum oils and oils obtained from bituminous minerals, encompassing products such as gasoline, jet fuel, diesel oil, fuel oil, lubricating oil, and other refined derivatives.

We construct bilateral import data for crude and refined oil products in two steps. First, we compile an unbalanced panel from trade statistics and exclude countries and territories with very few trade records. We then construct a balanced panel of sample exporters and importers by assigning zero import values to missing observations. Second, we address a notable increase in missing observations for the year 2024, which likely reflects delays in trade reporting to the UN Comtrade database at the time of data access. To mitigate potential bias, we assign zero values to

[7] Turkey does not report customs data on crude oil imports for several reasons. First, it receives blended crude oil through multiple pipelines originating from various sources, complicating efforts to identify the country of origin. Second, its imports include oil from politically sensitive regions such as Russia and Iran, which may contribute to limited transparency. Third, a portion of the crude oil entering Turkey may be intended for re-export, further obscuring the final destination and origin of the shipments.

missing 2024 observations only when the country in question has reported positive import values for the same product in other years. This imputation strategy helps preserve consistency in panel construction while acknowledging limitations in data availability. Finally, we exclude the exporters (importers) with zero export (import) values during the sample period.

The constructed panel data comprises 105 exporters and 107 importers of crude oil under HS code 2709. Based on aggregate export values over the sample period, the leading exporters are Saudi Arabia, the Russian Federation, Iraq, Canada, and the UAE. The top importers include China, the United States, India, South Korea, and Japan. Meanwhile, the panel data for refined petroleum products under HS code 2710 includes 205 exporters and 176 importers. The major exporters in this category are the U.S., the Russian Federation, the Netherlands, Singapore, and the UAE. The largest importers are China, the United States, India, South Korea, and Japan.

5.2. Descriptive Analysis

We proceed with a descriptive analysis of import trends for crude oil and refined petroleum products. To highlight potential structural shifts, we aggregate import values and quantities by key exporter groups and normalize the data to an index value of 100 for the year 2021. Given that import values may be significantly affected by annual price fluctuations, we report both import values and physical quantities and shed light on the relative importance of volume-driven and price-driven changes in the import trends.

Figure 1 illustrates the trend in crude oil imports in the EU market from Russia and other exporters over the period 2018–2024. A sharp decline in both import value and quantity from Russia is evident following the EU's prohibition on seaborne Russian crude oil, which took effect in December 2022. Relative to the base year, Russian crude oil imports to the EU declined by 82% in value and 80% in quantity in 2023. Meanwhile, Figure 2 shows the import trends of crude oil in laundromat countries—China, India, Turkey, Singapore, and the UAE—from Russia and other exporters. In 2023, imports of Russian crude oil to these countries increased by 154% in value and 123% in quantity, while imports from other exporters remained largely unchanged. Thus, the diverging trade patterns between the EU and laundromat countries suggest a sudden reorientation of Russian crude oil exports toward alternative markets in response to the EU embargo.

---Figures 1, 2 and 3 here---

To investigate the potential laundering of Russian oil through laundromat countries, Figure 3 illustrates the trend in EU imports of refined petroleum products from both laundromat and other exporters. Beginning in 2022, the import value of these products from laundromat countries rose sharply, while the physical quantity did not increase at a comparable rate. Relative to 2021, import values surged by 118%, whereas quantities rose by only 36%, indicating that the spike in value was likely driven by global energy price inflation following Russia's invasion of Ukraine and the broader economic recovery from the COVID-19 pandemic. However, import quantities from laundromat countries increased by 89% in 2022, lending support to the hypothesis that these countries exported significant volumes of refined petroleum products—potentially derived from Russian crude oil—to the EU market following the EU's embargo on Russian oil.

6. Estimation Results

6.1. Main Results

We start by examining the event-study plot of the estimated coefficients β_k from equation (1) for crude oil, with the regression result reported in Appendix Table 1. Figure 4 indicates no statistically significant change in crude oil imports from Russia into laundromat countries prior to the invasion, relative to the 2021 baseline. In contrast, the post-invasion coefficients are significant and positive, suggesting that the laundromat countries dramatically increased their import values from Russia. Specifically, imports increased by 271% in 2022, 5,360% in 2023, and an astonishing 10,894% in 2024.[8] These extraordinarily large marginal effects are likely explained by a sharp increase in import values for India—from initially very low levels to substantially high ones—as shown in the import trends in Appendix Table 3. While prior studies have documented export reorientation of Russian crude oil (Thieriot et al. (2023)), descriptive analysis could suffer from unobserved heterogeneity across exporters, importers, and years. In this regard, our analysis provides formal econometric evidence of the extraordinary scale of increased crude oil flows to laundromat countries following the invasion.

---Figures 4 and 5 here---

Figure 5 presents the event-study plot of the estimated coefficients δ_k from equation (2), capturing the dynamics of refined petroleum imports from laundromat countries into the EU. The regression result is reported in Appendix Table 2. Relative to the 2021 baseline, there is no statistically significant deviation in import values from zero during the pre-invasion period 2018–2020. The coefficient for 2022 is positive but not statistically significant. In contrast, the coefficients for 2023 and 2024 are significant and positive, suggesting that imports increased by 103% in 2023 and 59% in 2024. Notably, the timing of this surge aligns closely with the EU's embargo on Russian oil implemented in 2023. These findings provide empirical support for the hypothesis that EU sanctions have unintentionally led to a roundabout inflow of refined Russian oil via laundromat countries.

