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Assessing Russia's Shadow Fleet: Initial Build-Up, Links to the Global Shadow Fleet, and Future Prospects

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June 2024

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Acknowledgments

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We thank Craig Kennedy for his invaluable contributions and comments.

Executive Summary

In February of 2022, Russia started the largest war on the European continent since the end of World War II with the full-scale invasion of Ukraine, prompting the EU, its primary trading partner, to discontinue most seaborne imports of Russian crude oil and petroleum products. However, Russia was able to swiftly reorient its exports and found new buyers. To constrain Russia's oil export earnings while keeping its supplies on the global market and prevent soaring energy prices, the G7/EU implemented a novel price cap system. To circumvent these restrictions, the Kremlin stepped up the establishment of its "shadow fleet" of tankers.

In this study, we investigate: (i) the process of the shadow fleet's initial setup with a focus on the vessels' origins; (ii) the shadow fleet's current size and operations; (iii) its position within the broader context of global shadow oil trade; (iv) Russia's shadow fleet needs to become fully independent from sanctions-compliant vessels; (v) Russia's ability to counteract vessel designations; and (vi) prospects for the shadow fleet's future expansion. Based on our findings, we develop detailed policy recommendations to rein in the shadow fleet.

The key findings from our analysis are as follows:

- We estimate that, as of the first quarter of 2024, 435 vessels are part of the Russian shadow fleet, i.e., they are not owned, managed, or insured by an entity in the sanctions coalition and, thus, the price cap does not apply to them. Most importantly, these tankers do not carry oil spill (P&I) insurance from the International Group (IG). 185 vessels are transporting crude oil and 250 are transporting oil products.
- The vessels of the Russian shadow fleet can cover ~60% of total crude and ~45% of total products exports independent of restricted maritime services. Despite a concerted – and costly – effort to build up the shadow fleet, Russia still falls short of its ultimate objective with regard to sanctions evasion.
- We identify three key channels through which Russia has built its shadow fleet: (1) transfer of tankers that were previously owned by Russian entities, e.g., Sovcomflot, to new management companies; (2) purchase of vessels older than 15 years from the mainstream (or white) fleet, which had carried P&I insurance from the International Group before; and (3) acquisition of very old vessels (20+ years) from the shadow and white fleets, which would have otherwise been decommissioned. Stripping mainstream fleet vessels of their service relationships with coalition countries has been the most important strategy.
- Only a small share of the current Russian shadow fleet was built by transferring vessels from other segments of the global shadow oil trade, e.g., actions related to Iran or Venezuela. We estimate that the non-Russian shadow fleet consists of 575 tankers. Most of these are not suitable for Russia due to their size (VLCCs) or ownership/management structures that do not allow Russia sufficient control.
- In terms of the future expansion of the Russian shadow fleet, we estimate that ~500 Aframax equivalent crude oil tankers – mostly from the white fleet – are potentially available (3.6 times what is needed to become fully independent of the price-cap compliant fleet. For oil products, we assess that ~1,200 Seawaymax equivalent vessels are available for further growth (2.8 times what is needed).
- These numbers only indicate the theoretical availability of vessels and do not reflect specific challenges that Russia may encounter when attempting to acquire them for its shadow fleet. First, there are high

up-front costs. For instance, Russia has already spent an estimated $8.5 billion[1] on the shadow fleet and additional financing may be hard to secure, especially given the risk of sunk costs due to vessel designations. Second, the EU has recently introduced legislation (in its 12th sanctions package) aimed at cracking down on the sale of mainstream tankers into the Russian shadow trade. Importantly, our estimates do not account for attrition within a fleet of overwhelmingly older vessels.

- We observe a high correlation between the share of the shadow fleet in the transport of Russian oil and the spread between Russian oil prices and benchmark North Sea Brent. Thus, the shadow fleet's expansion is a direct challenge to the effectiveness – and overall leverage – of the international energy sanctions regime, which is supposed to deprive Russia of financing for the war.
- In addition, the shadow fleet represents a significant and growing risk to the environment around the world due to the advanced age of the vessels in question as well as the fact that they are largely uninsured or underinsured. As Russia's oil export infrastructure is oriented towards traditional markets in the West, the risk is particularly high in the Baltic Sea, North Sea, Mediterranean, and Black Sea.
- We believe that the expansion of the Russian shadow fleet can be effectively curtailed through targeted measures. Taking such steps is critical for preserving the overall leverage of the price cap, which is an integral part of the international energy sanctions regime, and addressing urgent environmental risks.

To address the existing Russian shadow fleet, we propose the following steps:

1. **Continue and expand vessel designation campaign**, which has proven to be extremely successful in removing shadow fleet tankers from operations. Authorities should prioritize the vessels most-heavily used for the export of Russian crude oil from Baltic and Black Sea ports to India and China.
2. **Make shadow fleet operations difficult and costly** by requiring all vessels entering coalition ports to disclose information about their mandatory oil spill (P&I) insurance and, should they refuse to do so or the coverage turn out to be inadequate (i.e., not sufficiently capitalized, no independent credit rating) ban them from entry. The sale of spare parts for use by such vessels should also be prohibited.
3. **Enforce existing oil spill insurance requirements** to address the significant and rising environmental threat stemming from aging and uninsured shadow fleet tankers without removing transport capacity and, in turn, affecting global oil supply. Coalition countries should get involved as the flag states of the Russian shadow fleet have proven to be unable or unwilling to enforce IMO regulations and guidelines.
4. **Step up investigations and impose significant fines** to alter risk perceptions by all actors involved in shadow fleet operations and thereby drive up costs and cut into Russian oil earnings. Efforts should focus on opaque vessel ownership and management networks as well as practices such as STS (ship-to-ship) operations and AIS spoofing, which can be used to circumvent sanctions.

To limit the future expansion of the shadow fleet, we propose the following steps:

1. **Broaden and enforce restrictions on vessel sales** to limit Russia's ability to acquire tankers from the white fleet. Regulations such as the EU's authorization requirement (which was established with the

[1] See "The Shadow Fleet in Crisis" by Craig Kennedy here.

12th sanctions package) should be adopted by other coalition jurisdictions as well, and applied strictly. The threat of secondary sanctions by the U.S. could increase the impact considerably.

2. **Designate vessels acquired from third countries**, including those from the white fleet where sales restrictions did not apply or were violated, as well as vessels transferred from other parts of the shadow fleet and/or from Russia's partners. Designations can effectively remove the vessels from commercial operations and would create significant sunk costs for Russia or Russian-linked actors.

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Introduction

On February 24, 2022, Russia began its full-scale invasion of Ukraine and initiated a brutal and unprovoked war that has lasted for more than two years. To compel Russia to halt its actions, Western countries, including the G7, implemented numerous sanctions targeting entire sectors of the Russian economy, as well as companies and individuals. One of the key objectives of these measures was to impact the oil and gas sector, which traditionally accounted for 60% of Russian export earnings and approximately 40% of budget revenues.

Sanctions targeting Russian oil can be broadly categorized into two main groups: First, restrictions on EU purchases of Russian oil and petroleum products (along with restrictions on technology transfers for extraction). In June 2022, the European Union adopted the sixth sanctions package. Among other provisions, the package imposed an embargo on the import of seaborne crude oil from Russia, which came into effect on December 5, 2022, and on most petroleum products (with minor exceptions) effective February 5, 2023.

Second, the G7/EU established a mechanism to limit the price of Russian crude oil and petroleum products (aka, the “price cap”).[2] This regime allowed Western companies to remain engaged in Russian exports as long as the price stayed below a certain level. Ultimately, the threshold was set at $60/bbl for crude oil, $45/bbl for petroleum products trading at a discount to crude oil (e.g., mazut), and $100/bbl for products trading at a premium (e.g., diesel). The price caps took effect with the respective embargoes in December of 2022 and February of 2023. The guiding principle behind the price cap was to maintain the supply of Russian oil and petroleum products to the global market, and, thus, prevent supply shocks, while limiting the Kremlin's profits.

In response, Russia developed strategies to evade the restrictions. Losing traditional buyers in the EU because of the embargo, it began to seek new ones in Asian countries, primarily India. In response to the price cap, Russia started to build up its own fleet of tankers, often referred to as the “shadow fleet”.[3] This fleet consists of vessels that do not have service relationships with the G7/EU and as such can transport oil regardless of the price. It was intended to be large enough to maintain Russia's traditional export volumes and revenues.

Prior to this, the term "shadow fleet" was primarily used when tankers turned off their tracking transponders to conceal their true location and the destination of oil subject to U.S. sanctions.[4] This evasion tactic, known as "darkening," quickly became associated with the growing fleet of tankers engaged in the transport of Iranian and Venezuelan oil, and the list of such vessels began to be compiled and published by Lloyd's List.[5]

We propose to expand the definition of the shadow fleet in response to recent developments (i.e. Russia’s attempts to evade the price cap) and the new and significant risks they create. In this paper we define the shadow fleet as consisting of non-G7/EU owned or managed vessels navigating without International Group (IG) protection and indemnity (P&I) insurance. In this paper, we assess in detail how Russia has altered its trade in crude oil and petroleum products in response to the loss of EU markets and how it has begun to create its own shadow fleet in response to the price cap. We explore how this shadow fleet is critical in evading sanctions, what share it occupies in the global fleet, and what prospects Russia has for its further expansion.

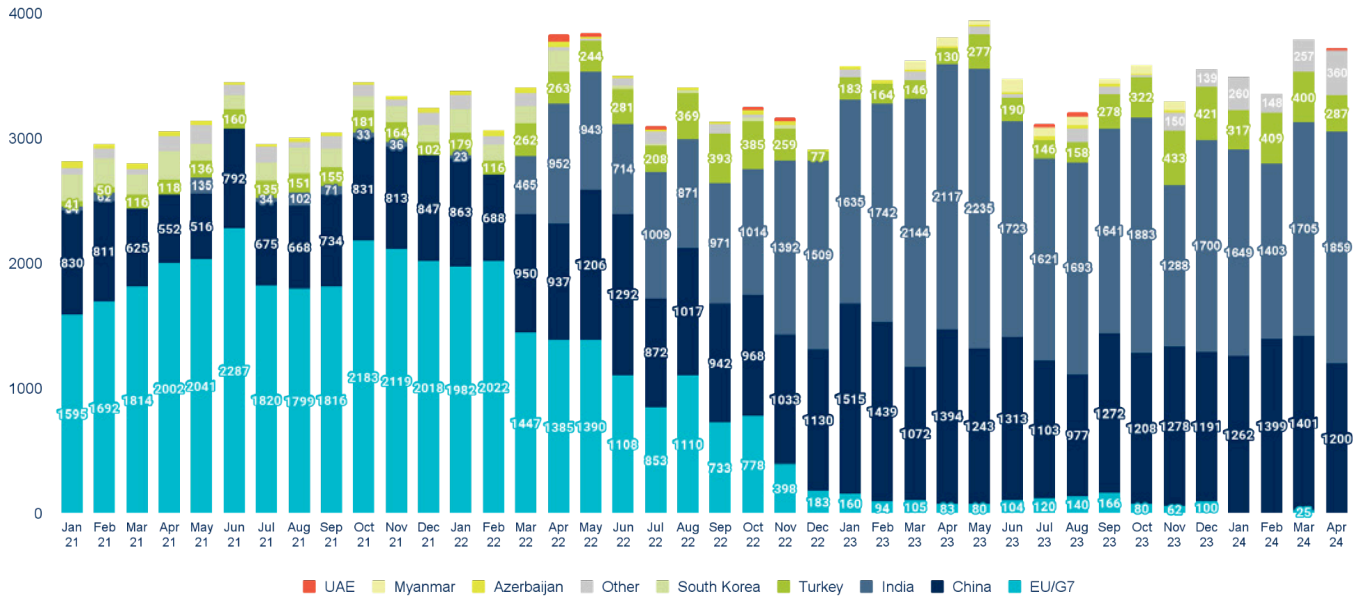
[2] See Council Decision (CFSP) 2022/1909 of 6 October 2022 here.
[3] The shadow fleet comprises all vessels that simultaneously meet two conditions: (1) They lack Western insurance (which until recently covered 95% of all ship transports worldwide) through the non-commercial International Group of P&I Clubs (IG), the center of which is located in Europe. The presence of IG P&I insurance for tankers was verified monthly by the International Maritime Organization (IMO) on The International Group of P&I Clubs website. (2) They belong to companies not from EU/G7 countries.
[4] See MARPRO Group whitepaper here.
[5] See Lloyd’s List Intelligence here.

Transformation of the Russian Oil Trade

In this section, we consider the dynamics of seaborne deliveries of Russian crude oil and petroleum products during 2021-2023. Since the onset of the full-scale invasion on February 24, 2022, the landscape of trading Russian oil and petroleum products has undergone a significant transformation, which experts from the Kyiv School of Economics have documented in detail as part of a monthly "Russian Oil Tracker".[6]

According to our assessment[7], the volumes of seaborne exports of Russian crude oil (see Figure 1) averaged 3.1 million barrels per day (mb/d) in 2021. After February 2022, these volumes even increased. In 2022, monthly average exports grew by 7% to 3.3 mb/d, and, in 2023, they increased by an additional 5% (compared to 2022) to 3.5 mb/d. However, the most significant change occurred in terms of the geographical distribution. While in 2021, the primary recipients of Russian crude oil were G7/EU countries with a volume of 1.9 mb/d, deliveries to these countries decreased to 1.1 mb/d in 2022, and amounted to less than 200 kilo barrels per day (kb/d) in 2023.[8] Instead of the G7/EU, the largest buyers of Russian crude oil are now India and China. In 2021, India purchased less than 100 kb/d. This number increased to 900 kb/d in 2022 and almost doubled to 1.78 mb/d in 2023. India accounted for half of all Russian crude oil exports in 2023. The second-largest purchaser in volume terms was China. Throughout 2021, it acquired 725 mb/d, whereas in 2022, the number increased to 990 kb/d, and reached 1.3 mb/d in 2023. This constitutes 35% of the total.

Figure 1. Russia's seaborne crude oil shipments by destination, kb/d



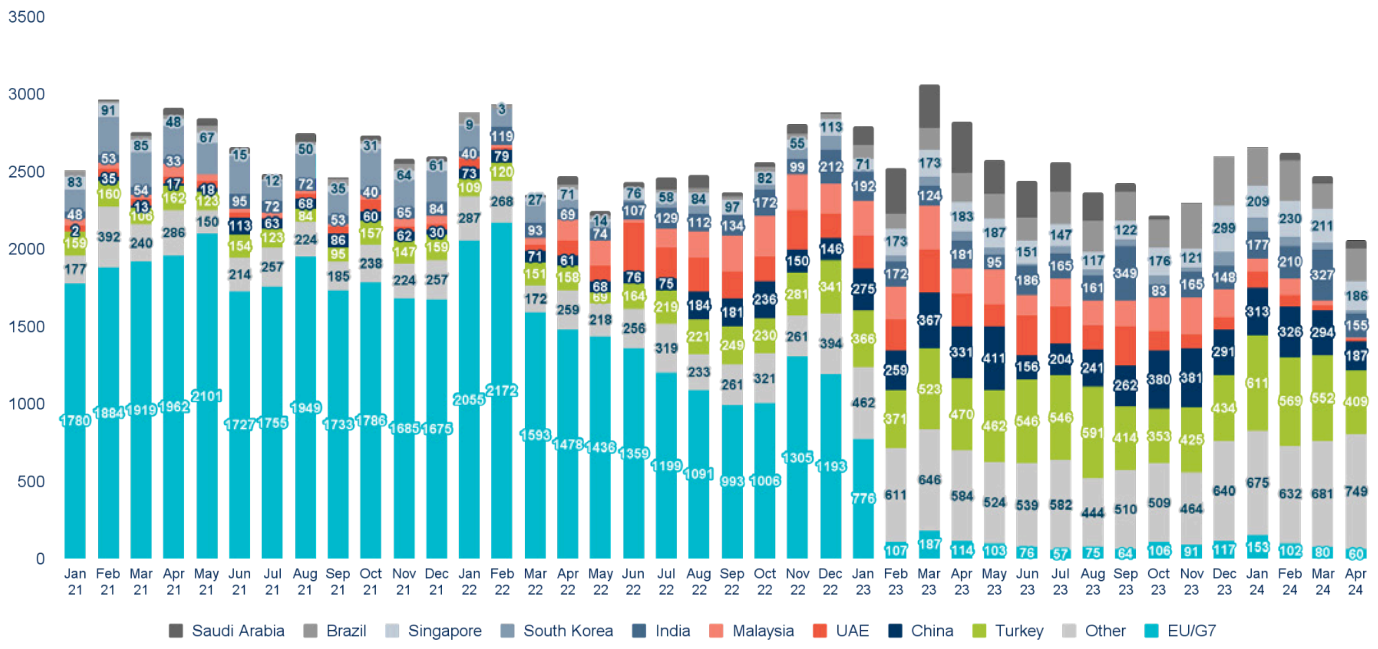
Source: Kpler, Equasis, 'IG' P&I Club webpage, KSE Institute estimates

[6] See KSE assessments here.
[7] The monitoring and collection of data on the volume of transportation of Russian oil products was carried out on a monthly basis from the Kpler platform database and the volumes may differ from other independent organizations, given the different timing of data uploads and methodologies for collecting and updating preliminary data on information platforms.
[8] Kilo barrels per day - the total number of barrels of oil transported in a month divided by 1,000 and divided by the number of days of the month.

Beyond the G7/EU, several other countries ceased their procurement of Russian crude oil after 2022, among them South Korea, Thailand, Singapore, and Australia. Although their volumes were significantly smaller than those of G7/EU countries, they nonetheless compelled Russia to seek alternative destinations. Other countries seized the opportunity and commenced purchasing Russian crude oil from 2023. These include Myanmar, Ghana, Pakistan, Indonesia, and Tunisia. Despite their purchases comprising only 2% of the total volume in 2023, this helped Russia to further diversify its exports.