To account for potential confounding effects arising from changes in import flows within the control group, we conduct a series of robustness checks. For crude oil, column (2) of Appendix

[8] The marginal effects are computed by $100[exp(\beta_k) - 1]$.

Table 1 excludes EU imports of Russian crude oil. The post-invasion coefficients remain statistically significant and positive, confirming the robustness of the main findings. In column (3), we explicitly include the interaction terms $\sum_{k\neq-1}\mu_k RU_i \cdot EU_j \cdot \mathbf{1}(t = 2022 + k)$ to control for dynamic changes in Russian crude oil exports to the EU. The result shows that the post-invasion coefficients remain significant and positive.

For refined oil products, Appendix Table 2 presents robustness checks for refined petroleum products. Column (2) excludes EU imports of refined oil products from Russia. The coefficient for 2023 remains significant and positive, while the coefficient for 2024 becomes statistically insignificant. In column (3), we explicitly control for dynamic changes in EU imports of refined oil from Russia. The coefficient for 2023 remains significant and positive, reinforcing the conclusion that the observed increase in EU imports of refined petroleum products from laundromat countries is robust and coincides with the timing of the EU's embargo on Russian oil.

6.2. Exporter Heterogeneity

The main results have shown a sharp increase in refined oil products from laundromat countries in the EU market following the EU's embargo on Russian oil. However, the aggregate results may mask heterogeneity across laundromat exporters. In this respect, we extend the analysis in equation (1) and estimate the following model:

$$E_{ijt} = \exp\left(\gamma + \sum_{h}\sum_{k\neq-1}\delta_{hk} LD_h \cdot EU_j \cdot \mathbf{1}(t = 2022 + k) + \lambda_{ij} + \varphi_{it} + \rho_{jt}\right) \cdot e_{ijt}, \qquad (3)$$

where E_{ijt} is the value of refined petroleum products. LD_h is a dummy variable for each laundromat exporter. The coefficients δ_{hk} show the heterogeneity across laundromat exporters, and this specification provides a test of the hypothesis that these countries engage in Russian oil laundering to varying degrees. To account for a substantial decline in EU imports of these goods from Russia following the Russian invasion, we also estimate the coefficients δ_{hk} for Russian exports to the EU.

Figure 6 presents event study plots for individual laundromat exporters, including Russia. The results indicate that post-invasion coefficients are significant and positive for China and India, but not for other laundromat exporters. This suggests that China and India may have played a prominent role in the laundering of Russian crude oil following the EU's embargo. Notably, the pattern of significant coefficients implies that the EU began increasing imports of refined petroleum products from China in 2022—a year marked by the energy crisis.[9] In contrast,

[9] COVID-19 restrictions and economic slowdowns reduce domestic demand for fuel in China for 2022, leading to excess capacity in Chinese oil refineries. Meanwhile, rising energy prices in the global market would induce European buyers to seek competitively priced refined oil products. These can partly explain a surge in EU imports of Chinese refined oil for 2022.

imports from India did not rise significantly in 2022 but showed a marked increase in 2023 and 2024, coinciding with the timing of the enforcement of the EU's embargo. Additionally, the EU import of refined petroleum oil from Russia significantly decreased in 2023 and 2024. Taken together, these trends support the hypothesis that China and India emerged as key intermediaries in the laundering channel for Russian oil, potentially facilitating the circumvention of EU trade sanctions.

---Figure 6 here---

6.3. Non-EU importers

While we examine the impact of the EU embargo on Russian oil, other countries also imposed embargoes such as outright bans on imports of Russian crude and refined oil products and price caps to reduce export revenues in Russia: e.g., the U.S., Canada, Australia, and Japan.[10] This policy coordination raises a question of whether other sanctioning countries would increase refined oil products from laundromat countries at a similar time. To investigate this question, we estimate the following model for exporter *i*, importer *j*, and year *t*:

$$E_{ijt} = \exp\left(\gamma + \sum_{g}\sum_{k\neq -1} \psi_{hk} LD_i \cdot NonEU_g \cdot \mathbf{1}(t = 2022 + k) + \pi_{ij} + \chi_{it} + \upsilon_{jt}\right) \cdot u_{ijt}, \quad (4)$$

where E_{ijt} is the export value of refined petroleum products, and $NonEU_g$ is a dummy variable for non-EU importers, including Japan, the U.S., Canada, and Australia. The coefficients ψ_{hk} capture a dynamic trend in imports of refined oil products from laundromat countries into non-EU sanctioning countries, providing a test of the hypothesis that these countries engage in Russian oil laundering following the imposition of the embargo.

Figure 7 presents event study plots of the estimated coefficients ψ_{gk} from the PPML estimation of equation (4). The post-invasion coefficients are not significant for Canada, Japan, and the U.S., suggesting that laundromat countries did not significantly increase their exports of refined oil products to these countries in 2023 and 2024. Meanwhile, the post-invasion coefficients are significant and negative in Australia, suggesting a significant decline in refined oil products from the laundromat exporters into Australia. Thus, these results present no evidence that other sanctioning countries engage in roundabout imports of refined oils made from Russian crude oil via third countries.

---Figure 7 here---

[10] These measures restrict imports of Russian oil, LNG, and coal in the U.S. from March 2022, Russian crude oil in Canada from March 2022, Russian crude oil and other energy products in Australia from April 2022, aligning with the G7 price cap from late 2022.