Russian petroleum product exports, predominantly comprising diesel fuel[9], also experienced only a marginal decline from 2021 to 2023 (see Figure 2). While the average volume of petroleum products stood at 2.68 mb/d in 2021, it decreased to 2.56 mb/d in 2022 and further to 2.52 mb/d in 2023. Russian petroleum product deliveries to G7/EU countries mirror those of crude oil. In 2021, the average volumes amounted to 1.8 mb/d. It decreased by 23% to 1.4 mb/d in 2022 and plummeted to 160 kb/d in 2023. Turkey has emerged as the primary purchaser of Russian petroleum products, steadily increasing its volumes from 135 kb/d in 2021 to 190 kb/d in 2022 and 460 kb/d in 2023. Turkey accounted for 17% of total Russian petroleum product exports in 2023. China comes second, importing 47 kb/d in 2021, 115 kb/d in 2021, 295 kb/d in 2023. In 2023, China's imports constituted 12% of the entire Russian petroleum product exports. In contrast to crude oil, Russian petroleum product deliveries are quite diversified: in 2023, there were 76 countries importing them.

Figure 2. Russia's seaborne oil product shipments by destination, kb/d



Source: Kpler, Equasis, 'IG' P&I Club webpage, KSE Institute estimates

Despite the rejection of Russian oil and products by EU countries as well as other members of the sanctions coalition – and the corresponding shift in the geography of Russian crude oil and petroleum products exports –, this step was limited in nature. Western countries did not intend to remove Russian oil from the global markets,

[9] In this document, the following product groups were taken into account to calculate the volumes of Russian petroleum products, classified on the Kpler platform as: 'Fuel Oils', 'Gasoil/Diesel', 'Gasoline/Naphtha', 'Kero/Jet'.

which would have likely caused a price shock. Instead, they developed a different approach to reconcile this objective with the goal of limiting Russia's ability to pay for the war in Ukraine: the price cap. This restriction applies when Russian crude oil and petroleum products are transported with the participation of Western (maritime) service providers. This has prompted the Kremlin to build up its shadow fleet of sanctions-proof tankers. It is critical to examine the functioning of this fleet, including by conducting a detailed analysis of vessels and companies involved as well as patterns of the fleet's utilization.

Problem Statement: The Shadow Fleet Challenge

The expansion of Russia's and the world's shadow fleets entails several risks: First, the shadow fleet mainly consists of vessels that have reached the end of their normal service life and many of them likely lack proper spill liability (P&I) insurance as mandated by International Maritime Organization (IMO) regulations and guidelines. These tankers pose a significant risk to the environment for coastal states worldwide, especially those in the Baltic and Mediterranean Seas, where the largest flows of Russian oil on such shadow tankers are observed.[10] This is due to the orientation of Russia's oil extraction, refining, and export infrastructure towards its traditional clients in Europe. In recent months, approximately half of the tankers transporting Russian oil in the Baltic Sea belonged to the shadow fleet and their number regularly exceeds 70 loaded vessels per month.

A major accident involving the Russian shadow fleet is likely only a matter of time. In fact, several close calls have already occurred in recent months, including one near the coast of Denmark.[11] Coastal states are facing the challenge that they will have to bear the consequences of any spill, while they traditionally do not exert much control over insurance-related IMO guidelines, which are the flag states' responsibility. Due to the urgency of the matter, coastal states should not delegate this to the shadow fleet's flag states, which have clearly failed to ensure compliance, but rather take it upon themselves to enforce existing requirements.

While Russian oil tankers' P&I insurance has been found to be often insufficient, some policies also appear to be effectively unenforceable. According to leaked shipping documents reviewed by the Financial Times and the Danish media group Danwatch[12], a number of Russian vessels sailing from Baltic Sea ports rely on insurance from Moscow-based Ingosstrakh, which can be easily canceled in the event of a disaster as the fine print of the contract contains a "sanctions exclusion clause," which nullifies claims for most tankers carrying Russian oil. Insurance arrangements of the Russian shadow fleet with Ingosstrakh potentially expose coastal countries in Europe and Asia to huge potential clean-up costs in the event of a spill. Michelle Wiese Bockmann, an analyst at Lloyd's List, stated that "[t]his presents serious environmental and safety risks in key chokepoints where Russian oil is shipped – including through Denmark's waters and the English channel, which are international routes through which these tankers sail daily."[13]

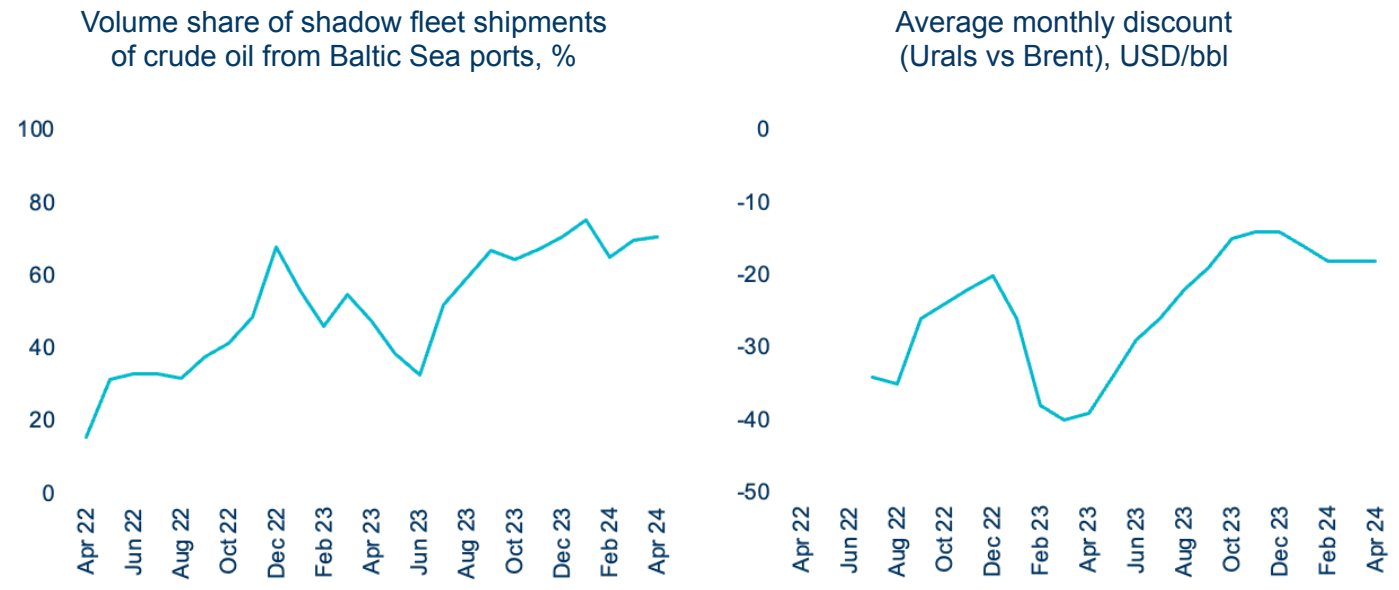
The second challenge posed by the proliferation of the shadow fleet is circumvention of the price caps. On December 5, 2022, when the price limit of $60/bbl of crude oil and the ban on its import into the EU came into effect, Ursula von der Leyen, President of the European Commission, stated that "[t]his decision will further hit Russia's revenues and diminish its ability to wage war in Ukraine." To an extent, this turned out to be correct.

[10] See the International Working Group on Russian Sanctions report here,
[11] See "Measuring the Shadows" by Craig Kennedy here.
[12] See Financial Times article here.
[13] See Financial Times article here.

The discount on Russia's main crude export grade – Urals – to dated North Sea Brent jumped by around $12/bbl month-over-month in December 2022 and peaked at $40/bbl in January 2023 after the EU embargo and G7/EU price cap on crude oil had fully taken effect. Total monthly oil export losses also peaked at $8.4 bn in January 2023.[14] However, the discount on Russian oil gradually declined thereafter and so did correspondent oil export losses. In October 2023, the discount narrowed to below $14/bbl and the correspondent monthly losses dropped to $2.5 bn. The introduction of OFAC sanctions on vessels carrying Russian crude above the price cap widened the discount again to $17-18/bbl starting in December 2023. As a result, monthly Russian oil export losses increased to around $3.0-3.5 bn in January-April 2024. KSE Institute estimates total Russian oil export losses of $126 bn since the start of the full-scale invasion.[15]

One of the key strategies for countering the price cap, in our opinion, has been the creation of Russia's shadow fleet. It is hard not to notice (see Figure 3) the correlation between the share of the shadow fleet in the transport of Russian crude oil in the Baltic Sea and the discount of Urals vs. Brent. When the share of the shadow fleet increases, the discount on Urals falls. Conversely, when the share of the shadow fleet decreases, the discount increases. Specifically, the variation in the share of the shadow fleet explains 55% of the variation in the discount, and if we take the causal relationship of these two indicators as a rule, then in this case, an increase in the share of the shadow fleet for every 10 percentage points is associated with a decrease in the discount by $4.4 (with a 95 % confidence interval from $2.6-6.3/barrel. The discount can be understood as a direct proxy for the losses of export earnings that Russia suffers.

Figure 3. Share of exports from Russian Baltic ports using the shadow fleet and price discount on Urals oil.



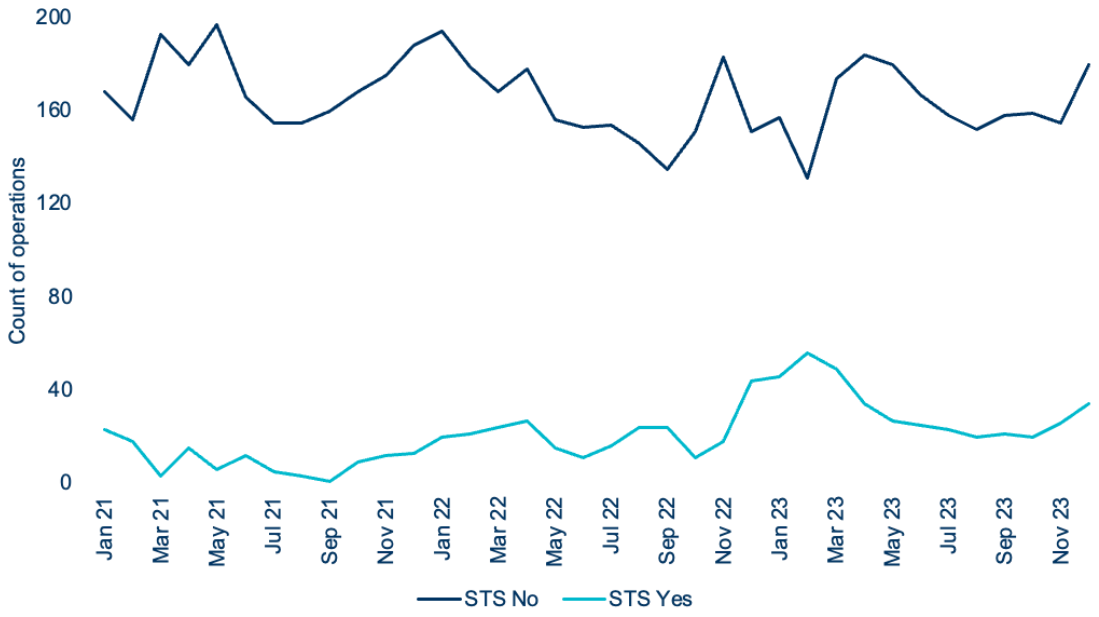
Sources: Kpler data, IEA data, KSE calculations. On the right, the graph shows the difference in spot prices for Urals and Brent oil with a lag of +2 months ahead. The graph on the left shows the percentage of the shadow fleet in the export of crude oil from the ports of the Baltic Sea (the ports of Ust-Luga and Primorsk), which are the main channels for the export of Urals oil.

[14] Please see KSE Institute Russian Oil Tracker, May 2024 for methodology of losses estimation.
[15] Ibid.

Prior to the full-scale invasion of Ukraine, the difference between Urals and Brent ranged from $1-2/bbl. After February 2022, Russian oil became "toxic" on global markets, resulting in a significant discount to the Brent benchmark, which initially soared to $30/bbl. Gradually, however, markets adjusted to this shock, and the discount started narrowing until December 2022 when the EU imposed its embargo and the G//EU price cap policy on Russian crude took effect. From the end of 2022, many involved entities were hesitant to deal with Russian oil due to fears of sanctions from the EU and US, leading to a decrease in the share of the shadow fleet and a dramatic increase in the discount, which reached $38-40/bbl in December 2022-February 2023.

In the second quarter of 2023, Russia adapted by stepping up efforts to build the shadow fleet. Consequently, the discount began to decline again, casting serious doubts on the effectiveness of energy sanctions by the end of 2023. According to estimates by KSE Institute, over 95% of all seaborne Russian crude oil exports were sold above the price cap of $60/bbl.[16]

Figure 4. With the introduction of the price cap, the share of STS operations in the Baltic Sea sharply increased in early 2023.



Sources: Kpler data, KSE calculations

In October of 2023, the U.S. Department of the Treasury's Office of Foreign Assets Control (OFAC) imposed a first round of sanctions on vessels transporting oil in violation of the price cap, widening the discount again. While additional vessels were designated in the first few months of 2024, there is currently no reason to believe that the overall trend – i.e., the build-up of the shadow fleet – will be overcome. There is a significant risk that further growth of the shadow fleet will lead to a further reduction in the price differential to Brent and dramatically reduce the impact of energy sanctions. As of April 2024, 83% of Russian crude oil and 46% of Russian petroleum products are being transported by shadow tankers.

[16] See KSE's monthly Russia Chartbook here.

The environmental threat emanating from the shadow fleet is exacerbated by practices such as “spoofing”[17] (i.e., the temporary switching off of transponders) as well as ship-to-ship (STS) transfers. Such strategies can also aid in the circumvention of sanctions as they may be employed to conceal the origin of a cargo. "Ship-to-ship," or STS operation, is a term applied to the transfer of liquid bulk cargo between two or more vessels in open waters. An STS operation can be conducted when both vessels are underway or when one vessel is at anchor and the other is moored alongside.[18] While commonplace, ship-to-ship operations have proven to be a convenient tool in the shadowy realm of oil trading. Since the imposition of the price cap, ship owners transporting Russian oil have relied on ship-to-ship operations in international waters to consolidate cargoes – e.g., in light of limitations regarding the availability of certain types of ships. The most active vessels in this practice, coincidentally, are old tankers that are part of the shadow fleet.

The data we have collected confirms this. Consider, for example, the export of crude oil and petroleum products from Russia's Baltic Sea ports (Ust-Luga and Primorsk) in Figure 4. With the introduction of the price cap, the share of STS operations sharply increased, albeit temporarily, until Russia could rely more heavily on exporting crude oil and oil products with its own, newly established shadow fleet in 2023. There is evidence that this increase may be associated with sanctions evasion, especially if it entails the transfer of cargo from shadow fleet vessels to mainstream fleet vessels during which the specific nature of the cargo can be concealed. For instance, in the first quarter of 2024 nearly 60% of tankers conducting STS operations after departing from Baltic ports were part of the shadow fleet, while 84% of tankers ultimately receiving such oil as a result of STS operations were not part of the shadow fleet. We assess that almost two-thirds of all STS operations worldwide are currently attributed to the Russian shadow fleet, indicating that, what has always been part of international tanker operations, is particularly critical in the realm of the shadow fleet.

Examples of STS operations that potentially indicate violations of oil transportation conditions above the established price cap.

Example 1.

In February 2024, 9 tankers loaded in Russian ports and not insured with 'IG' P&I insurance in 4 different regions transferred oil to 5 tankers that were insured with 'IG' P&I insurance. Among them, the Liberian floating storage tanker New Trust (IMO 9274812) is involved. Its behavior closely resembles that of the Liberian tanker New Legend (IMO 9230505), which was subject to a journalistic investigation demonstrating that the tanker is actively used as a transshipment vessel for Russian oil, from which European tankers are then loaded to supply oil to EU countries. This suggests that Russia has simply replaced the tanker that attracted attention with another one to continue its activities off the coast of Romania (further detailed information can be found in Table 1 of the Appendix or in “Russian Oil Tracker”, slide 22)

Example 2.

The IG-insured floating storage vessel A Jewel engages in the transfer of oil products from tankers lacking verifiable P&I insurance off Malaysia, subsequently transferring them to vessels insured with 'IG' P&I.

[17] Because the AIS relies on radio frequencies and manual data input, the system is prone to both human error and intentional manipulation. This opens for the opportunity of AIS spoofing, an umbrella term for all manipulation of AIS data.
[18] Syver B. Skedsmo Navigating the Shadows: Russian Oil Destinations, the Dark Fleet, and Deceptive Shipping Practices post-2022, December 2023

Since the end of 2023, five tankers with opaque insurance of uncertain quality have discharged Russian and possibly Iranian fuel oil and VGO to A Jewel, which was then transshipped to 'IG' P&I insured tankers.

Among these 5 tankers, according to Kpler's assumptions, the Emirati tanker Pioneer Sam (IMO 9232620) was also present, which on January 24, 2024, loaded oil in Iran and subsequently transshipped it to the floating storage vessel A Jewel through STS operations (for more detailed information, refer to "Russian Oil Tracker", slide 21).

Additional instances of potentially suspicious STS operations can be found in our team's research on the "Russian Oil Tracker," slides 19-20

These instances are not isolated, which confirms that, while STS operations are a common occurrence in maritime transportation, Russia may actively utilize them to circumvent sanctions and supply oil products to various countries, including European ones, concealing the origin of its products.

Methodology

We utilize data from the Kpler[19] and other sources to conduct our calculations and determine the size and composition of the shadow fleet, including vessel ownership and P&I insurance. This section explains our methodology in detail.

We consider exports of crude oil and petroleum products from January 1, 2021, for the following types of products: "Crude/Co," "Fuel Oils," "Gasoil/Diesel," "Gasoline/Naphtha," and "Kero/Jet." During this time, there were approximately 228,000 maritime transport operations. Additionally, we have incorporated insurance data and updated information regarding owners and ship managers, their addresses, and other details.

The shadow fleet, in our definition, comprises all vessels that simultaneously meet two conditions:

- They lack Western insurance coverage as they rely on providers outside of the International Group of P&I Clubs (IG), a non-commercial consortium. Until recently, around 95% of the global oil tanker fleet carried IG P&I insurance to meet IMO guidelines on financial adequacy of insurers. The presence of IG P&I insurance for tankers was verified monthly on the International Group of P&I Clubs' website.[20]
- They are owned and managed by companies not from G7/EU countries.

Here lies the main difference to Lloyd's methodology, which does not include ships of Russia's state-owned Sovcomflot in the shadow fleet. We believe that both purpose as well as risks associated with the shadow fleet are independent of the specific owner or ship manager. State-owned (rather than private) fleets, as the Kremlin's practice shows, may pose the same or even greater risk to the safety of international navigation as well as compliance with good trading practices and transparency.

[19] Sea Kpler platform here.

[20] See The International Group of P&I Clubs website here. The International Group of P&I Clubs is a collective association of 12 Protection and Indemnity (P&I) insurance providers that collaboratively offer liability insurance coverage to shipowners, operators, and charterers, ensuring financial protection against a wide range of risks and liabilities associated with maritime operations.

One issue with the definition of the shadow fleet is related to the inclusion of smaller tankers that rely on local insurance services outside of the International Group but provided by entities located in coalition countries. Therefore, our estimate of the shadow fleet's size may overstate the actual situation somewhat. As insurance information for these vessels is not easily available, we could only exclude them based on their size, which would falsely remove a large number of shadow tankers from the estimate. If vessels insured by such smaller companies, which may not have the capital to cover the cost of environmental damages, should be considered as part of the shadow fleet is an open conceptual question that we will focus on more in our upcoming research. In addition, there is the issue of sanctions exclusion clauses (e.g., in the case of Ingosstrakh), which state that an insurance policy is void in the case of sanctions violations. And, in fact, we know that a large share of shipments of Russian oil, at least of crude oil, are in violation of the price cap.

Throughout this analysis, we will consistently indicate the number of vessels in Aframax-equivalent units (with an average deadweight of 110,000 tons) in parentheses for the transport of crude oil, and in terms of Seawaymax (smaller product tankers, with an average deadweight of 40,000 tons) for the transport of petroleum products, since these are the main types of vehicles for the respective categories. This way, we account for the different sizes of tankers operating in the shadow fleet.

Another key issue for defining the shadow fleet is determining the appropriate analysis period. The period during which we assess whether a vessel belongs to the shadow fleet or not starts from December 5, 2022, the first day of the introduction of sanctions in the form of a price cap on crude oil. This marks the date when Russia began to clearly establish its own shadow fleet as an alternative to circumvent the price cap. However, this does not imply that Russia did not possess or utilize its own fleet prior to this date. We understand that this approach may be debatable and impact all further analysis results.

To be able to identify changes within this period, we also present an alternative approach that considers shipments on a quarterly basis. Specifically, if a vessel lacked IG P&I insurance coverage and transported Russian oil or oil products in a given quarter of the year, it would be classified as part of the Russian shadow fleet for that specific quarter. Our estimates of the shadow fleet using both annual and quarterly approaches (based on the year 2023 and the beginning of the first quarter of 2024) yield very similar results.

Results of the Analysis

In this section, we describe the main findings of our study. We explore how Russia has formed the shadow fleet of 435 vessels – 185 transporting crude oil and 250 transporting petroleum products –, its current composition and activities, its position and intersection with the global shadow fleet, as well as our assessment of the potential for its further expansion.

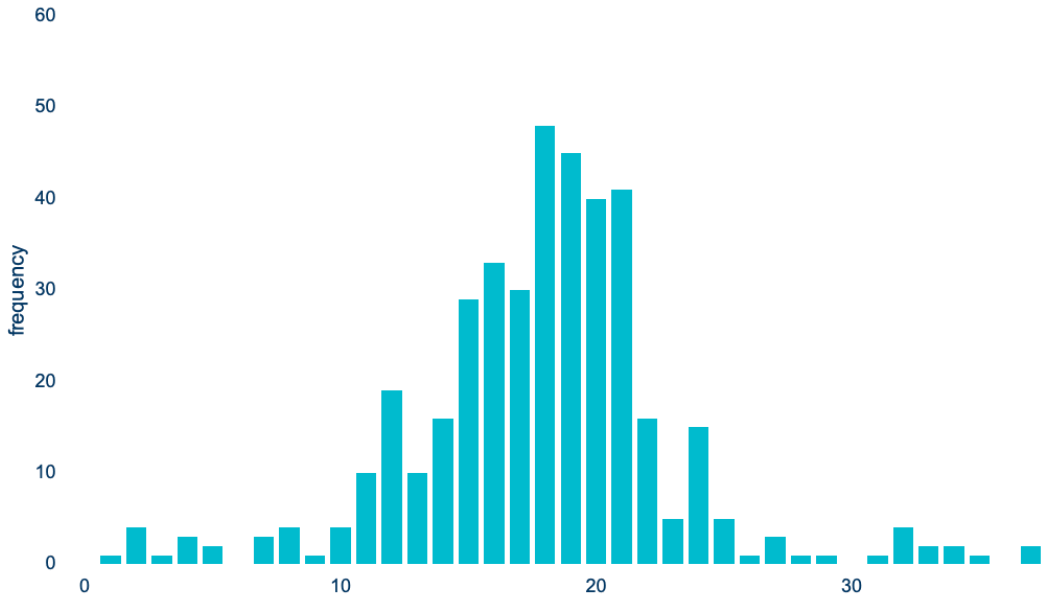
A. How Russia Created its Shadow Fleet

When it comes to securing tanker capacity, exporters have three main options they can turn to:[21] (1) spot chartering: renting vessels on a voyage-by-voyage basis; (2) time chartering: leasing a tanker for a longer period and using it for multiple round trips; or (3) vessel ownership: full ownership of the tanker. Historically, Russia utilized all three: it owned a fleet of tankers through Sovcomflot, and some exporters chartered vessels on a time-charter basis. However, undoubtedly, the largest source of tonnage prior to sanctions was spot charters. The proximity of Russian export terminals to the two largest import markets in the world ensured Russia significant, stable, competitive supplies of major tankers for discharge.

However, this entire scheme faltered due to sanctions on Russian oil, changing trade flows from Europe to Asia, and the need to create its own shadow fleet. For this purpose, Russia primarily relied on older tankers in the market. We examine the distribution of Russian shadow tankers by age and find that three-quarters of all tankers fall into the age group of 15-20 years (see Figure 5).

The reason for the low number of tankers aged 0 to 15 years in the shadow fleet may lie in the fact that most companies owning relatively young tankers have obligations regarding loan repayments. These loans are long-term, for example, up to 15 years, and compel owners to comply with regulatory requirements throughout this period. Therefore, tankers planning to receive P&I insurance coverage from the International Group and undergo inspections for ESP recertification at 5, 10, or 15 years are less involved in Russia's shadow fleet.

Figure 5. Distribution of tankers of the Russian shadow fleet by age



Source: Kpler, Equasis, 'IG' P&I Club webpage, KSE Institute estimates

[21] See Craig Kennedy's report "Measuring the Shadows" here.

By the 16th year of a tanker's life, after potential loan repayments are completed and after passing through three stages of vessel inspection, a significant number of owners consider selling or writing off these vessels and renewing their own fleets. This opens a window of opportunity for Russia to purchase such rather old tankers and use them for transporting oil above the price cap. However, the age of tankers is just one indicator/source for creating a shadow fleet – and perhaps not the primary one.

We used the TensorFlow Decision Forests (TF-DF) method[22] to analyze nearly 7,000 tankers transporting crude oil and petroleum products from 2021 to December 5, 2022. The aim of this analysis was to identify the features that predominated determined whether a tanker would join the shadow fleet during 2023. A visualization of the results can be found in Figure 1 of the Appendix.

The most significant and evident characteristic on this path is that the vessel was **previously operated by Russia itself.** These ships are typically older than 10 years (relatively young for the Russian fleet) and previously operated with Russian cargo. However, most of them changed management before December 5, 2022, making this the most likely path to the shadow fleet. There are approximately 90 tankers of this type. They are former ships of the state-owned Russian company Sovcomflot, which have come under the management of companies based in Dubai and elsewhere. The largest companies in Russia's shadow fleet based on the number of vessels are Emirati-based Sun Ship Management and Oil Tankers Scf Mgmt Fzco.

If a vessel did not fall under this category but ended up in the Russian shadow fleet, it was **transferred from a non-Russian entity**, and stripped of its service relationships with the G7/EU. A first group of these vessels previously dealt with Russian crude oil and products, mostly belonged to companies from non-G7/EU countries, and were older than 20 years. There are over two hundred of these tankers that would have likely been written off had they not found a new life in the Russian shadow fleet. A separate group consists of tankers beyond the “insurance age” of 15 years that originally belong to European entities and had never transported Russian oil before. This category includes about 100 vessels.

Overall, the factors included in the model (age of the tanker, region of ship manager/commercial manager origin, class/size of the vessel, whether it previously transported Russian crude oil or petroleum products, and some other characteristics) can explain 96% of the outcome. It is worth noting that we did not build a predictive model, but only sought retrospective explanation. The coefficients' values (importance of parameters) of the model can be found below Figure 1 of the Appendix.

B. Current Structure of the Russian Shadow Fleet

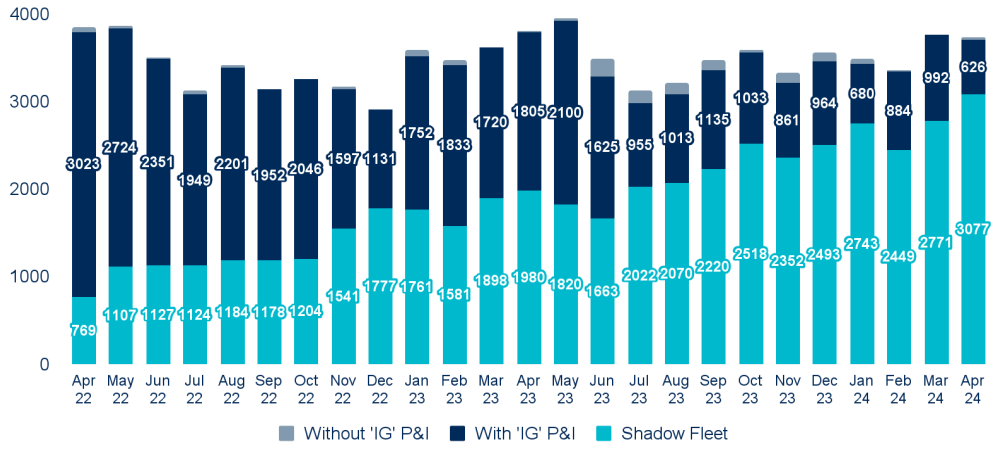
Russia’s efforts to establish its own shadow fleet, which began in the latter half of 2022, continue to date. Below, we document the current state of affairs with regard to some key dimensions: volumes transported, ports used, destinations, flag states, number and types of vessel, and ship managers.

[22] TF-DF is a collection of production-ready state-of-the-art algorithms for training, serving and interpreting decision forest models (including random forests and gradient boosted trees). You can now use these models for classification, regression and ranking tasks - with the flexibility and composability of the TensorFlow and Keras.

Volumes

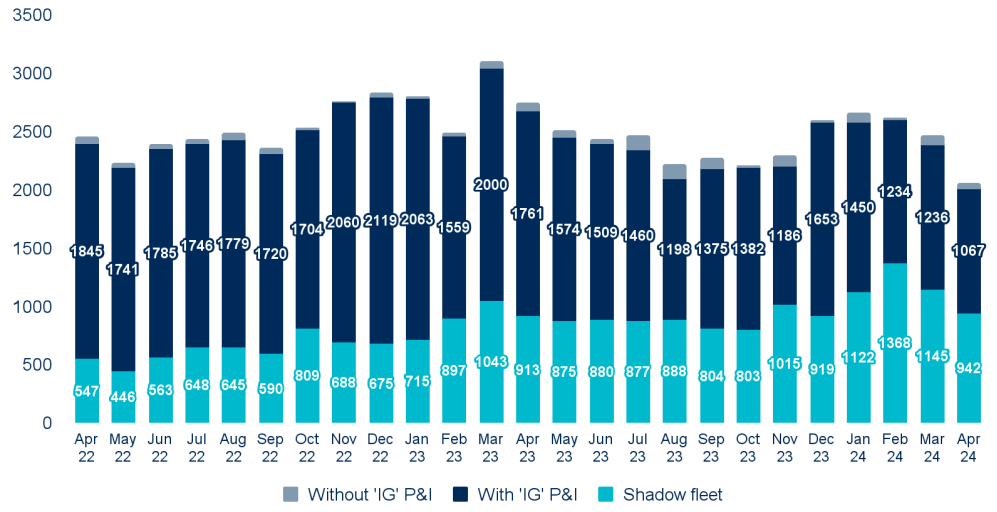
The volumes of crude oil (see Figure 6) transported by the shadow fleet began to exceed the volumes transported with 'IG' P&I insured vessels starting in December 2022. The highest monthly volume was reached in April 2024 around 3.1 mb/d. While the shadow fleet share accounted for only 20% of monthly exports of crude oil in April 2022, it steadily increased throughout almost the entire analysis period, reaching around 83% in April 2024. This allows Russia to sell its oil above the price cap and generate significant excess profits.

Figure 6. Russia's seaborne crude oil shipments, kbbl/day



Source: Kpler, Equasis, 'IG' P&I Club webpage, KSE Institute estimates

Figure 7. Russia's seaborne oil products shipments, kbbl/day



Source: Kpler, Equasis, 'IG' P&I Club webpage, KSE Institute estimates

Note: Shadow fleet: tankers affiliated with jurisdictions outside the sanctions coalition and lacking ”IG” P&I insurance. With “IG” P&I: tankers affiliated with jurisdictions of sanctions coalition and outside coalition and with ”IG” P&I insurance. Without “IG” P&I: tankers affiliated with jurisdictions of sanctions coalition but lacking ”IG” P&I insurance.

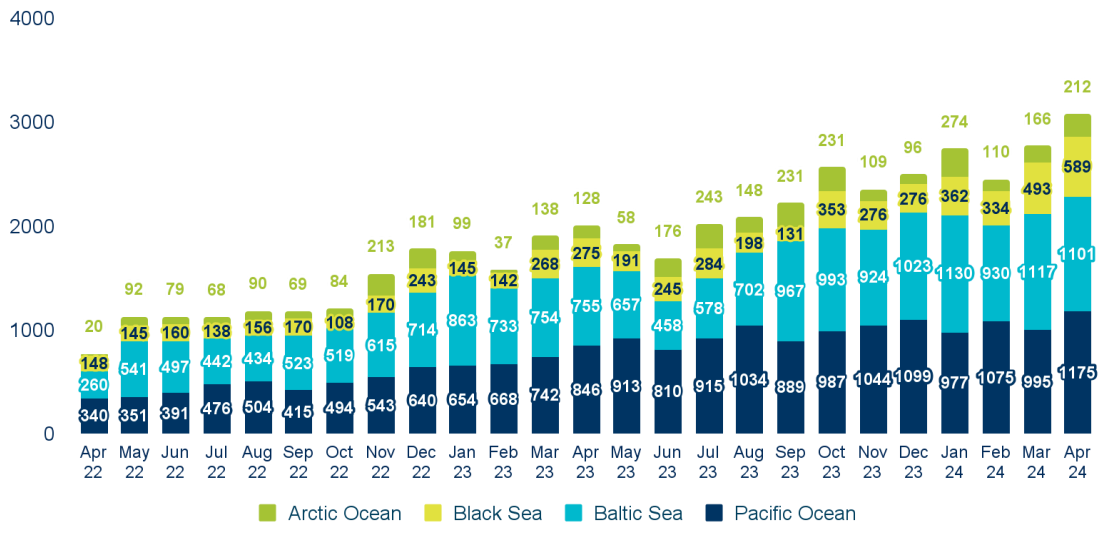
The overall picture regarding the volumes of Russian petroleum products (see Figure 7) is similar, but there are some differences, most notably that the shadow fleet's share is overall lower than in the case of crude oil. An increasing share has been observed since May 2022: if only 20% of petroleum products were transported by the shadow fleet then, this share had more than doubled to 40-50% by early 2024. The increase in recent months may indicate that Russia is finding product tankers willing to transport petroleum products above the price cap and without using 'IG' P&I insurance. We believe that the slower pace of the shadow fleet's build-up in the case of petroleum products is due to the fact that the premium products price cap has been above market prices for Russian exports.

Ports

The following statistics refer to volumes transported with the shadow fleet focusing on geographical regions (see Figure 8). In 2023, the leader in crude oil exports by shadow fleet were ports of the Pacific Ocean region (e.g. Nakhodka/Kozmino (largest volume), De Kastri, Prigorodnoye). The region's share in 2023 ranged from 37% to 50% depending on the month. The second place is occupied by ports of the Baltic Sea region (e.g. Primorsk (largest volume), Ust Luga, Kaliningrad), with the region's volume share in 2023 ranging from 27% to 49%. The share of the Black Sea and the Arctic Ocean regions throughout 2023 did not exceed 26% of monthly crude oil volumes. The largest ports were Novorossiysk and Murmansk, respectively.