6.4. Placebo Tests of Oil Embargo in the EU

A concern in the previous analysis is that unobserved heterogeneity in the EU markets could drive a surge in imports of refined oil products from laundromat countries, which can potentially weaken our interpretation of causal inference for oil laundering. To this end, we conduct placebo tests to check whether the EU's embargo is a crucial determinant of oil laundering. Specifically, we exploit the fact that EU members such as Czechia, Hungary, and Slovakia are exempt from the EU's embargo: these countries depend heavily on pipeline supplies for their energy supply and were allowed to continue importing Russian crude oil via the southern branch of the Druzhba pipeline (Levi et al., 2025).[11] Because these countries did not impose an embargo on Russian crude oil, they would not need to engage in oil laundering via third markets. This suggests that these non-sanctioning countries should not increase imports of refined oil from laundromat countries during the embargo period, as compared with other sanctioning EU members.[12]

To conduct a placebo check, we separate EU importers between sanctioning- and non-sanctioning countries and re-estimate equation (2). Figure 8 shows event study plots of the estimated coefficients by the PPML estimation. The post-invasion coefficients for sanctioning EU importers remain significant and positive, while those for non-sanctioning EU importers are not significant. Assuming that sanctioning and non-sanctioning EU countries would experience similar unobserved positive shocks, these contrasting results would not likely be explained by the similar positive shocks in these markets. Thus, the placebo check supports our interpretation that the Russian crude oil could circumvent the EU embargo via laundromat countries.

---Figure 8 here---

6.5. Alternative Specifications

An event-study specification for trade in oil products highlights the impact of the EU's embargo on oil laundering. However, the result may depend on this specification and the definition of laundromat countries, the latter of which are defined based on casual observation. To check the robustness of our specification, we measure exporters' import dependency on Russian crude oil and examine a question of whether an EU import of refined petroleum products increases significantly from the export markets with greater import reliance on Russian crude oil. The import reliance is measured by the import share and the value of Russian crude oil. We replace

[11] The southern Druzhba pipeline is the branch of Russia's Druzhba oil pipeline network, which is split from the main line in Ukraine to transport crude oil to central Europe, including Czechia, Hungary, and Slovakia. Meanwhile, Czechia halted imports of Russian crude oil through the Druzhba pipeline in early 2025, which was made possible by the expansion of the Transalpine Pipeline connecting the Italian port of Trieste to Austria and Germany (*Central European Times*, 5 May 2025).

[12] Because Bulgaria imposed a full ban on Russian crude oil on March 1, 2024, it is treated as an EU member state applying sanctions on Russian oil.

the dummy variable for laundromat countries, LD_i, in equation (2) with the import dependence variable and estimate the new specification with the PPML method. Additionally, we extend the sample period from 2015 and 2024.

Table 1 shows the results for the import dependence on Russian crude oil. In column (1), the coefficient of the import share interacted with the EU importer dummy is significant and positive, suggesting that EU imports increased significantly from exporters with greater reliance on Russian crude oil. To check whether this significant result holds for any period, we restrict the sample period to 2015-2019. Column (2) shows that the coefficient of the import dependence is not significant, suggesting that the significant relationship is not observed before the Russia's invasion of Ukraine. In column (3), we use the import value of Russian crude oil and find that the coefficient is significant and positive, consistent with the result in column (1). Additionally, we estimate this specification for the period 2015-2019 and find the significantly negative relationship between the import reliance and EU imports of refined oil. Taken together, these results suggest that EU imports increased significantly from exporters with greater dependence on imports of Russian crude oil, consistent with the hypothesis of oil laundering brought about by the EU embargo.

---Table 1 here---

6.6. Processing of Russian Crude Oil

Our results up to this point have highlighted a substantial reallocation of crude oil refining through laundromat countries such as China and India following the EU's embargo on Russian crude oil. While a close diplomatic relationship between Russia and these countries is a fundamental reason, we highlight the processing nature of Russian crude oil as an additional explanation.

Russia's Urals blend is commonly characterized as a medium to heavy sour crude, different from lighter, sweeter crudes such as Brent or WTI (SA Oil, 2019; Öhlinger et al., 2024). India and China are better positioned to refine discounted medium-sour crudes at scale because many of their large refineries have complex upgrading capacity such as coking and hydrocracking (Kaiser, 2016). These technical and structural factors help explain post-2022 shifts in the regional distribution of Russian crude processing. As Western sanctions forced a redirection of Urals away from Europe—previously its primary market—countries capable of efficiently processing medium-heavy sour crude emerged as natural replacement destinations. India and China dramatically increased their intake of Russian crude beginning in mid-2022, leveraging their high-complexity refineries to convert discounted feedstock into profitable refined products.

7. Conclusion

The EU banned seaborne imports of Russian crude oil from December 2022 to constrain Russia's war effort following its invasion of Ukraine. However, a loophole in the embargo permits the import of refined petroleum products, even when they are produced from Russian crude. This creates the possibility of "oil laundering," whereby third countries purchase discounted Russian crude, refine it, and legally export the resulting products to the EU. This paper investigates the oil-laundering hypothesis by testing two core predictions: first, that Russian crude exports to laundromat countries surge after the embargo; and second, that EU imports of refined petroleum products from those same countries rise in parallel. Using a gravity-model framework and an event-study design, we estimate systematic shifts in crude and refined oil trade flows surrounding the embargo, isolating sanction-induced changes from other trade determinants. Synchronized increases in these flows would provide empirical support for oil laundering through third-country refining.