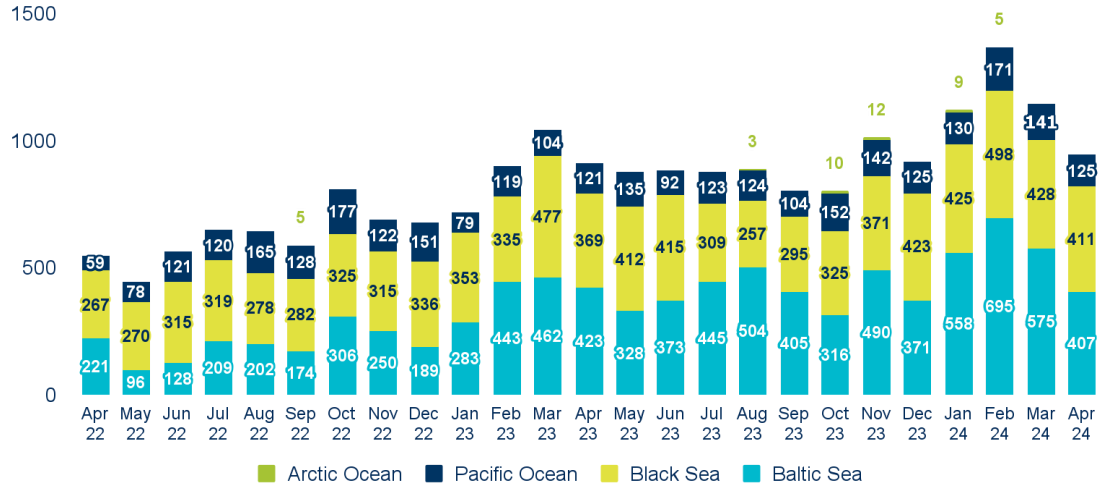
The volumes of Russian petroleum products (see Figure 9), transported by the Russian shadow fleet, has also been steadily increasing, reaching its highest reading in February 2024 at 1.4 mb/d. In 2023, the leader in total petroleum product exports were ports of the Baltic Sea region (e.g. Ust-Luga (largest volume), Primorsk), with the region's volume share in 2023 ranging from 37% to 56% depending on the month. The second place is occupied by ports of the Black Sea (e.g. Novorossiysk (largest volume), Tuapse), with the share of this region's volumes in 2023 ranging from 28% to 49%. The share of the Pacific and the Arctic Ocean regions throughout 2023 did not exceed 20%. The ports with the largest volumes were Nakhodka and Murmansk, respectively.

Figure 8. Russia's seaborne crude oil shipments from regions by shadow fleet, kbbl/day



Source: Kpler, Equasis, 'IG' P&I Club webpage, KSE Institute estimates

Figure 9. Russia's seaborne oil products shipments from regions by 'Shadow fleet', kbbl/day

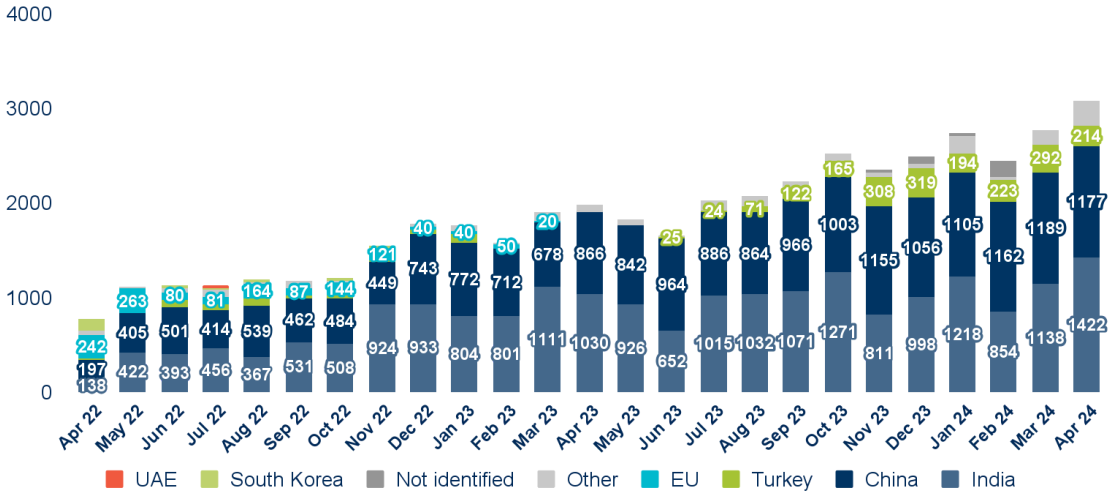


Source: Kpler, Equasis, 'IG' P&I Club webpage, KSE Institute estimates

Destinations

The top three countries importing Russian crude oil via the shadow fleet were India, China, and Turkey (see Figure 10). India accounted for the largest volume share in 2023 (47% of the total volume transported by the shadow fleet in 2023) and the highest monthly reading was recorded in October 2023 at 1.2 mb/d. However, the volumes are quite volatile. For instance, by February 2024, India purchased only approximately 0.9 mb/d. China has been consistently purchasing 1-1.1 mb/d since October 2023. Turkey, in turn, has been consistently purchasing relatively stable amounts from November 2023, ranging from 0.2 to 0.3 mb/d.

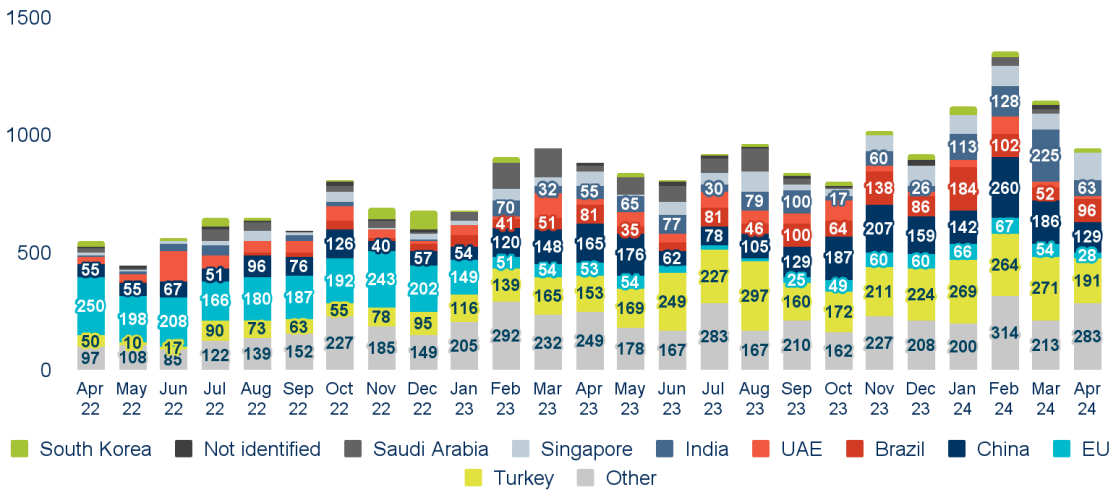
Figure 10. Russia's seaborne crude oil shipments for destination by 'Shadow fleet', kbbl/day



Source: Kpler, Equasis, 'IG' P&I Club webpage, KSE Institute estimates

In contrast to crude oil, Russian petroleum products transported with shadow takers are supplied to a larger number of countries (see Figure 11). Throughout 2023, Turkey was the undisputed leader, however, purchasing an average of 190 kb/d. China takes the second place with daily deliveries averaging 132 kb/d, followed by Brazil with 67 kb/d. Additionally, in early 2024, there is a significant increase in petroleum products exports to India: while the average deliveries in 2023 were 55 kb/d, in January-February, they exceeded 100 kb/d.

Figure 11. Russia's seaborne oil products shipments for destination by 'Shadow fleet', kbbl/day



Source: Kpler, Equasis, 'IG' P&I Club webpage, KSE Institute estimates

Flags

The leadership in flags under which shadow tankers transported Russian crude oil belongs to the following five countries: Panama, Liberia, Gabon, Cook Islands, and Marshall Islands (see Figure 12). In 2023, tankers under these flags transported approximately 90% of the total volume of shadow crude oil. The most active are tankers under the Panamanian flag, which began to increase volumes starting from April 2022, growing from 265 kb/d to 1.2 mb/d. A similar situation is observed with tankers under the flag of Gabon, which managed to increase daily volumes from 25 kb/d to 525 kb/d since April 2022.

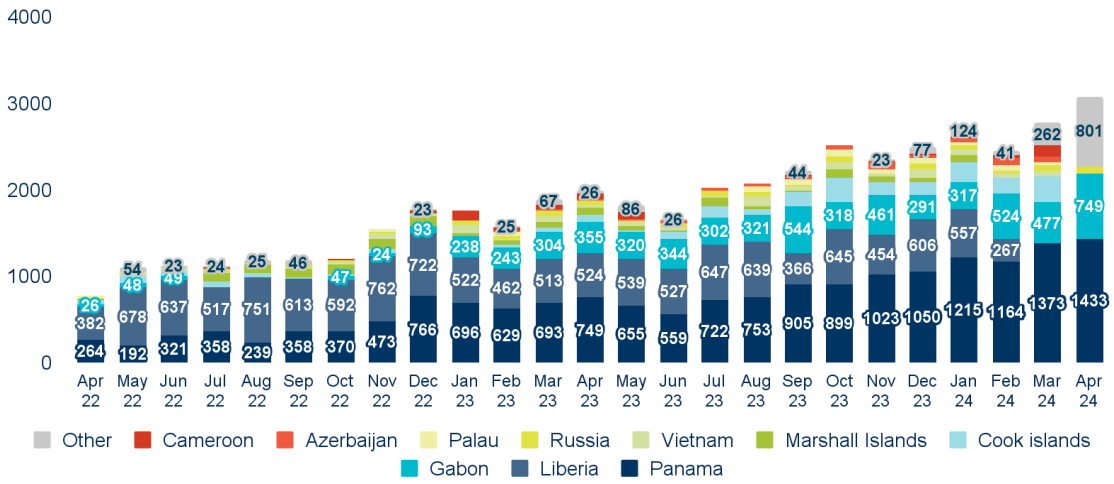
The situation regarding the flags of Liberia and the Marshall Islands[23] may change in the coming months due to increased sanctions by the United States on vessels associated with these registries. We already observe a decrease in the volumes transported with tankers operating under the Liberian flag during January-February 2024, dropping from 560 kb/d to 270 kb/d, while tankers under the flag of the Marshall Islands did not engage in transport at all in February 2024. It is worth noting that the use of these flags may create significant and prolonged vulnerabilities for the shadow fleet, as even under the condition of transitioning to a new flag, these tankers may be subject to additional scrutiny and surveillance.

The leadership in flags under which shadow tankers transport Russian petroleum products belongs to the following countries: Liberia, Gabon, Marshall Islands, Panama, and Russia (see Figure 13). In 2023, tankers under these flags transported approximately 80% of the total volume of shadow petroleum products.

[23] See Reuters article here.

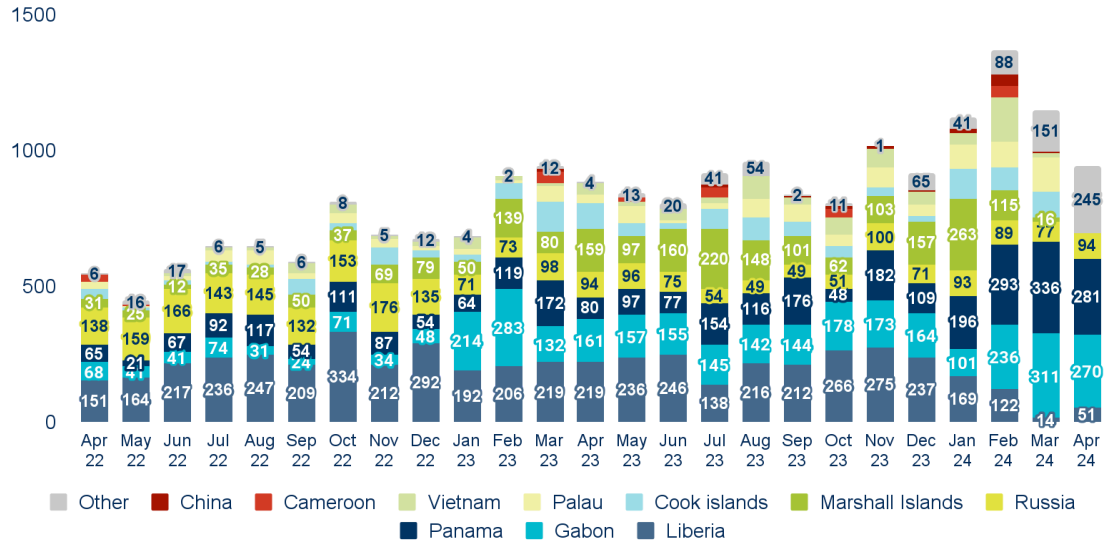
For tankers using the flags of Liberia and the Marshall Islands, we observe downward trends: during January-February 2024, tankers under the Liberian flag decreased volumes from 170 kb/d to 120 kb/d, thereby dropping below the April 2022 reading, and under the Marshall Islands flag from 260 to 115 kb/d. However, for the Marshall Islands flag, these values are comparable to the average daily volumes for 2023 at 120 kb/d. On the other hand, tankers under the flags of Panama and Gabon are becoming more active, with a February 2024 increase in their daily volumes by +50% and +130%, respectively, compared to January 2024.

Figure 12. Russia's seaborne crude oil shipments under the flags of the 'Shadow fleet', kbbl/day



Source: Kpler, Equasis, 'IG' P&I Club webpage, KSE Institute estimates

Figure 13. Russia's seaborne oil products shipments under the flags of the 'Shadow fleet', kbbl/day



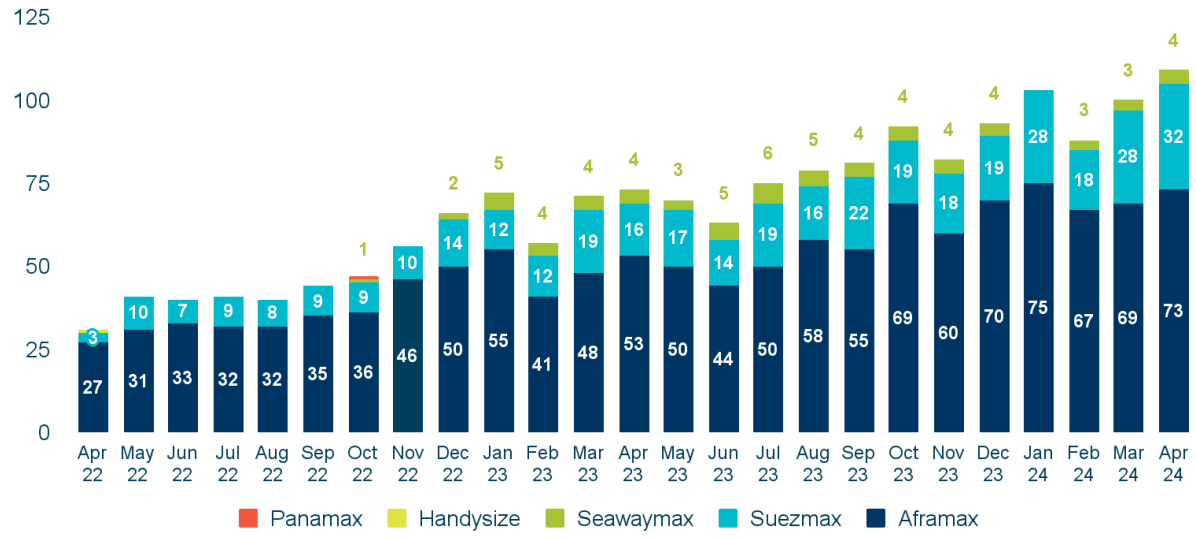
Source: Kpler, Equasis, 'IG' P&I Club webpage, KSE Institute estimates

Size

In addition to an increase in the volume of crude oil transported by the shadow fleet, there is a corresponding growth in the *number* of shadow tankers (see Figure 14). As of April 2022, their number was 31, but by January 2024 their monthly quantity exceeded 100. The majority of them are Aframax-type tankers (ships between 80,000 to 120,000 deadweight tons), consistently representing over 70% of the total.[24]

The number of shadow tankers transporting Russian petroleum products also experiences growth almost every month, albeit at a slower pace compared to crude oil tankers (see Figure 15). As of April 2022, their number was approximately 70, but by October 2023 started to exceed 100. The majority of them are Seawaymax-type tankers (ships between 10,000 and 60,000 deadweight tons), consistently representing around 55%.