The results show a dramatic shift in global oil trade following Russia's invasion of Ukraine and the EU's subsequent embargo. Before the invasion, Russian crude oil exports to laundromat countries—China, India, Turkey, Singapore, and the UAE—were stable. Afterward, these imports surged sharply, increasing by 271% in 2022, 5,360% in 2023, and 10,894% in 2024, providing strong econometric evidence of a major reorientation of Russian crude flows. At the same time, EU imports of refined petroleum products from these same countries showed no significant change before the embargo but rose by 105% in 2023 and 59% in 2024. The synchronized timing of rising Russian crude exports to laundromat countries and rising EU imports of refined products supports the hypothesis that sanctions unintentionally enabled oil laundering through third-country refining.

We conclude by discussing some remaining issues for future research. First, trade data cannot identify the precise share of Russian crude embedded in EU imports of refined petroleum products. Because the true origin of refined outputs is unobservable, the exact scale of oil laundering cannot be fully measured. Second, the laundering mechanism hinges on the refining capacity for Russian Urals crude in laundromat countries, yet actual refinery utilization, technical constraints, and product-mix decisions are not directly observable. These limitations leave uncertainty about how much Russian crude is feasibly processed abroad. Finally, the EU has recently taken steps to tighten enforcement and close loopholes in its oil embargo. Assessing the effectiveness of these policy adjustments—and whether they reduce the flow of refined products derived from Russian crude into the EU—remains an important avenue for future work.

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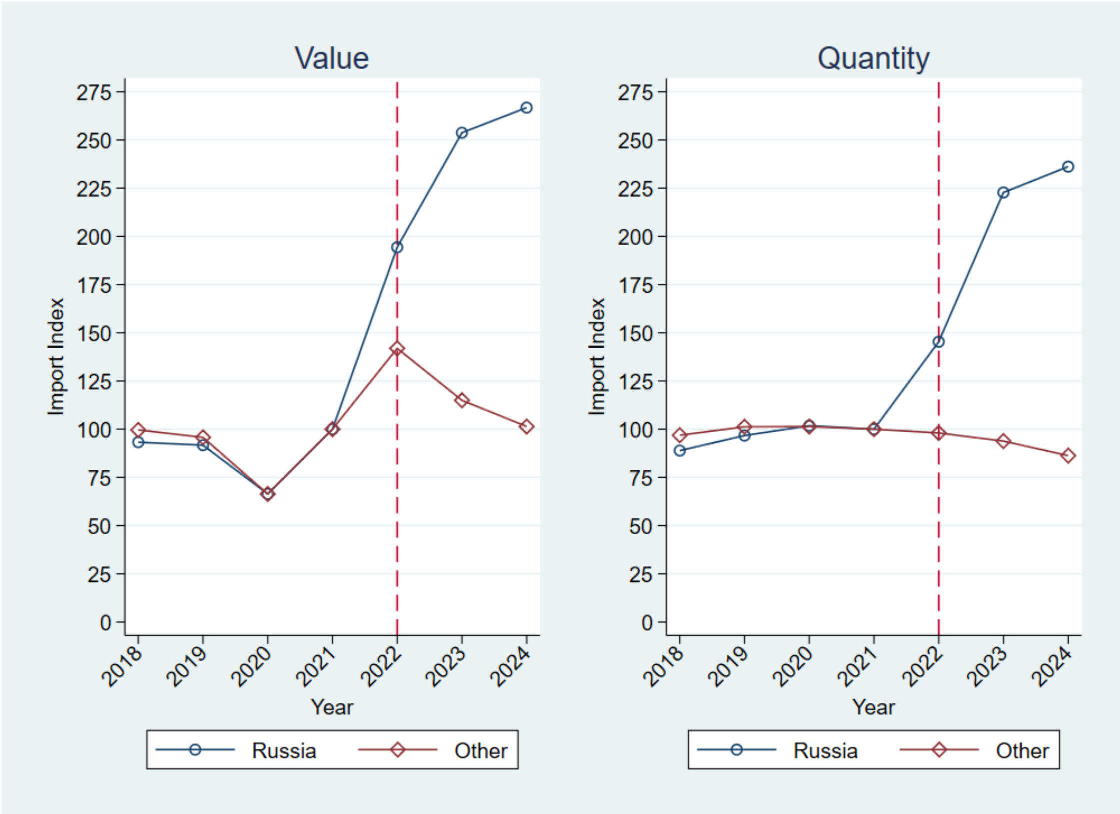
Figure 1. Import of Crude Oil in the EU

Notes: Import data are import statistics reported by destination countries. Crude oil indicates the goods in HS 2709.

Source: Authors' calculation using the UN Comtrade database.

Figure 2. Import of Crude Oil in Laundromat Countries



Notes: Import data are import statistics reported by destination countries. Crude oil indicates the goods in HS 2709. Laundromat countries include China, India, Singapore, and the UAE. Turkey is not included for missing observations.

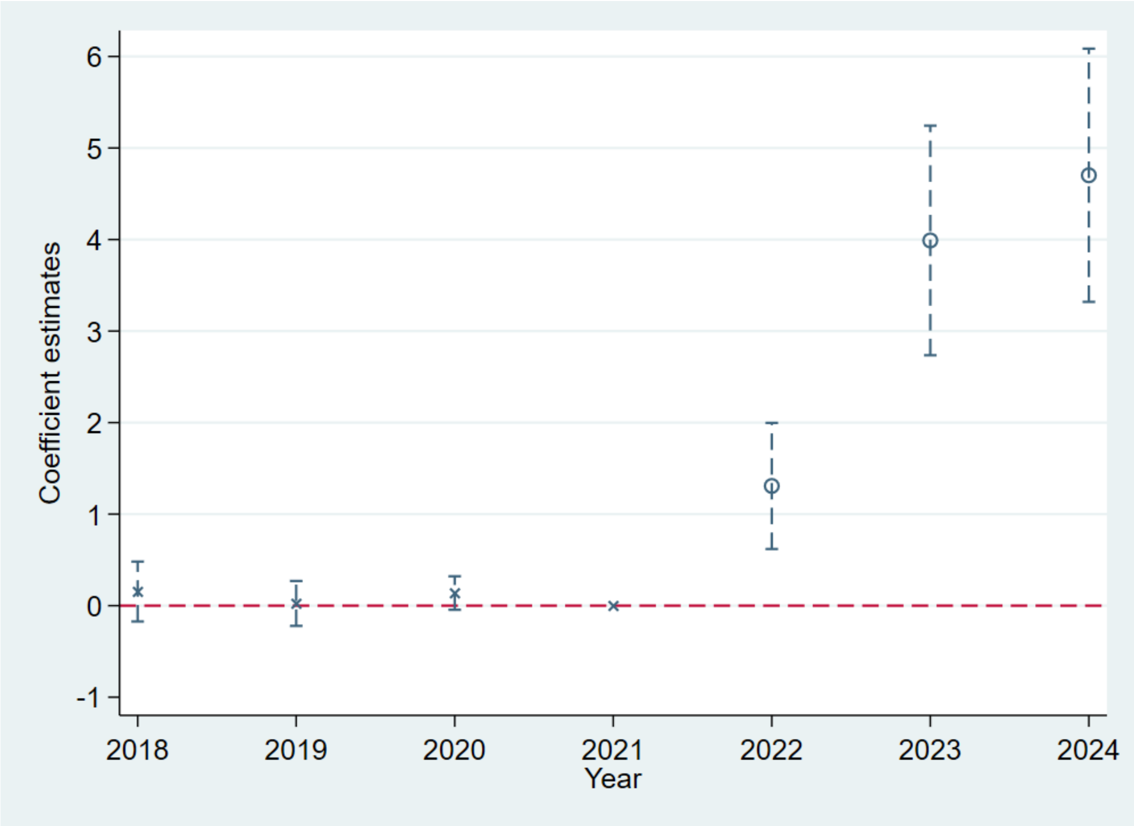
Source: Authors' calculation using the UN Comtrade database.

Figure 3. Import of Refined Oil Products in the EU

Notes: Import data are import statistics reported by destination countries. Refined oil products indicate the goods in HS 2710. Laundromat countries include China, India, Singapore, the UAE, and Turkey.

Source: Authors' calculation using the UN Comtrade database.

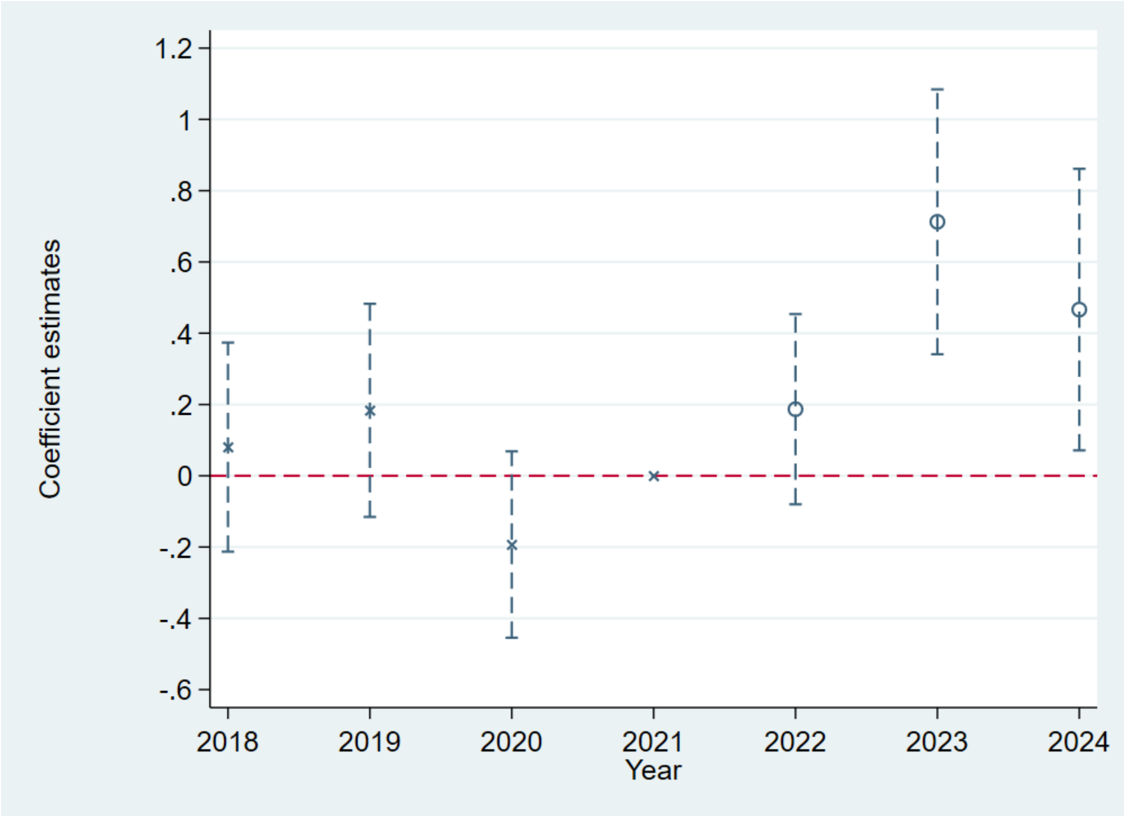
Figure 4. Event Study Plot for Crude Oil Export from Russia to Laundromat