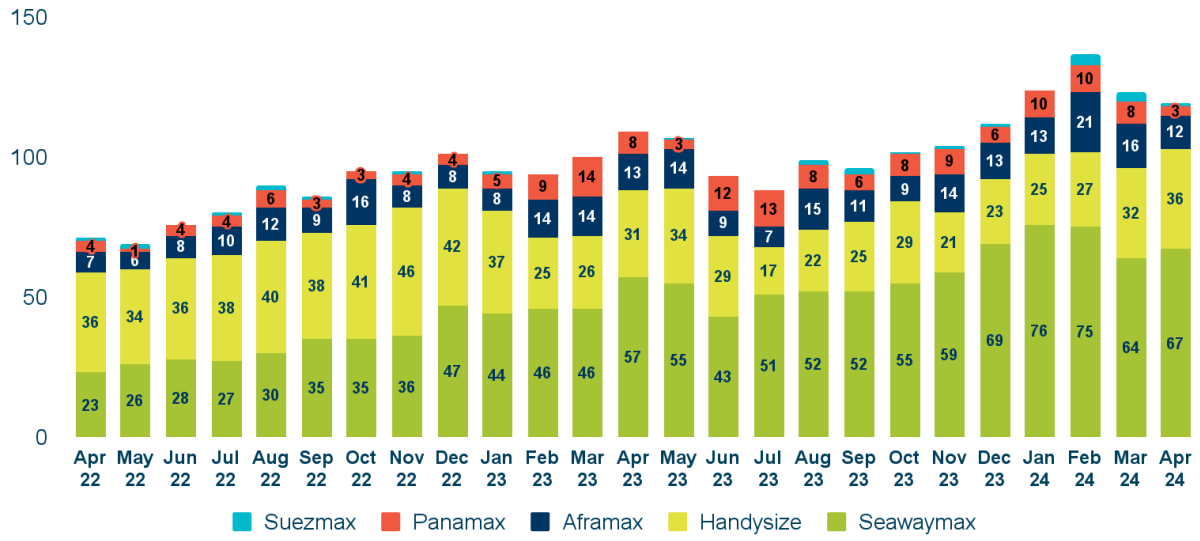
Figure 14. Structure of Russian shadow fleet carrying crude oil, number of unique tankers



Source: Kpler, Equasis, 'IG' P&I Club webpage, KSE Institute estimates

[24] Note: It is worth noting that the calculations of the number of tankers transporting crude oil and petroleum products do not include tankers involved in STS operations.

Figure 15. Structure of Russian shadow fleet carrying oil products, number of unique tankers

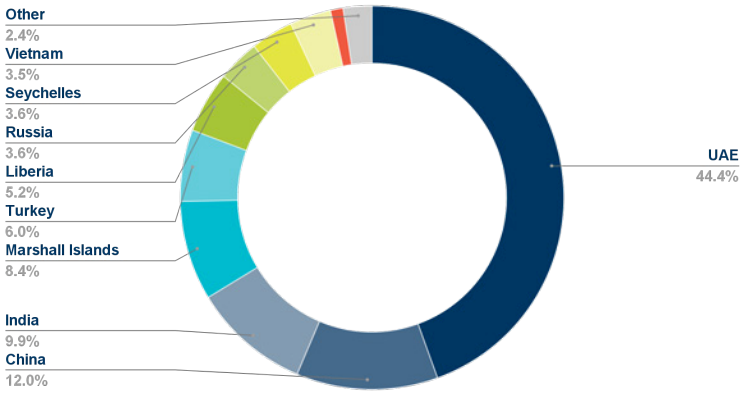


Source: Kpler, Equasis, 'IG' P&I Club webpage, KSE Institute estimates

Ship Managers

Next, we will delve deeper into the shadow fleet at the level of management companies. We focus specifically on entities based on their position as "Ship manager/Commercial manager," as this role is responsible for the commercial aspects of maritime operations, including managing finances, contracts, agreements with clients and suppliers, as well as overseeing cargo transportation, organization, and coordination of vessel activities in accordance with contractual terms.

Figure 16. Volumes of transportation of Russian oil and crude products by shadow fleet tankers in 2023, depending on the country of the manager



Source: Kpler, Equasis, 'IG' P&I Club webpage, KSE Institute estimates

Among the countries hosting companies involved in the transport of shadow oil, those with the highest volume shares are from the following countries: UAE, China, and India. These three jurisdictions accounted for two-thirds of the total volume of Russian crude oil and petroleum products in 2023 (see Figure 16).

The largest management companies in Russia's shadow fleet comprises the Emirati-based Sun Ship Management and Oil Tankers Scf Mgmt Fzco. These companies have been identified by OFAC as entities with beneficial ownership held by the government of the Russian Federation through Sovcomflot, a Russian state-owned shipping company. Some tankers belonging to these companies were involved in the export of crude oil originating from Russia at a price exceeding $60/bbl after the price restriction came into effect.[25] [26] As they came under increased scrutiny, they have actively begun transferring tankers to new Emirati companies such as Stream Ship Management Fzco and Fornax Ship Management.

In mid-2023, Sun Ship Management was managing approximately 84 tankers, but started actively transferring tankers to the management of Oil Tankers Scf Mgmt Fzco in July 2023. After the imposition of sanctions on May 16, 2024, some tankers once again changed management to Stream Ship Management Fzco, whose legal address is in a neighboring building to that of Oil Tankers Scf Mgmt Fzco. Stream Ship Management Fzco now manages 46 tankers that previously belonged to the Sovcomflot chain of companies, while Fornax Ship Management owns 23 of such tankers. The respective addresses are listed on the Equasis website.[27]

For a more detailed history of ownership changes, please refer to the "Sun Ship Management" spreadsheet.

Our team has also consistently reported on and focused attention on tankers from this group in the monthly reports "Russian Oil Tracker."
Slides 19,20 of the November 2023 issue
And Slides 19,20 of February 2024 issue

Another key player from late 2022 was the Indian company Gatik Ship Management M/S. It effectively ceased operations in June 2023 following the loss of her American Club P&I insurance and the withdrawal of its ships' certification from Lloyd's Register. Although there have not been any official statements from the insurance company or Lloyd's Register, this suggests that this Indian company may have violated the price cap.[28] As of March 2024, the company does not operate any tankers.

There are other examples of rapid changes in terms of ship management in response to enforcement actions: In February 2024, the Emirati company Fractal Marine Dmcc was added to the sanctions list by the UK Foreign, Commonwealth & Development Office (FCDO). As of March 2024, this company no longer manages any tankers.[29] In December 2023, Emirati companies such as K&O Shipmanagement FZE, Radiating World Shipping Services LLC, and Star Voyages Shipping Services, which were also among the top 30 carriers of Russian oil, were sanctioned by the UK government. As of March 2024, K&O Shipmanagement FZE and Star

[25]See U.S. Department of the Treasury Press Release here.
[26]See U.S. Department of the Treasury Press Release here.
[27] Sun Ship Management Address: Office OT 17-32, 17th Floor, Office Tower, Central Park Towers, Dubai International Financial Centre, PO Box 507065, Dubai, United Arab Emirates.
Oil Tankers Scf Mgmt Fzco Address: Unit 27610 - 001, Building A1, IFZA Business Park, DDP, Dubai Silicon Oasis, Dubai, United Arab Emirates.
Fornax Ship Management Address: Unit 40260-001, Building A1, IFZA Business Park, DDP, Dubai Silicon Oasis, Dubai, United Arab Emirates.
Stream Ship Management Fzco Address: DDP 27700-001, Dubai Silicon Oasis, PO Box 342001, Dubai, United Arab Emirates.
[28]See Reuters article here.
[29]See Bloomberg article here.

Voyages Shipping Services no longer manage any tankers. Radiating World Shipping Services LLC remains in control of only 2 tankers.[30]

Although several of the largest shadow fleet management companies have been sanctioned, a significant number, including Chinese and Turkish companies, continue to transport Russian oil without IG P&I insurance and potentially above the established price cap (see detailed Top 30 List in Table 2 of the Appendix).

There are other patterns that suggest networks of shadow fleet operators, for instance groups of tankers that are associated with the same legal address, although they do not officially have the same owner and/or manager. As of April 2024, approximately 72 managers and owners of tankers are registered at the following address: Trust Company Complex, Ajeltake Road, Ajeltake, Majuro MH 96960, Marshall Islands.

The situation where a large number of companies are registered at one legal address is suspicious and potentially indicative of an offshore zone for conducting business activities. Unlike large companies that oversee a significant number of tankers, each company only owns one vessel, with the tanker's name often matching the company's name, and all of these tankers conducted transportation in 2023 without IG P&I insurance. Out of 72 companies, 46 conducted Russian oil transport without IG P&I insurance. While it may seem that these companies are independent and carry out such operations separately, apart from the shared registration address for managers and owners, 30 of them have common Indian ISM managers, such as Galena Ship Management, Gaurik Ship Management, Orion Ship Management, and several other companies. Upon examining the previous managers of these tankers, we noticed that most of these tankers were managed by the Indian company Gatik Ship Management M/S before it lost its P&I insurance. Thus, despite changes in ownership and the key Indian manager, actual control may remain with Indian companies, which continue their activities of transporting Russian oil without IG P&I insurance, potentially above the price cap.

While 46 companies registered at this address actively conducted Russian oil transport without IG P&I insurance in 2023, there are 26 companies that were not involved in Russian oil transport and could, under certain conditions, switch to the Russian market in the future. Interestingly, according to Kpler data, 6 tankers of these companies transported Iranian oil in 2023, which indicates that this address serves as a safe harbor for tankers engaged in illegal or shadow activities related to the transport of oil from different sanctioned jurisdictions. It is also noteworthy that among the tankers registered at this address, there are several with unknown ISM managers as of March 2023, which also raises suspicions about their activities and subsequent accountability for their transportation and use.

The list of companies registered at the aforementioned address can be found at the link, under the sheet "Trust Company Complex."

The situation with regard to a group of tankers registered at 80 Broad Street, Monrovia, Liberia, is very similar. A total of 48 such companies have been identified, which, like the companies at the Trust Company Complex address, mostly have identical names for managers and owners and manage only one tanker each. Of these, 27 companies were actively transporting Russian oil without IG P&I insurance. As of April 2024, some of these tankers have obtained IG P&I insurance. However, this applies to those tankers and companies where ISM managers are registered in Turkey, Singapore, the UAE, and Greece. A group of managers stands out here, in which either the ISM manager is unknown or it is the Indian Maritas Fleet Pvt Ltd.

[30]See Lloyd's List Intelligence article here.

The list of companies registered at the aforementioned address can be found on the spreadsheet labeled "80, Broad Street, Monrovia.":

In our team's report, "Russian Oil Tracker," attention was also drawn to a group of tankers from this group: Slide 19 of October 2023 issue.

Furthermore, we identified two additional legal addresses where 24 tankers are registered, namely: Suite 10, 3rd Floor, La Ciotat, Mont Fleuri, Mahe Island Seychelles, and Suite 212, 2nd Floor, Block A, Unity House, Victoria, Mahe Island, Seychelles. Patterns resemble the aforementioned cases: one tanker - one manager and owner, but with different ISM managers. Transport of Russian oil in 2023 was carried out without IG P&I insurance. However, unlike the previous ISM managers, Moldovan companies are more active here: Bpc Shipmanagement Srl, Ost Shipmanagement Srl, Mrk Shipmanagement Srl, Flc Shipmanagement Srl. Also, unlike tankers where managers were registered in Liberia and actively began to receive IG P&I insurance, Seychelles managers as of March 2024 did not obtain IG P&I insurance.

The list of companies registered at the aforementioned address can be found on the "Mahe Island Seychelles" spreadsheet:

C. Russian Shadow Fleet vs. Non-Russian Shadow Fleet

As of the beginning of 2024, the global fleet of vessels for transporting oil and petroleum products is estimated at approximately 11,000 units.[31] A significant portion of these vessels either have not undertaken any voyages since late 2022 or are small tankers operating exclusively in inland waters. Only approximately 6,541 vessels have been engaged in transport in international waters according to data from Kpler. 978 tankers (or 17%) are part of the global shadow fleet based on the definition mentioned above, while 5,563 are not.

The global shadow fleet can be divided into a Russian one and a non-Russian one, depending on whether the majority of voyages over a specified period were conducted with crude oil or petroleum products from Russia. We assess that 403 tankers (or 41%) should be classified as part of the Russian shadow fleet for the full year of 2023. Of these, one quarter (over one hundred vessels) are directly controlled by Russian companies. 575 tankers (or approximately 59%) are part of a broader – i.e., non-Russian, global shadow fleet. They partially serve other rogue states, whose oil exports are under sanctions, including Iran and Venezuela.

Our estimate of the Russian shadow fleet should be understood as a lower-bound as there is a certain number of vessels that transported Russian oil at some point but not predominantly so. In most cases, the different segments of the global shadow fleet do not intersect very much, meaning that they either transport Russian cargo or that of other sanctioned countries (see Figure 17). For example, we count only 12 tankers that participated in transporting both Russian and Iranian oil since December 2022. Only 2 vessels transported both

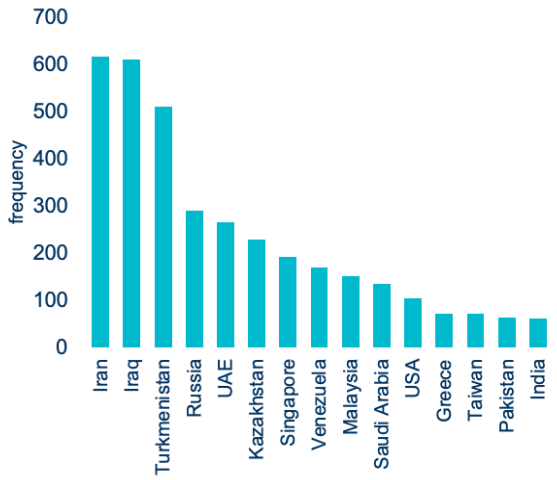
[31] See Vesselfinder database here.

Russian and Venezuelan oil. While the different fleets are quite separated, sometimes they may be managed by the same ship managers or owned by the same entities.

We also include an alternative quarterly assessment to track developments over time in more detail (see Figure 18). Before the introduction of the price cap, the shadow fleet – or what would become part of it – mainly consisted of Sovcomflot and other Russian-owned tankers and did not exceed 150 vessels. By the time the price caps were implemented, the fleet had expanded to 300 tankers. Throughout 2023, it grew to 360 tankers, and by the first quarter of 2024, it surpassed 435 tankers.

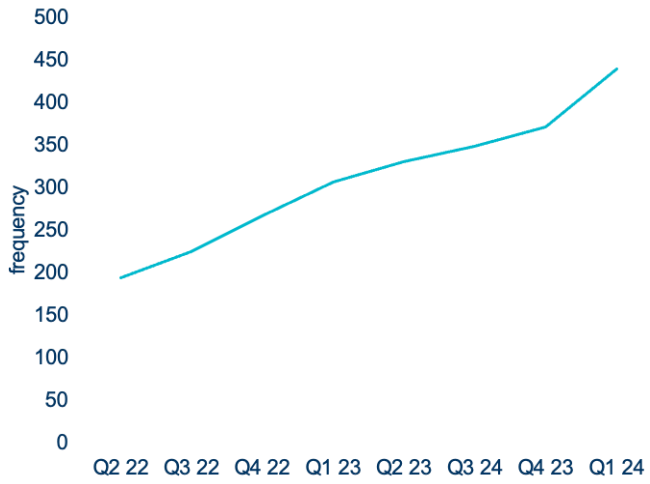
More insights can be derived once shadow fleet tankers are divided by the type of products they transport and their size. Aframax vessels are most often used for transporting crude oil, and smaller Seawaymax vessels are used for transporting petroleum products. According to our estimates, the number of shadow tankers transporting crude oil is 185 (203 ships in Aframax equivalents), while for petroleum products the number is 250 (318 in Seawaymax equivalents). Some ships transported both oil and oil products during 2023.

Figure 17. Voyages of tankers of the non-Russian shadow fleet in 2023.



Source: Kpler, Equasis, 'IG' P&I Club webpage, KSE Institute estimates

Figure 18. Quarterly assessment of the Russian shadow fleet.



Source: Kpler, Equasis, 'IG' P&I Club webpage, KSE Institute estimates

D. Russia's Shadow Fleet Needs

Considering the fact that Russia is actively expanding its shadow fleet, the question arises whether the current number of shadow tankers is sufficient to independently transport all Russian oil while circumventing sanctions. Therefore, we estimate Russia's ultimate needs for its own shadow fleet. This was done separately for tankers transporting Russian crude oil and for those transporting Russian petroleum products. For the analysis, we consider exports from ports in the following regions: Arctic Ocean, Baltic Sea, Black Sea, and Pacific Ocean. These shipments largely went to three destinations: China, India, and Turkey.

First, we assess total volumes. May 2023 saw the highest overall deliveries of Russian crude oil (121 million barrels), with shipments to these three countries amounting to 115 million barrels (or 95% of the total). Second, it is critical to incorporate the average duration of voyages as Russia has had to reorient its exports in a significant way following the adoption of embargoes in the EU and other sanctions coalition countries while it continues to rely on its existing exports infrastructure.

Total Russian shadow fleet needs were calculated using the following formula:

monthly oil volume from specific port to specific country / 700,000 × voyage duration × 2 / 30, where:

- 700,000 barrels is the average volume of crude oil transported by Aframax-class tankers.
- The factor 2 is introduced to account for the return journey of the vessel along the same route without being used for transporting non-Russian products.
- The divisor 30 represents the average number of days in a month.

According to our calculations, Russia would require a fleet of 342 Aframax-class tankers, each with an average capacity of 700,000 barrels (average deadweight 110,000 tonnes). Thus, the Russian shadow fleet is able to cover only around 59% of crude shipment needs.

A similar calculation was conducted to estimate Russia's requirements for the transport of oil products. However, some methodological adjustments were made in this case:

- The reference month for the volume was February 2024, with a volume of 90 million barrels.
- Seawaymax (alternative name of class: Medium Range) tankers, with an average capacity of 370,000 barrels, were selected as the class of tankers most frequently used for Russian oil products.
- The duration of voyages from specific regions to countries and the respective volumes differed from the actual data presented in our regular reports. It was determined that the voyage duration and volumes in the calculations would consider the total volume of products delivered to multiple countries during the journey and the time from the port of departure to the final destination country of that journey. The total transported volume was attributed to the last country in that journey.