Notes: The event study plot shows the estimated coefficients β_k from the PPML result of the empirical model for exporter i, importer j, and year t: $E_{ijt} = \exp\left(\alpha + \sum_{k\neq-1} \beta_k RU_i \cdot LD_j \cdot \mathbf{1}(t = 2022 + k) + \pi_{ij} + \kappa_{it} + \theta_{jt}\right) \cdot \varepsilon_{ijt}$. E_{ijt} is the export value of crude oil. RU_i is a dummy variable for Russian exporter. LD_j is a dummy variable for laundromat importers. 95% confidence interval is shown for each coefficient.

Source: Authors' calculation using the UN Comtrade database.

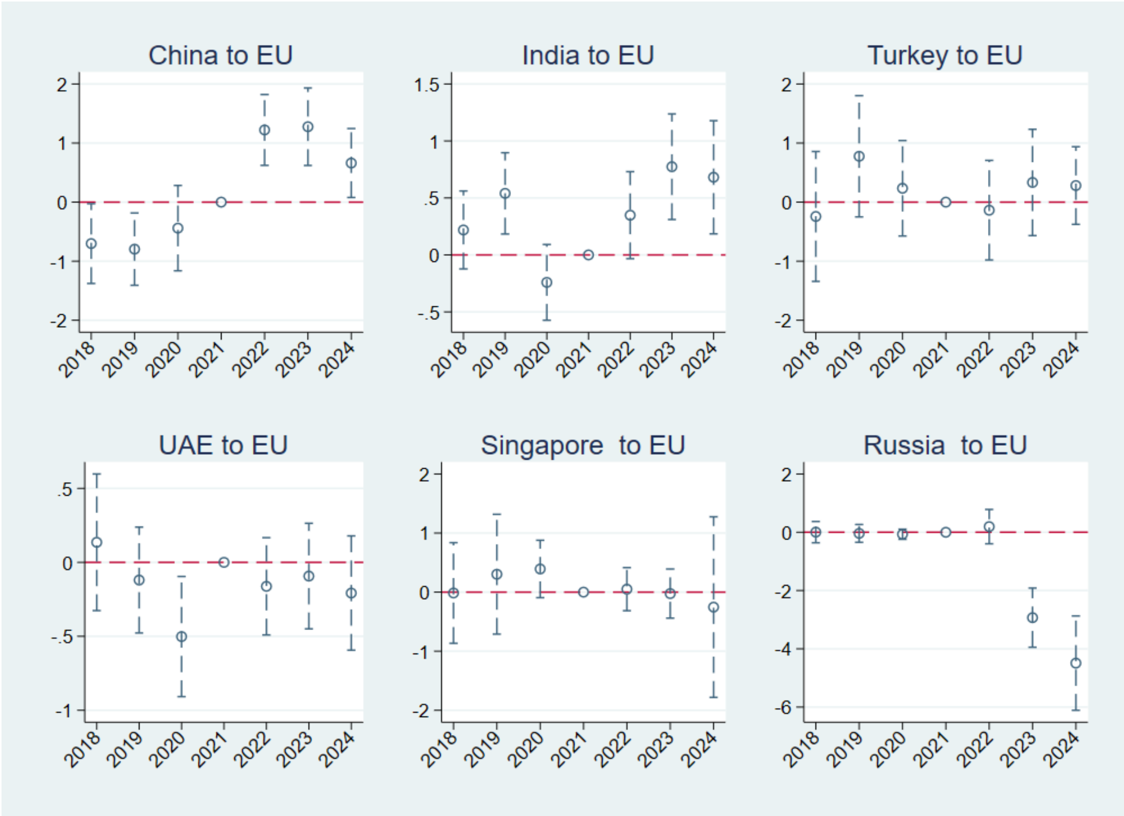
Figure 5. Event Study Plot for Refined Oil Export from Laundromat to the EU



Notes: The event study plot shows the estimated coefficients δ_k from the PPML result of the empirical model for exporter i, importer j, and year t: $E_{ijt} = \exp\left(\gamma + \sum_{k\neq-1} \delta_k LD_i \cdot EU_j \cdot \mathbf{1}(t = 2022 + k) + \lambda_{ij} + \varphi_{it} + \rho_{jt}\right) \cdot e_{ijt}$. E_{ijt} is the export value of refined oil products. LD_j is a dummy variable for laundromat exporters. EU_j is a dummy variable for EU importers. 95% confidence interval is shown for each coefficient.

Source: Authors' calculation using the UN Comtrade database.