According to these calculations, the requirement for Russia's own fleet is 748 Seawaymax tankers, each with an average capacity of 370,000 barrels (average deadweight 40,000 tonnes). Therefore, the current shadow fleet is able to cover around 43% of needed tonnage to ship oil products.

The duration of trips and volumes of transported products can be found in Tables 3-6 of the Appendix.

E. Potential for Expansion of the Russian Shadow Fleet

In this section, we consider several avenues through which the Kremlin may further expand its shadow fleet, which are informed by the TF-DF analysis above. The three paths – acquisition from the “white fleet”, transfer from another segment of the global shadow fleet, and transfer from a network of partners – are non-overlapping, which means that, together, they define the total number of available vessels. Based on our analysis of usage patterns, we only consider Aframax and Suezmax tankers for the transport of crude oil as well as Seawaymax and Handysize vessels for the transport of petroleum products.

We find that Russia has access to 426 crude oil tankers (503 Aframax equivalents) and 1,350 products tankers (1,211 Seawaymax equivalents) to expand its shadow fleet – or replace vessels that are removed from operations due to sanctions or lost to attrition.[32] Thus, the potential for fleet expansion is larger than previously believed.[33] Below, we discuss the three distinct avenues in detail as they carry different implications for policy recommendations. A summary of the numbers – current size of the fleet, ultimate needs to be independent from the mainstream fleet, and potential sources of shadow fleet growth – is provided in Figures 19 and 20.

White fleet

The first and likely primary avenue for the acquisition of additional vessels is the "white fleet" – tankers which currently hold IG P&I insurance. Based on our finding above that such tankers usually do not become available until the age of 15 due to their owners' loan obligations as well as inspection intervals, we include only vessels above 15 years of age in our estimate. Despite this restriction, the number of available tankers is considerable: 276 for crude oil (325 Aframax equivalents) and 1,123 for products (969 Seawaymax equivalents).

Global shadow fleet

The second avenue is the transfer of vessels from the non-Russian shadow fleet, which currently comprises nearly 600 vessels. The number of tankers available through this channel is seriously limited, however, for several reasons: First, many of the vessels in question are VLCCs that are not suitable for the Russian oil trade as they cannot access the most important export terminals in the Baltic Sea and Black Sea. To account for this, we only consider certain vessel sizes for our analysis: Aframax and Suezmax.

In addition, the Kremlin currently relies primarily on vessels that it has sufficient control over, which may not be the case for tankers from other segments of the global shadow fleet. Therefore, we limit the pool of tankers to those that have previously carried Russian oil but are largely (>50% of cargo carried) involved in other activities, for instance with regard to Iran or Venezuela. Altogether, this leads to a relatively small number of available vessels: 38 crude oil (43 Aframax equivalents) and 29 product tankers (12 Seawaymax equivalents).

Network of partners

The third avenue involves the transfer of tankers from partner networks. These are vessels that are not currently involved in the transport of Russian cargo but their ship managers are. To avoid overlap with the previously described strategies, we do neither consider shadow fleet vessels here nor do we include those over 15 years of age. We assess that there are 112 crude oil tankers (135 Aframax equivalents) and 198 products tankers (230 Seawaymax equivalents) available to Russia through this channel.

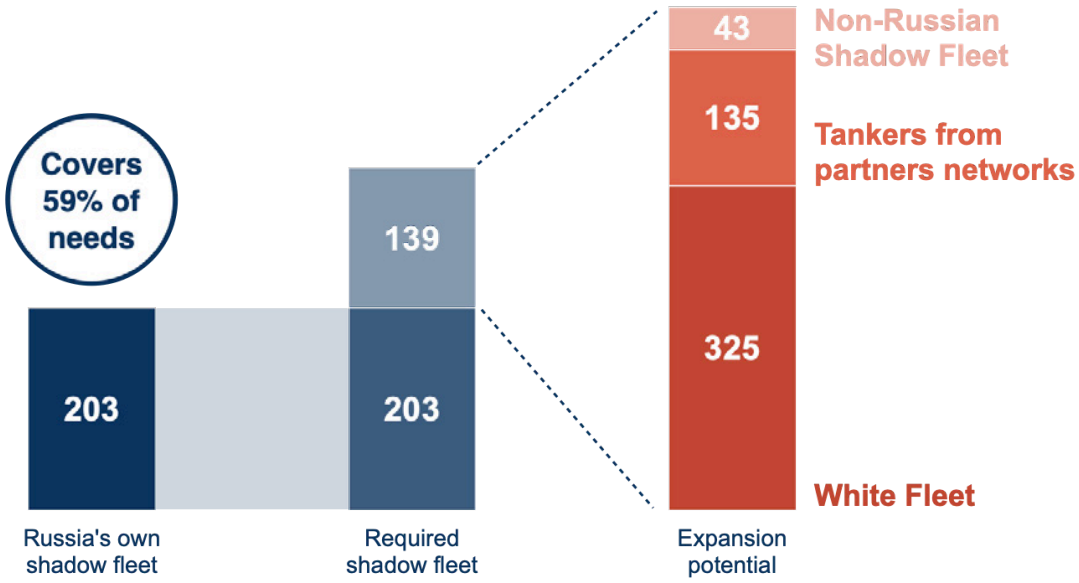
As of now, Russia's available fleet for transporting crude oil independent of the price cap consists of 203 Aframax-equivalent tankers (see Figure 19). The estimated number of vessels, which would allow Russia to ship its total export volume in such a way, is 342 tankers. Therefore, the existing fleet meets 59% of the requirement with 139 vessels "missing". The potential for expanding the crude oil shadow fleet is 503 Aframax-equivalent vessels – or 3.6 times what is needed to become fully independent of the mainstream fleet.

The situation with regard to oil products is somewhat different. Currently, Russia's fleet includes 318 Seawaymax-equivalent tankers (see Figure 20). The estimated requirement to operate independently of

[32] To avoid double counting, we classify vessels as crude vs. products tankers based on the last cargo they carried. This only affects a relatively small number of vessels (~65).
[33] See Craig Kennedy's report "Measuring the Shadows" here.

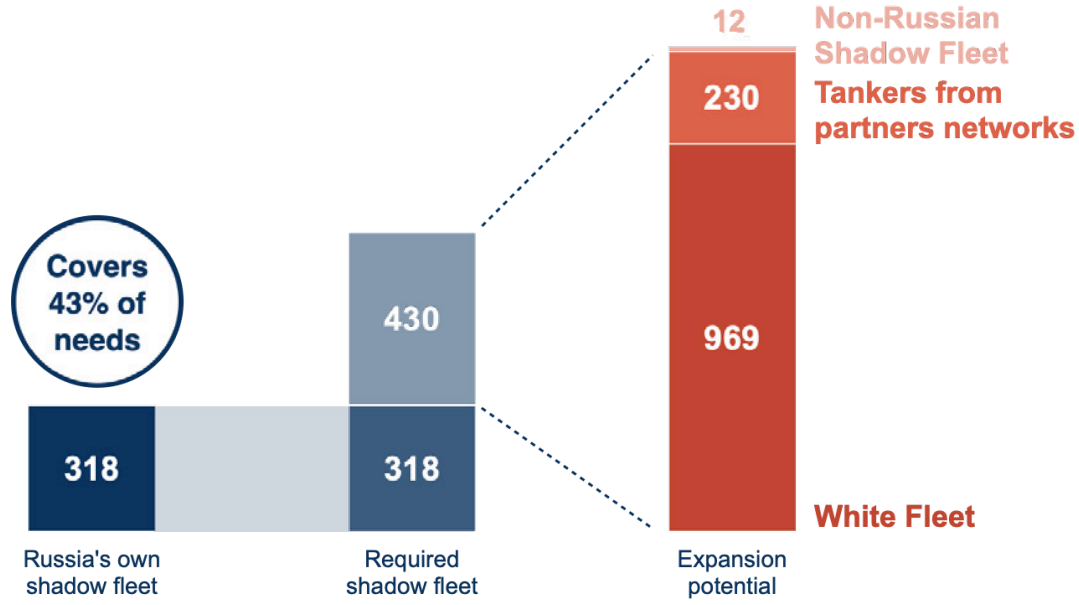
G7/EU-insured tankers is 748. Therefore, the existing fleet for oil products meets only about 43% of the requirement with 430 vessels “missing”. The potential for expanding Russia's shadow fleet is 931 Seawaymax-equivalent vessels – or 2.8 times what is needed to become fully independent.

Figure 19. Needs and potential for expansion of the Russian shadow fleet for crude oil tankers



Source: KSE Institute estimates

Figure 20. Needs and potential for expansion of the Russian shadow fleet for products tankers



Source: KSE Institute estimates

Importantly, these calculations do not account for real market conditions, enforcement action by the US and its allies, etc. Thus, the actual potential for shadow fleet expansion may be smaller. In the final section of this paper, we outline our policy recommendations on how the shadow fleet can be significantly curtailed through specific measures that target the different paths for potential expansion outlined above.

F. Russia's Countermeasures to U.S. Vessel Designations

Commencing on October 12, 2023, The Office of Foreign Assets Control ("OFAC") of the US Department of the Treasury began imposing sanctions on individual tankers that violated the price cap by transporting Russian above the established threshold while using G7/EU services or that operated in the marine sector of the Russian Federation economy more broadly. As of May 2024, a total of 41 tankers have been designated (as the property of SDN listed entities: 33 of these are classified as “Crude Oil Tankers,” and 8 are categorized as “Chemical or Oil Products Tankers.” Except for three vessels (Scf Primorye, Bratsk (former NS Burgas), Sanar-15), all of them remain idle, primarily in the Japanese, Eastern China, Mediterranean, and Black Seas.

The sanctioned tankers can be grouped based on their management as follows:

- 22 tankers are managed by SUN Ship Management D Ltd., which operates oil tankers transferred from Sovcomflot (Group 1);
- 13 tankers managed by companies registered at the suspicious address: 80 Broad Street, Monrovia, Liberia, as previously mentioned (Group 2);
- 4 tankers managed by the Indian company Maritas Fleet Pvt Ltd (Group 3);
- 2 tankers managed by Russian companies (Group 4).

For more information on the tankers above and their attribution, please refer to the "Authorized tankers" spreadsheet.

Overall, the strategy of sanctioning vessels has proven to be significantly more effective than sanctioning companies only – most of them have ceased all activities, while the tankers have quickly changed management and continue transporting Russian oil. Nevertheless, Russia has successfully addressed the challenge of idle vessels by incorporating new tankers into its shadow fleet.

Between December 2023 and May 1, 2024, Russia managed to recruit new tankers for the transport of its oil, which had not previously engaged in such activities throughout 2023. As of now, 35 tankers have been added to its shadow fleet, specifically:

- 13 tankers managed by Chinese companies (Group 1);
- 5 tankers managed by Indian companies (Group 2);
- 5 tankers managed by various companies registered in the Seychelles, sharing suspicious addresses at Suite 10, 3rd Floor, La Ciotat, Mont Fleuri and Suite 212, 2nd Floor, Block A, Unity House, Victoria as previously mentioned (Group 3);

- 4 tankers managed by various companies registered in the Marshall Islands, all sharing the suspicious address of Trust Company Complex, Ajeltake Road, Ajeltake, Majuro MH 96960, Marshall Islands, as previously mentioned (Group 4);
- 4 tankers managed by Turkish companies (Group 5) and others (Group 6).

For more information on the tankers above and their attribution, please refer to the "Additions to the shadow fleet" spreadsheet.

It is noteworthy that, according to Kpler, 9 of these 38 tankers transported Iranian oil in 2023. This suggests that Russia is partially augmenting its shadow fleet by absorbing tankers previously used by Iran for similar sanctions evasion efforts. In terms of the total deadweight tonnage (DWT), the 41 sanctioned tankers amount to 4.48 million tons, while the new 38 tankers amount to 3.92 million tons. Thus, we can conclude that Russia has managed to compensate for nearly 90% of the lost shipping capacity. It is important to note that, at present, we cannot assert that all these 38 tankers will exclusively transport Russian oil due to the short observation period. However, we are inclined to believe that such shipments will be their primary activity given their non-involvement in Russian oil transport throughout 2023 and sudden switch to it in 2024.

Policy Recommendations

We have demonstrated how the shadow fleet enables the circumvention of sanctions and the price cap, exacerbates insurance risks and liability in maritime transportation, increases environmental risks, and incentivizes reliance on problematic practices such as STS operations and AIS spoofing. Therefore, it is necessary to counteract it.

To address the existing Russian shadow fleet, we propose the following steps:

1. **Continue and expand vessel designation campaign.** Designating individual vessels has proven to be an extremely successful strategy as it has effectively removed almost all of the ones in question from commercial operations. As of June 2024, of the 41 vessels that have been identified as the property of listed entities by OFAC, 38 are unloaded, while 2 may attempt to load/deliver cargo, and 1 is involved in shuttle operations in the Sea of Azov. It is estimated that the affected vessels originally cost around $800-900 million to acquire, which means meaningful sunk costs in addition to the inability to use them going forward. This stands in stark contrast to sanctions targeting ship owners or management companies, which have been relatively ineffective as vessels can be sold and/or moved to different operators quickly (e.g., in the case of SUN Ship Management).

   Due to the substantial risk of facing enforcement action themselves, any entities involved with a designated vessel or the cargo transported by it – which includes ports, maritime service providers, financial institutions, as well as, importantly, buyers of the oil – will either pull out of such transactions or require financial compensation for the risks incurred. This is, in fact, what has driven the widening of the discount on Urals vs. Brent in our view, which went from $13-14/barrel in September-October 2023 to above $17/barrel in recent months. Vessel designations have the advantage that the strategy is gradually scalable and can be tailored to avoid any negative impact on the available transport capacity and, in turn, the supply situation on the global market for crude oil and oil products.

A stepped-up vessel designation campaign should begin with the crude oil sector since it accounts for a significantly larger portion of Russian export earnings and it is where the shadow fleet currently plays a bigger role vs. oil products. Furthermore, we propose to focus on tankers most-heavily involved in shipments from Baltic and Black Sea ports, largely Aframax or Suezmax. As Russian crude oil from these locations is mostly going to India (and, to a lesser extent, China), removing tankers from a segment of the market that requires extremely long journeys (of more than one month to India and around two months to China in one direction) will significantly drive up transport costs and, in turn, the discount on Russian oil. In Table 7 of the Appendix, we present a list of possible targets.

2. **Make shadow fleet operations difficult and costly.** Coalition countries should undertake additional steps to exacerbate shadow fleet operational challenges. First, they should require vessels entering coalition ports to provide information about their mandatory oil spill insurance and, should they refuse to do so or the coverage should turn out to be inadequate, ban them from entry. Second, they should prohibit the sale of spare parts to shadow fleet vessels and consider using the threat of secondary sanctions to impact entities in third countries. While Russia will likely find ways to circumvent such measures, the price of the shadow fleet's operation would rise considerably nonetheless.
3. **Enforce existing oil spill insurance requirements.** As we recognize that sanctions coalition authorities may not want to remove too much transport capacity from the market at once, the shadow fleet can also be reined in by forcing operators to return to G7/EU-based oil spill (P&I) insurance. This would also address the significant and rising environmental risk emanating from aging and under-/uninsured shadow fleet tankers around the world. We propose that coalition countries take it upon themselves to enforce existing IMO spill insurance requirements as the flag states of the Russian shadow fleet cannot be trusted to do so. This enforcement would work through the threat of vessel designations in the absence of adequate – i.e., properly capitalized and independently credit rated – insurance. We will discuss this proposal further in an upcoming paper.
4. **Step up investigations and impose significant fines.** To drive up the cost of the shadow fleet's operation, it is critical to investigate the actions of involved entities and levy meaningful financial penalties in case sanctions violations or other illicit acts are found. Demonstrating the willingness and ability to do this by enforcement agencies, including OFAC and OFSI, would alter all trade partners' risk assessments and widen the price differential between Russian oil and the global market as they demand higher freight rates, insurance premiums etc.

   Authorities need to monitor how STS (ship-to-ship) operations between tankers with different insurance status – mainstream fleet with IG P&I insurance and shadow fleet without – are being used to conceal the origin and/or destination of a cargo. In addition, they should investigate suspicious ownership and management structures. As mentioned above, there are numerous companies that own only one tanker and exclusively transport Russian oil. These companies operate in a very different way than major oil market participants and are often characterized by opaque and dubious registration practices. Authorities should attempt to comprehensively map the structures behind the Russian shadow fleet, which allows them to assess the risk of illicit activities and counteract them.

To limit the future expansion of the shadow fleet, we propose the following steps:

1. **Broaden and enforce restrictions on vessel sales.** To limit Russia's ability to acquire vessels from the white fleet, where we estimate the potential at 276 crude oil tankers (325 Aframax equivalents) and

1,123 oil products tankers (969 Seawaymax equivalents), all coalition jurisdictions should regulate the sale of tankers to persons or for use in Russia as the EU has done in its 12th sanctions package.

EU regulations now require that sellers apply for authorization for such transactions; this authorization should be denied in all cases when there is any risk that the vessel could be used by Russia or for the purpose of expanding the shadow fleet. If effectively enforced, such a step would significantly limit the number of white fleet tankers available to Russia, with the secondary effect that prices for used tankers in other market segments will rise. In our assessment, 51% of white fleet crude oil and 55% oil products tankers available to Russia are currently owned by entities in coalition jurisdictions.