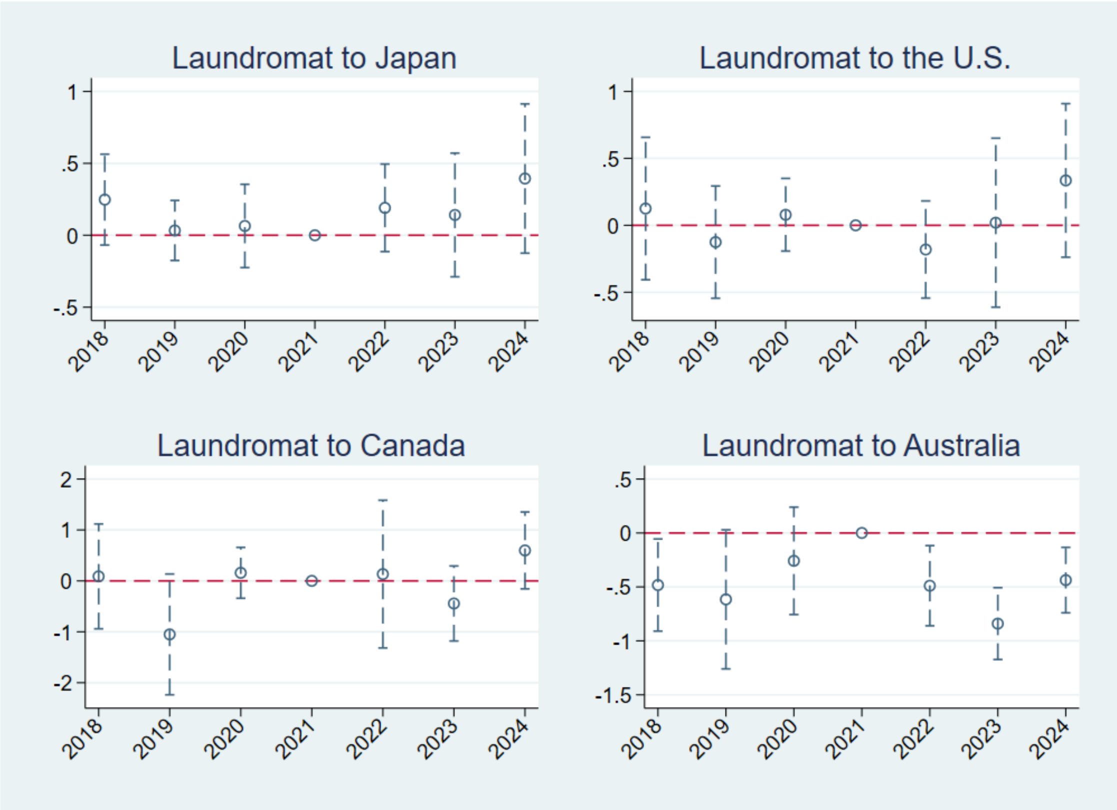
Figure 6. Event Study Plot for Refined Oil Export by Exporter



Notes: Event study plots show the estimated coefficients δ_{hk} from the PPML result of the empirical model: $E_{ijt} = \exp\left(\gamma + \sum_h \sum_{k\neq-1} \delta_{hk} LD_h \cdot EU_j \cdot \mathbf{1}(t = 2022 + k) + \lambda_{ij} + \varphi_{it} + \rho_{jt}\right) \cdot e_{ijt}$, where E_{ijt} is the value of refined petroleum products. LD_h is a dummy variable for laundromat exporters, including Russia. 95% confidence interval is shown for each coefficient.

Source: Authors' calculation using the UN Comtrade database.

Figure 7. Event Study Plot for Refined Oil Export by Non-EU importer



Notes: Event study plots show the estimated coefficients ψ_{gk} from the PPML result of the empirical model: $E_{ijt} = \exp\left(\gamma + \sum_g \sum_{k \neq -1} \psi_{hk} LD_i \cdot NonEU_g \cdot \mathbf{1}(t = 2022 + k) + \pi_{ij} + \chi_{it} + v_{jt}\right) \cdot u_{ijt}$, where E_{ijt} is the value of refined petroleum products. LD_i is a dummy variable for laundromat exporters. $NonEU_g$ is a dummy variable for non-EU importers, including Japan, the U.S., Canada, and Australia. 95% confidence interval is shown for each coefficient.

Source: Authors' calculation using the UN Comtrade database.

Figure 8. Placebo Tests of Non-sanctioning EU Countries

Notes: The event study plot shows the estimated coefficients δ_k^{Sanc} and $\delta_k^{Non-sanc}$ from the PPML result of the empirical model for exporter i, importer j, and year t: $E_{ijt} = \exp\left(\gamma + \sum_{k\neq-1}\delta_k^{Sanc}LD_i \cdot EU_j^{Sanc} \cdot \mathbf{1}(t = 2022 + k) + \sum_{k\neq-1}\delta_k^{Non-Sanc}LD_i \cdot EU_j^{Non-Sanc} \cdot \mathbf{1}(t = 2022 + k) + \lambda_{ij} + \varphi_{it} + \rho_{jt}\right) \cdot e_{ijt}$. E_{ijt} is the export value of refined oil products. LD_j is a dummy variable for laundromat exporters. EU_j^{Sanc} and $EU_j^{Non-Sanc}$ are a dummy variable for EU importers with and without the imposition of embargoes on Russian crude oil, respectively. Non-sanctioning EU include Czechia, Hungary, and Slovakia. Sanctioning EU includes the U.K. 95% confidence interval is shown for each coefficient.

Source: Authors' calculation using the UN Comtrade database.