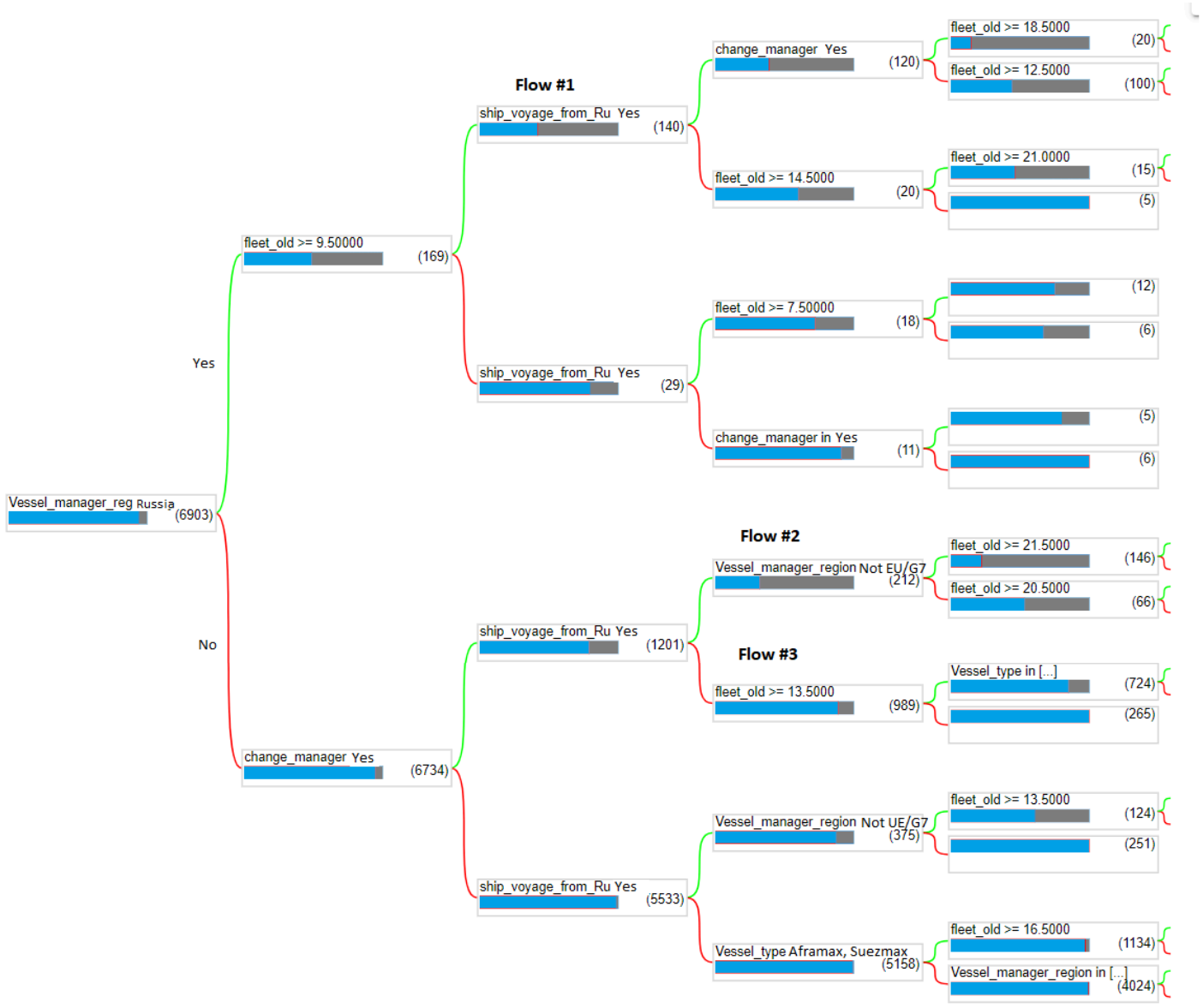
Restrictions on vessel sales could be strengthened further by the threat of secondary sanctions from the US This would impact any buyer, seller, or facilitator who has any connections to the U.S. financial system, for instance due to the use of the dollar or correspondent banking accounts. The effect of the sale restrictions could, thus, be extended to a certain share of white fleet vessels that are currently owned by entities based outside of sanctions coalition jurisdictions.

2. **Designate vessels acquired from third countries.** White fleet tankers acquired from non-sanctions coalition jurisdictions as well as vessels transferred from other parts of the global shadow fleet (38 crude oil tankers, 29 oil products tankers) or from Russia's partners (112 crude oil tankers, 198 oil products tankers) can be effectively removed from commercial operations via designations by OFAC and other enforcement agencies (e.g., OFSI). The listing of vessels would generate substantial "sunk costs" for those involved with the Russian shadow fleet.

   This tool should also be applied to all sales that were conducted in violation of the EU authorization requirement and/or similar measures in other jurisdictions. Ultimately, these can only affect the initial transaction and cannot retroactively prevent on-selling to Russian buyers or for use as part of the Russian shadow fleet. Such on-sales could very well constitute a violation of contractual obligations and have legal implications, but that does not stop the use of a vessel for shadow fleet purposes.

Appendix

Figure 1. Source of the creation of the future shadow fleet



Source: KSE Institute estimates

Importance of the variables that affect whether a ship will become part of the Shadow Fleet

```
Variable Importance: INV_MEAN_MIN_DEPTH:
    1.    "ship_voyage_from_Ru"  0.550892 ################
    2.         "change_manager"  0.394210 ##########
    3.              "fleet_old"  0.291635 ######
    4. "Vessel_manager_region"  0.220894 ####
    5.            "Vessel_type"  0.205708 ###
    6."Group(oil or products)"  0.118066
    7.         "sts-operations"  0.110632
```

Table 1: Suspicious STS transactions between tankers in February 2024

IMO	Vessel	Ship manager /Commercial manager	Registered owner	Insurance 'IG' P&I Club	Product	Date Start STS 1	Zone STS	IMO	Vessel	Ship manager/ Commercial manager	Registered owner	Insurance 'IG' P&I Club
9683726	Dmitry Pokrovsky	Russia. Volgotrans Llc	Russia. Volgotrans Llc	-	SRFO	2024-02-13 04:05	Constanta Light.	9274812	New Trust	Liberia. Primary Shipping Co	Liberia. Primary Shipping Co	West of England
9640516	Vf Tanker -3	Russia. Investneftetrade Llc	Russia. Investneftetrade Llc		SRFO	2024-02-09 06:43						
9640528	Vf Tanker -4				Gasoil	2024-02-20 12:25						
					SRFO	2024-02-29 08:00						
9397547	Scf Anadyr	UAE. Oil Tankers Scf Mgmt Fzco	UAE. Mist Maritime Inc		Diesel	2024-03-06 08:45	Dakar Light.	9240445	Norah	Kuwait. Sabaek General Trading Co Wll	Kuwait. Sabaek General Trading Co Wll	AMERICANCLUB
9344100	Elijah	UAE. Mercure Marine Solutions Fze	UAE. Elijah Marine Sa		Gasoil	2024-03-10 10:19						
9273052	Danica	UAE. Glowing Sea Shipping Llc	UAE. Phoenix Shipping Inc		Dirty Feedstocks	2024-03-12 11:29	Kalamata Light.	9252333	Takma	Antigua & Barbuda. Marinerminds Maritime Ltd	Antigua & Barbuda. Marinerminds Maritime Ltd	AMERICANCLUB
9655470	Svl Unity	Marshall Islands.	Marshall Islands.		unknown	2024-03-03 12:48						

		Unity Shipping & Marine Inc	Unity Shipping & Marine Inc									
9261657	Shandong Zihe	Moldova. Surt Ship Management Srl	Moldova. Marinequest Corp		Gasoline	2024-03-08 07:30		9380051	Grace Leo	Cyprus. Cymare Shipmanagement Ltd	Cyprus. Grace Leo Shipping Ltd	West of England
9540364	Penelope	Russia. Prime Shipping Llc-Rus	Russia. Pb Norge As		Dirty Feedstocks	2024-03-03 09:45	Kerch Light.	9236975	Sredina	Turkey. Srediste Shipping Gemi	Turkey. Plcm Pte Ltd	

Source: Kpler, Equasis, 'IG' P&I Club webpage

Table 2. List of top-30 companies that transported oil products by shadow fleet.

Volumes of transportation of Russian oil and crude products by shadow fleet tankers in 2023, depending on manager		
Ship manager/Commercial manager	**Volume, million barrels**	**% of total**
UAE. Sun Ship Management	264	25%
UAE. Oil Tankers Scf Mgmt Fzco	99	9%
India. Gatik Ship Management M/S	35	3%
UAE. Fractal Marine Dmcc	29	3%
Turkey. Beks Tanker Isletmeciligi As	27	3%
China. Sunne Co Ltd	25	2%
UAE. Radiating World Shipping Servs	24	2%
Turkey. Beks Gemi Isletmeciligi Ve Tic	15	1%
UAE. K&O Shipmanagement Fze	15	1%
India. Maritas Fleet Pvt Ltd	14	1%
India. Eastern Euro Ship Management	13	1%
China. Prominent Shipmanagement Ltd	13	1%
Liberia. Hs Esberg Ltd	12	1%
India. Pilot Ship Management Opc Pvt	10	1%
China. Shanghai Future Ship Mgmt Co	9	1%
China. Intercon Marine Shanghai Co	8	1%
India. Ark Seakonnect Shipmanagment	8	1%
Vietnam. Sao Viet Petrol Transportation	8	1%
Vietnam. Hung Phat Maritime Trading	8	1%
UAE. Star Voyages Shipping	8	1%
China. Supership Management Co Ltd	8	1%
Vietnam. Ovtrans Petrol Transport	7	1%
Seychelles. Cheng Shipping & Trader Ltd	7	1%
Vietnam. Opec Petrol Transportation Co	7	1%
Russia. Rosnefteflot Jsc	7	1%
Turkey. Active Denizcilik Ve Gemi	7	1%
Liberia. Hs La Pride Ltd	6	1%
UAE. Indo Gulf Ship Management Llc	5	1%
Kyrgyzstan. Munai Invest Llc	5	0%
China. Merluza Group Ltd	5	0%
Other	356	34%
Total	**1062**	**100%**

Source: Kpler, Equasis, 'IG' P&I Club webpage, KSE Institute estimates

Table 3. Average voyage duration for crude oil from Russian ports by destination in May 2023, days

Region	China	India	Turkey
Arctic Ocean	52	40	-
Baltic Sea	69	38	21
Black Sea	47	32	11
Pacific Ocean	11	41	-

Source: Kpler, KSE Institute estimates

Table 4. Russian crude oil supplies from Russian ports by destination in May 2023, million barrels

Region	China	India	Turkey	Total
Arctic Ocean	4	5	-	**9**
Baltic Sea	4	40	6	**50**
Black Sea	2	14	3	**19**
Pacific Ocean	28	8	-	**36**
Total	**38**	**68**	**9**	**115**

Source: Kpler, KSE Institute estimates

Table 5. Average voyage duration for oil product from Russian ports by destination in February 2024, days

Destination	Arctic Ocean	Baltic Sea	Black Sea	Pacific Ocean
Algeria	-	97	-	-
Benin	-	36	-	-
Brazil	57	50	-	-
Brunei	-	-	51	-
Bulgaria	-	-	5	-
Cape Verde	-	62	-	-

China	-	66	50	17
Egypt	-	-	46	-
Gambia	-	-	35	-
Georgia	-	-	12	-
Ghana	-	59	-	-
Greece	-	-	17	-
India	-	42	-	-
Indonesia	-	-	65	-
Israel	-	-	16	-
Jamaica	-	32	-	-
Lebanon	-	-	34	-
Libya	33	40	29	-
Malaysia	-	49	44	58
Malta	-	108	-	-
Morocco	-	51	-	-
Nigeria	-	65	91	-
Romania	-	-	6	-
Saudi Arabia	-	-	22	-
Senegal	-	20	31	-
Singapore Republic	76	58	54	30
South Korea	-	76	68	14
Sudan	-	45	-	-
Taiwan	-	52	-	16
Togo	-	-	56	-
Trinidad and Tobago	-	54	-	-
Tunisia	-	23	17	-
Turkey	-	37	16	-

United Arab Emirates	-	65	55	-
Venezuela	-	81	-	-
Yemen	-	-	54	100

Source: Kpler, KSE Institute estimates

Table 6. Russian oil products supplies from Russian ports by destination in February 2024, million barrels

Destination	Arctic Ocean	Baltic Sea	Black Sea	Pacific Ocean	Total
Algeria	-	0,3	-	-	**0,3**
Benin	-	0,4	-	-	**0,4**
Brazil	0,3	23,6	-	-	**23,9**
Brunei	-	-	1,7	-	**1,7**
Bulgaria	-	-	0,1	-	**0,1**
Cape Verde	-	0,3	-	-	**0,3**
China	-	5,7	3,3	2,3	**11,2**
Egypt	-	-	0,7	-	**0,7**
Gambia	-	-	0,3	-	**0,3**
Georgia	-	-	0,1	-	**0,1**
Ghana	-	2,5	-	-	**2,5**
Greece	-	-	0,8	-	**0,8**
India	-	5,0	-	-	**5,0**
Indonesia	-	-	0,5	-	**0,5**
Israel	-	-	0,7	-	**0,7**
Jamaica	-	0,3	-	-	**0,3**
Lebanon	-	-	0,2	-	**0,2**
Libya	0,4	1,3	1,3	-	**2,9**
Malaysia	-	0,6	1,1	0,2	**2,0**

Malta	-	0,5	-	-	**0,5**
Morocco	-	0,6	-	-	**0,6**
Nigeria	-	1,9	0,4	-	**2,4**
Romania	-	-	0,2	-	**0,2**
Saudi Arabia	-	-	0,1	-	**0,1**
Senegal	-	0,6	0,7	-	**1,3**
Singapore Republic	0,1	3,2	0,8	0,7	**4,8**
South Korea	-	0,3	0,5	1,1	**1,8**
Sudan	-	0,6	-	-	**0,6**
Taiwan	-	3,4	-	0,7	**4,2**
Togo	-	-	0,5	-	**0,5**
Trinidad and Tobago	-	0,3	-	-	**0,3**
Tunisia	-	0,5	1,3	-	**1,8**
Turkey	-	6,2	7,2	-	**13,4**
United Arab Emirates	-	2,9	0,3	-	**3,2**
Venezuela	-	0,5	-	-	**0,5**
Yemen	-	-	0,3	0,3	**0,6**
Total	**0,7**	**61,5**	**23,1**	**5,3**	**90,7**

Source: Kpler, KSE Institute estimates

Table 7. List of potential designation targets

IMO	Name	Build	Vessel type	Ship manager/Commercial manager	Volume
9316127	Scf Vankor	2007	Suezmax	UAE. Stream Ship Management Fzco	9,5
9412335	Ns Bora	2010	Suezmax	UAE. Stream Ship Management Fzco	8,3
9311622	Vladimir Tikhonov	2006	Suezmax	UAE. Stream Ship Management Fzco	8,1
9271585	Heracles	2004	Suezmax	India. Amsha Maritime	5,5
9842188	Vladimir Vinogradov	2022	Aframax	Russia. Rosnefteflot Jsc	5,1
9511521	Moskovsky Prospect	2010	Aframax	UAE. Stream Ship Management Fzco	5,1
9511533	Primorsky Prospect	2010	Aframax	UAE. Oil Tankers Scf Mgmt Fzco	5,1
9321691	Sai Baba	2006	Suezmax	Mauritius. Osdung Shipping Inc	5,0
9321706	Mercury	2006	Suezmax	Seychelles. Gessi Maritime Corp	4,6
9319870	Thalassa	2007	Aframax	UAE. Aquaflow Marine Fze	4,4
9297371	Suleyman I	2006	Aframax	Marshall Islands. Magnificent Shipping Inc-Mai	4,4
9253325	Nurkez	2004	Aframax	China. Shanghai Future Ship Mgmt Co	4,3
9341093	Ns Consul	2006	Aframax	UAE. Oil Tankers Scf Mgmt Fzco	4,1
9522324	Suvorovsky Prospect	2011	Aframax	UAE. Oil Tankers Scf Mgmt Fzco	3,7
9511387	Olympiysky Prospect	2010	Aframax	UAE. Oil Tankers Scf Mgmt Fzco	3,7
9339337	Ns Lotus	2008	Aframax	UAE. Stream Ship Management Fzco	3,7
9413559	Ns Antarctic	2009	Aframax	UAE. Oil Tankers Scf Mgmt Fzco	3,7
9843560	Vernadsky Prospect	2019	Aframax	UAE. Oil Tankers Scf Mgmt Fzco	3,7
9413547	Ns Arctic	2009	Aframax	UAE. Oil Tankers Scf Mgmt Fzco	3,7
9304825	Theseus	2006	Aframax	Mauritius. Campana Shipping Inc	3,6
9866380	Okeansky Prospect	2022	Aframax	Russia. Sovcomflot	3,6
9250892	Lucia	2003	Aframax	Vietnam. Sealink Transport Service Co	3,6
9610808	Anatoly Kolodkin	2013	Aframax	UAE. Oil Tankers Scf Mgmt Fzco	3,6

9299733	Antaeus	2006	Aframax	Seychelles. Barka Maritime Corp	3,6
9339325	Ns Laguna	2007	Aframax	UAE. Stream Ship Management Fzco	3,6
9296822	Sagitta	2005	Aframax	China. Camellia Jackson Ltd	3,5
9354301	Zaliv Amerika	2008	Aframax	UAE. Stream Ship Management Fzco	3,5
9306794	Ns Commander	2006	Aframax	UAE. Stream Ship Management Fzco	3,5
9341067	Ns Captain	2006	Aframax	UAE. Oil Tankers Scf Mgmt Fzco	3,5
9224441	Firn	2002	Suezmax	Seychelles. Trident Beauty Ltd	3,4
9242223	Shun Tai	2003	Aframax	Liberia. Symi Shipping Ltd	3,3
9288899	Rocky Runner	2005	Suezmax	UAE. Breath Shipping Services Llc	3,2
9290335	Jumbo	2004	Suezmax	Marshall Islands. Blessed Shipping & Marine Inc	3,1
9290309	Thea	2004	Aframax	China. Thea Stewart Ltd	3,0
9319882	Atalanta	2007	Aframax	India. Ark Seakonnect Shipmanagment	2,9
9256054	Nevskiy Prospect	2003	Aframax	UAE. Sun Ship Management	2,9
9256078	Liteyny Prospect	2003	Aframax	UAE. Oil Tankers Scf Mgmt Fzco	2,9
9310525	Ionia	2006	Aframax	Marshall Islands. Ionia Shipping & Marine Inc	2,9
9235725	Fuga Bluemarine	2003	Aframax	Marshall Islands. Fuga Shipmanagement Sa	2,9
9544281	Corum	2010	Aframax	China. Prominent Shipmanagement Ltd	2,9
9842176	Vladimir Monomakh	2020	Aframax	Russia. Rosnefteflot Jsc	2,9
9610810	Viktor Bakaev	2013	Aframax	UAE. Oil Tankers Scf Mgmt Fzco	2,9
9312884	Ns Columbus	2007	Aframax	UAE. Oil Tankers Scf Mgmt Fzco	2,9
9345623	Tarang	2008	Aframax	UAE. Seasphere Dynamics Fze	2,9
9288746	Marathon	2005	Aframax	Mauritius. Bicol Shipping Inc	2,9
9249128	Sakhalin Island	2004	Aframax	UAE. Sun Ship Management	2,8
9292204	Adygeya	2005	Aframax	UAE. Oil Tankers Scf Mgmt Fzco	2,8
9314088	Lyra	2004	Aframax	China. Coureage Co Ltd	2,8

9321976	Heidi A	2006	Aframax	China. Sunne Co Ltd	2,8
9413573	Ns Africa	2009	Aframax	UAE. Oil Tankers Scf Mgmt Fzco	2,8
9312896	Ns Creation	2007	Aframax	UAE. Oil Tankers Scf Mgmt Fzco	2,8
9257022	Laconia	2003	Aframax	Marshall Islands. Otto Shipping & Marine Inc	2,8
9331153	Galian 2	2007	Aframax	UAE. Radiating World Shipping Servs	2,7
9288693	Andaman Skies	2004	Aframax	UAE. Alqutb Alshamali Marine Srvs	2,7
9247883	Elza	2002	Aframax	Moldova. Adel Ship Management Srl	2,7
9233741	Hali	2003	Suezmax	Vietnam. Opec Petrol Transportation Co	2,7
9296406	Pagos	2006	Suezmax	Marshall Islands. Pagos Shipping & Marine Inc	2,6
9318539	Swiftsea Rider	2007	Suezmax	UAE. One Moon Marine Services Llc	2,5
9339313	Ns Lion	2007	Aframax	UAE. Oil Tankers Scf Mgmt Fzco	2,4
9610793	Georgy Maslov	2012	Suezmax	UAE. Stream Ship Management Fzco	2,2
9194995	Ocean Peri	2000	Suezmax	India. Blue Fortune Shipmanagement	2,2
9258868	Asher	2003	Aframax	Vietnam. Venus Gas Co Ltd	2,2
9322839	Hs Atlantica	2006	Aframax	Liberia. Hs Atlantica Ltd	2,2
9283289	Thya	2005	Aframax	China. Winocean Management Ltd	2,2
9317949	Artemis	2007	Aframax	Marshall Islands. Apollo Shipping & Marine Inc	2,2
9332834	Wisdoms Daughter	2007	Aframax	Marshall Islands. Wisdoms Shipping & Marine Inc	2,2
9368223	Achilles	2008	Aframax	Marshall Islands. Achilles Shipping & Marine Inc	2,2
9388780	Khalissa	2009	Aframax	Seychelles. Bubble Marine Inc	2,2
9331141	Vela Rain	2006	Aframax	UAE. Radiating World Shipping Servs	2,2
9337901	Golden Mile	2006	Aframax	Marshall Islands. Like Minds Shipping & Marine	2,2
9339301	Ns Leader	2007	Aframax	UAE. Oil Tankers Scf Mgmt Fzco	2,2
9319674	Eastern Glory	2007	Aframax	China. Delta Ships Management Ltd	2,2

9332781	Panta Rei 1	2006	Aframax	Seychelles. Whip Marine Inc	2,2
9387255	Beks Daisy	2008	Aframax	Turkey. Tokyo Gemi Isletmeciligi As	2,2
9842190	Akademik Gubkin	2023	Aframax	Russia. Rosnefteflot Jsc	2,2
9388742	Hector	2008	Aframax	India. Plutos Ship Management	2,2
9319686	Nemo 1	2008	Aframax	Seychelles. Beryl Marine Inc	2,2
9259197	Thalia Iii	2003	Aframax	China. Munne Co Ltd	2,2
9168946	Zevs	1999	Suezmax	Seychelles. Elysian Horizon Corp	2,2
9281891	Merope	2003	Aframax	China. Shanghai Future Ship Mgmt Co	2,2
9224465	Neve	2002	Suezmax	Seychelles. Trident Infinity Ltd	2,2
9416422	Ocean Thunder	2009	Suezmax	Turkey. Active Denizcilik Ve Gemi	2,2
9185528	Limo	2000	Suezmax	Seychelles. Lokk Shipping Ltd	2,1
9299719	Ns Champion	2005	Aframax	UAE. Sun Ship Management	2,1
9299692	Ns Concord	2005	Aframax	UAE. Stream Ship Management Fzco	2,1
9311531	Lefkada	2005	Aframax	Marshall Islands. Paradise Shipping & Marine Inc	2,1
9233349	Vesna	2000	Aframax	China. Shanghai Legendary Ship Mgmt	2,1
9436941	Attica	2010	Aframax	Seychelles. Elgon Maritime Corp	2,1
9326720	Hera	2007	Suezmax	Vietnam. Hung Phat Maritime Trading	2,1
9422445	Scf Surgut	2009	Suezmax	UAE. Sun Ship Management	2,1
9229374	Odune	2002	Suezmax	Seychelles. Lorni Marine Ltd	2,1
9354313	Zaliv Amurskiy	2008	Aframax	UAE. Stream Ship Management Fzco	2,1
9408205	Fast Kathy	2010	Suezmax	UAE. One Moon Marine Services Llc	2,1
9291250	Beks Star	2005	Aframax	Turkey. Modern Gemi Isletmeciligi As	2,1
9285835	Sea Fidelity	2005	Aframax	UAE. One Moon Marine Services Llc	2,1
9288722	Azure Celeste	2005	Aframax	UAE. Alqutb Alshamali Marine Srvs	2,1
9301524	Palmer	2006	Suezmax	Vietnam. Ovtrans Petrol Transport	2,1
9187227	Omega	2000	Suezmax	Seychelles. Harmony Grove Corp	2,1

9314105	Makalu	2005	Aframax	Seychelles. Double Harmony Marine Corp	2,1
9224283	Kapal Cantik	2002	Suezmax	India. Pamban Ltd	2,1
9253894	Taurus A	2002	Suezmax	Antigua & Barbuda. Wavevoyage Ventures Ltd	2,0
9236004	Katiuska	2002	Suezmax	China. Katiuska Marine Ltd	2,0
9296391	Fighter Two	2006	Suezmax	UAE. Almuhit Alhadi Marine Services	1,9
9274434	Nanda Devi	2003	Suezmax	Marshall Islands. Glory Shipping & Marine Inc	1,9
9408695	Bay Global	2009	Suezmax	Liberia. Bay Global Maritime Inc	1,9
9315654	Kapok	2005	Suezmax	China. Shang Shipping Ltd	1,9
9260823	Future	2004	Aframax	Vietnam. Ovtrans Petrol Transport	1,8
9589750	Li Bai	2011	Suezmax	Seychelles. Haima Shipping Ltd	1,8
9412347	Leonid Loza	2011	Suezmax	UAE. Stream Ship Management Fzco	1,8
9524463	Sakarya	2011	Suezmax	China. Prominent Shipmanagement Ltd	1,8
9513139	Fjord Seal	2011	Suezmax	China. Prominent Shipmanagement Ltd	1,8
9421972	Scf Samotlor	2010	Suezmax	UAE. Sun Ship Management	1,7
9299666	Mianzimu	2005	Suezmax	Seychelles. Reef Marine Inc	1,5
9183271	Iona	2000	Suezmax	Seychelles. Sorni Shipping Co Ltd	1,5
9418482	Ride	2009	Aframax	Liberia. Hs Ride Ltd	1,5
9282493	Vaigai	2005	Aframax	Marshall Islands. Gomti Lines Inc	1,5
9288710	Kudos Stars	2005	Aframax	UAE. Almuhit Alhadi Marine Services	1,5
9346720	Kira K	2007	Aframax	China. Shunyuan Shipmanagement Co Ltd	1,5
9235713	Amber 6	2003	Aframax	China. Sunne Co Ltd	1,5
9297357	Hammurabi	2006	Aframax	Marshall Islands. Eren Shipping Inc	1,5
9305568	Scf Baltica	2005	Aframax	UAE. Sun Ship Management	1,5
9321847	Emily S	2006	Aframax	China. Sunne Co Ltd	1,5
9274800	Yangtze	2004	Aframax	Seychelles. Zenith Shipping Inc-Sey	1,5
9388792	Beks Swan	2009	Aframax	Turkey. Beks Tanker Isletmeciligi As	1,5

9410870	Hs Everett	2008	Aframax	Liberia. Hs Everett Ltd	1,5
9265756	Beks Sun	2005	Aframax	Turkey. Modern Gemi Isletmeciligi As	1,5
9281011	Oriental Pearl	2004	Aframax	UAE. Wavecrest Maritime Ltd	1,5
9288851	Carl	2004	Aframax	Marshall Islands. Cube Ventures Shipping Sa	1,5
9332810	Odysseus	2007	Aframax	Turkey. Unic Tanker Gemi Isletmeciligi	1,5
9338905	Aegean Power	2007	Aframax	India. Anemone Marine Inc	1,5
9346744	Ma Jin	2007	Aframax	India. Orion Ship Management	1,5
9388766	Destan	2008	Aframax	Turkey. Unic Tanker Gemi Isletmeciligi	1,5
9402471	Andromeda Star	2009	Aframax	Seychelles. Algae Marine Inc	1,5
9826902	Korolev Prospect	2019	Aframax	UAE. Sun Ship Management	1,5
9434890	Nautilus	2010	Aframax	Moldova. Adel Ship Management Srl	1,5
9378620	Varvara	2008	Aframax	Marshall Islands. Gorgeous Shipping & Marine Inc	1,4
9253076	Mira	2003	Aframax	Vietnam. Sao Viet Petrol Transportation	1,4
9257814	Torex	2003	Aframax	Moldova. Ksn Shipmanagement Srl	1,4
9293155	Junia	2005	Aframax	India. Eastern Euro Ship Management	1,4
9306782	Ns Century	2006	Aframax	UAE. Sun Ship Management	1,4
9336426	Naxos	2007	Aframax	India. Caishan Ship Management	1,4
9247792	Gabrielle	2003	Aframax	China. Qingdao Huitong Shipping Co	1,4
9183295	Neon	1999	Aframax	Seychelles. Zollo Shipping Ltd	1,4
9404948	Bambu	2009	Aframax	Seychelles. Acropora Marine Inc	1,4
9293002	Jaguar	2005	Aframax	Marshall Islands. Speed Venture Shpg & Marine	1,4
9237412	Hontao	2004	Aframax	China. Seawin Marine Co Ltd	1,4
9436006	Samsun	2009	Aframax	China. Prominent Shipmanagement Ltd	1,4
9299898	Turbo Voyager	2005	Aframax	UAE. Radiating World Shipping Servs	1,4
9285859	Eastern Pearl	2006	Aframax	UAE. Alqutb Alshamali Marine Srvs	1,4

9274616	La Pride	2004	Aframax	Liberia. Hs La Pride Ltd	1,4
9832547	Venture	2018	Aframax	China. Prominent Shipmanagement Ltd	1,4
9832559	Crudesun	2018	Aframax	China. Prominent Shipmanagement Ltd	1,4
9258002	Kazan	2003	Aframax	UAE. Sun Ship Management	1,4
9250531	Python	2004	Aframax	Moldova. Adel Ship Management Srl	1,3
9394935	Ocean Amz	2008	Aframax	UAE. One Moon Marine Services Llc	1,3
9422988	Volans	2009	Aframax	China. Jetee Co Ltd	1,3
9321689	Ocean Faye	2007	Aframax	UAE. One Moon Marine Services Llc	1,2
9207027	Liberty	2000	Suezmax	Marshall Islands. Vythos Ventures Co	1,1
9249087	Hs Glory	2005	Suezmax	Liberia. Hs Glory Ltd	1,1
9234642	Orbit I	2003	Suezmax	UAE. Vesta Shipmanagement Ltd	1,1
9274446	Hs Star	2004	Suezmax	Liberia. Hs Star Ltd	1,1
9421960	Scf Primorye	2009	Suezmax	UAE. Sun Ship Management	1,0
9231509	Spm Strength	2002	Suezmax	Marshall Islands. Trend Shipping Ltd	1,0
9411020	Ns Burgas	2009	Suezmax	UAE. Sun Ship Management	1,0
9308077	Tyche 1	2006	Suezmax	Turkey. Westanker Ltd	1,0
9208069	Xocota	2000	Suezmax	China. Ocean Coral Ship Management	1,0
9308065	Charvi	2006	Suezmax	UAE. Laguna Shipping & Trading Llc	1,0
9249312	Misca	2001	Suezmax	Russia. Conrad Management Co	1,0
9194983	Deliver	2000	Suezmax	China. Stellar Ocean Ltd	1,0
9293117	Leopard I	2005	Suezmax	Antigua & Barbuda. Wavewhisper Shipping Ltd	0,9
9270529	Krymsk	2003	Aframax	UAE. Sun Ship Management	0,7
9232931	Narcissus	2003	Suezmax	China. Taihong Shipping Ltd	0,7
9378632	Ping An	2009	Aframax	Seychelles. Cheng Shipping & Trader Ltd	0,7
9256066	Ligovsky Prospect	2003	Aframax	UAE. Sun Ship Management	0,7
9288708	Stratos Aurora	2005	Aframax	UAE. Radiating World Shipping Servs	0,7

9374868	Elephant	2007	Aframax	Vietnam. Hung Phat Maritime Trading	0,7
9392822	Himalayan	2008	Aframax	China. Santiago Ships Management Co	0,7
9248849	Swordfish	2004	Aframax	China. Minsheng Qiping Tianjin Shpg	0,7
9270517	Seagull	2003	Aframax	British Virgin Islands. Leah Shipping Inc	0,7
9319703	Great Jacombo	2008	Aframax	Marshall Islands. Augusta Shipping & Marine Inc	0,7
9381732	Hs Buraq	2008	Aframax	Liberia. Hs Buraq Ltd	0,7
9389679	Ace	2008	Aframax	Seychelles. Flaming Star Corp	0,7
9402469	Anavatos Ii	2009	Aframax	China. Hera Gam Ltd	0,7
9419137	Sivas	2010	Aframax	China. Prominent Shipmanagement Ltd	0,7
9388754	Wei Feng	2008	Aframax	Seychelles. Xingfu Hai Shipping Ltd	0,7
9206671	Elbrus	2001	Aframax	Marshall Islands. Hambo Shipmanagement Sa	0,7
9288734	Seabravery	2005	Aframax	Seychelles. Pearl Cascade Corp	0,7
9412995	Osperous	2009	Aframax	Liberia. Hs Osperous Ltd	0,7
9264570	Themis	2002	Aframax	China. Shanghai Prosperity Ship Mgmt	0,7
9337389	Glaucus	2007	Aframax	UAE. Oceanlink Maritime Dmcc	0,7
9237228	Rhea	2002	Aframax	Panama. Moselle Shipping Inc	0,7
9131357	Orion	1997	Suezmax	Marshall Islands. Finbar Navigation Corp	0,7
9205067	Raven	2001	Suezmax	Seychelles. Infinite Tide Corp	0,7
9417464	Aion	2009	Aframax	UAE. Laguna Shipping & Trading Llc	0,7
9144782	Robon	1997	Aframax	Russia. Scoot Chartering Corp	0,7
9304356	Hera 1	2005	Aframax	UAE. Triglav Shipping Inc	0,7
9301392	Captain Kostichev	2005	Aframax	UAE. Sun Ship Management	0,7
9227443	Innova	2002	Suezmax	Vietnam. Sao Viet Petrol Transportation	0,7
9326718	Caro	2007	Suezmax	Vietnam. Ovtrans Petrol Transport	0,6
9255660	Pontus I	2004	Aframax	China. Siddqom Overseas Ltd	0,6

9283291	Tiburon	2005	Aframax	Moldova. Adel Ship Management Srl	0,6
9292503	Panther I	2005	Aframax	Turkey. Gatsby Enterprises Ltd	0,6
9323986	Alicia	2007	Aframax	UAE. Seamasters Shipping Ltd	0,6
9383950	Elegance	2009	Aframax	China. Prominent Shipmanagement Ltd	0,6
9299769	Aquatica	2005	Aframax	Seychelles. Celestial Star Corp	0,6
9524451	Sable	2011	Suezmax	China. Prominent Shipmanagement Ltd	0,6
9322827	Peria	2006	Aframax	Liberia. Hs Peria Ltd-Lib	0,6
9530917	Salty Wolf	2013	Suezmax	China. Prominent Shipmanagement Ltd	0,6
9263643	Sona Star	2003	Aframax	India. Tbb Ship Management Pvt Ltd	0,5

Source: Kpler, Equasis, 'IG' P&I Club webpage, KSE Institute estimate