Table 1. Results for Import Dependence on Russian Crude Oil

Dependent: value of exports

	(1)	(2)	(3)	(4)
Import share of Russian oil_{it} $\times EU_j$	0.85***	-0.19		
	(0.30)	(0.44)		
Import value of Russian oil_{it} $\times EU_j$			0.019***	-0.041*
			(0.0034)	(0.024)
Exporter-importer fixed effect	Yes	Yes	Yes	Yes
Exporter-year fixed effect	Yes	Yes	Yes	Yes
Importer-year fixed effect	Yes	Yes	Yes	Yes
Sample period	2015-2024	2015-2019	2015-2024	2015-2019
No. of obs.	82,171	33,588	82,171	33,588
Pseudo R-squared	0.97	0.98	0.97	0.98

Notes: The results show the Poisson pseudo maximum likelihood estimation for export values of refined petroleum products. The sample excludes Russia and EU exporters. Parentheses show standard errors clustered by the exporter-importer pair. ***, **, and * denote significance at the 1%, 5%, and 10% level, respectively.

Source: Authors' calculation using the UN Comtrade database.

Appendix

Appendix Table 1. Results of Trade in Crude Oil

Dependent: value of exports

	(1)	(2)	(3)
$Russia_i \times Laundromat_j \times$Year 2018	0.15	0.30	0.29
	(0.17)	(0.33)	(0.32)
$Russia_i \times Laundromat_j \times$Year 2019	0.024	-0.027	-0.031
	(0.13)	(0.18)	(0.18)
$Russia_i \times Laundromat_j \times$Year 2020	0.14	0.24	0.24
	(0.093)	(0.19)	(0.18)
$Russia_i \times Laundromat_j \times$Year 2022	1.31***	1.64***	1.66***
	(0.35)	(0.44)	(0.43)
$Russia_i \times Laundromat_j \times$Year 2023	3.99***	3.72***	3.77***
	(0.64)	(0.81)	(0.80)
$Russia_i \times Laundromat_j \times$Year 2024	4.70***	4.17***	3.98***
	(0.71)	(0.95)	(0.93)
Exporter-importer fixed effect	Yes	Yes	Yes
Exporter-year fixed effect	Yes	Yes	Yes
Importer-year fixed effect	Yes	Yes	Yes
$Russia_i \times EU_j \times$Year Dummies			Yes
Sample	All	Excluding EU importers	All
No. of obs.	14,274	8,195	14,274
Pseudo R-squared	0.98	0.98	0.98

Notes: The results show the Poisson pseudo maximum likelihood estimation of equation (1) for export values of crude oil. Parentheses show standard errors clustered by the exporter-importer pair. $Russia_i \times EU_j \times$Year Dummies show a series of interaction terms for Russian exporter, EU importers, and year dummies with the base of year 2021. ***, **, and * denote significance at the 1%, 5%, and 10% level, respectively.

Source: Authors' calculation using the UN Comtrade database.

Appendix Table 2. Results of Trade in Refined Petroleum Products

Dependent: value of exports

	(1)	(2)	(3)
$Laundromat_i \times EU_j \times$Year 2018	0.080	0.062	0.080
	(0.15)	(0.15)	(0.15)
$Laundromat_i \times EU_j \times$Year 2019	0.18	0.15	0.18
	(0.15)	(0.15)	(0.15)
$Laundromat_i \times EU_j \times$Year 2020	-0.19	-0.21	-0.21
	(0.13)	(0.14)	(0.14)
$Laundromat_i \times EU_j \times$Year 2022	0.19	0.13	0.19
	(0.14)	(0.12)	(0.13)
$Laundromat_i \times EU_j \times$Year 2023	0.71***	0.34**	0.42***
	(0.19)	(0.15)	(0.16)
$Laundromat_i \times EU_j \times$Year 2024	0.47**	0.16	0.22
	(0.20)	(0.16)	(0.18)
Exporter-importer fixed effect	Yes	Yes	Yes
Exporter-year fixed effect	Yes	Yes	Yes
Importer-year fixed effect	Yes	Yes	Yes
$Russia_i \times EU_j \times$Year Dummies			Yes
Sample	All	Excluding Russian exporter	All
No. of obs.	74,917	74,051	74,917
Pseudo R-squared	0.97	0.97	0.97

Notes: The results show the Poisson pseudo maximum likelihood estimation of equation (1) for export values of crude oil. Parentheses show standard errors clustered by the exporter-importer pair. $Russia_i \times EU_j \times$Year Dummies show a series of interaction terms for Russian exporter, EU importers, and year dummies with the base of year 2021. ***, **, and * denote significance at the 1%, 5%, and 10% level, respectively.

Source: Authors' calculation using the UN Comtrade database.

Appendix Table 3. Crude Oil Import from Russia into Laundromat Country

Year	2018	2019	2020	2021	2022	2023	2024
Panel A: Import values in billion USD							
China	38.1	37.4	27.7	40.5	58.4	60.7	62.6
India	1.2	1.5	0.9	2.3	25.5	48.6	52.7
Singapore	1.0	0.7	0.1	0.3	0.1	0.1	0.0
United Arab Emirates	0.0	0.04	0.02	0.04	0.0	0.2	0.0
Panel B: Import quantity in million ton							
China	71.5	77.6	83.4	79.6	86.2	99.6	108.5
India	2.2	2.9	2.6	4.5	37.0	88.9	92.0
Singapore	1.7	1.4	0.2	0.6	0.1	0.2	0.0
United Arab Emirates	0.0	0.1	0.1	0.1	0.0	0.4	0.0

Note: Turkey does not report crude oil import.

Source: UN Comtrade Database