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Adaptive Capacity and Financial Fragmentation in Sanctions

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Abstract

This paper asks under what conditions financial fragmentation limits the coercive power of sanctions. Existing scholarship treats fragmentation as a system-level outcome; this paper reframes it around the target state, arguing that every sanctioned state shares the incentive to fragment but only some hold the capacity to act on it. Adaptive capacity sets the limits of sanctions, and those limits are uneven, nonlinear, and self-reinforcing. Testing this through alternative payment systems in Russia and Iran, the two most heavily sanctioned economies, it concludes that sanctions and fragmentation are successive stages of a single process: coercion accelerates adaptation that erodes it.

Introduction

Following Russia's 2022 invasion of Ukraine, the G7 responded with comprehensive sanctions, freezing \$300 billion of the Russian Central Bank's reserve assets and committing to remove selected Russian banks from the SWIFT messaging network (Setser, 2025; Parsons, 2022). The aim was to isolate Russia economically to secure concessions on Ukraine. Instead, the Russian economy began to adapt to its new paradigms, exposing the limits of sanctions. Trade was substantially rerouted away from the dollar and the euro, most notably towards China, with the share of the Chinese yuan in Russian export settlements reaching 35-37% in December 2023 from a pre-war figure of less than 1%, surpassing the combined euro and US dollar share of less than 30% (Baghdasaryan, 2023).

Moscow leaned on its own System for Transfer of Financial Messages (SPFS) and China's Cross-Border Interbank Payment System (CIPS) to move money outside SWIFT (The Business Times, 2022). The result was that the Russian financial system was strained by the sanctions but not broken. A decade earlier, the removal of Iranian Banks from SWIFT had been hailed as one of the most powerful sanctions imposed (Blumenthal, 2018). However, like Russia, Iran adapted by building shadow banking channels, barter arrangements, and non-SWIFT networks, allowing oil revenues to continue flowing (U.S. Department of the Treasury, 2025; Fineren, 2012).

Both cases highlight how financial sanctions have never been more comprehensive; however, the Western financial dominance on which that power rests appears to be fragmenting at the very moment it is being deployed most forcefully.

Existing sanctions scholarship asks whether, and to what extent, financial fragmentation limits the coercive power of sanctions. This framing is incomplete, as it treats fragmentation as a system-level outcome. Every sanctioned state shares the incentive to fragment, yet the ability to act upon it is not. The more precise question is, therefore, under what conditions can a targeted state convert the incentive to adapt into an effective adaptation, and what that variation reveals about the limits of sanctions. This paper argues that the answer lies in adaptive capacity, and that the limits this capacity places on sanctions take three forms: uneven, non-linear and self-reinforcing. Chief among them, the constraint is uneven, and it is strongest with large, well-connected states that have multiple trade partners and economies significant enough to demand adjustments from non-aligned states. Consequently, sanctions tend to be most effective against weaker targets and least effective against the major powers they are usually intended to impact

most. The remaining two properties describe how this capacity operates over time. Firstly, the relationship between fragmentation and sanctions is nonlinear: coercive power can be exerted on the target state until the target state secures access to alternative financial networks. Secondly, the limits of sanctions are self-reinforcing. Once international commerce has been weaponised through financial interdependence, strong economic incentives emerge for target states, as well as neighbouring and allied states affected by sanctions, to develop alternative financial arrangements that reduce dependence on Western-controlled institutions and infrastructure. Therefore, each time the West utilises sanctions aggressively enough to significantly increase the availability of alternative payment systems, it, in turn, undermines the next set of sanctions.

This paper examines this argument through the clearest institutional test available: the construction of alternative payment and messaging systems. It will examine in particular whether these processes occurred in Russia and Iran, among the most heavily sanctioned countries in the world today. Finally, it addresses the counterargument to this premise: that, despite some level of international financial fragmentation, the U.S. dollar still retains overwhelming dominance in global finance. The question is therefore not whether sanctions work, but under what conditions they begin to undermine the very networks and systems that make them effective. This paper contributes by extending the weaponised interdependence literature to the target side, examining the conditions under which the incentive to adapt becomes effective adaptation.

Literature Review

Debate over the effectiveness of sanctions has centred on how often they succeed and remains contested between sceptics and qualified optimists (Pape, 1998, p. 66; Elliott, 1998, pp. 50, 52). For this paper, the focus is therefore on the mechanisms through which sanctions exert pressure rather than their headline success rate. Kirshner observes, "the manipulation of international financial relations is a relatively modern tool of state power", with financial sanctions seeking to "interrupt the flow of resources to the target" (Kirshner, 1997, p. 37). The impact of these measures rests on the centrality of the dollar and Western payment, messaging and clearing systems; infrastructure through which interdependence can be weaponised.

Work on geoeconomics and interdependence argues that the use of financial power as a means of coercion "may trigger counter-adaptation strategies, the emergence of alternative networks, and tendencies toward institutional fragmentation in the medium and long term" (Arslan, 2026, pp. 93-94). Additionally, the International Monetary Fund empirically shows that rising geopolitical tensions between two states can reduce cross-border investment and bank lending between them by roughly 15% as financial ties consolidate within blocs rather than across them (International Monetary Fund, 2023, p. 81). Scholars highlight a broader trend towards deglobalization, as states seek to develop sanctions-resistant financial arrangements suited to life outside of a Western-centric financial system (Kagarlitsky, Puder and Schmalz, 2022, p. 489).

Farrell and Newman argue that when a state uses economic power aggressively to impose sanctions, it creates a motive for sanctioned countries to develop alternatives to the payment and messaging systems from which they have been excluded (Farrell and Newman, 2021a, p. 316; 2021b, p. 50). Drezner

identifies the “systemic implications of increased sanctioning behaviour” as an area that needs further research (Drezner, 2024, p. 9). However, the literature establishes that fragmentation occurs without asking which states are capable of acting on these motives and causing further fragmentation. Therefore, the question of what conditions a state must meet to exercise the incentive to build alternative payment systems is rarely posed.

Theoretical Framework

Drezner separates and defines economic coercion as a threat or measures tied to a quid pro quo demand; economic sanctions, which encompass coercion but also denial, containment, and symbolism; and the broader economic statecraft, which includes additional inducements (Drezner, 2024, p. 10). The point where the sender replaces economic coercion with force is thus outside the scope. This paper focuses on financial sanctions as an emerging part of broader economic statecraft. These sanctions are built upon denying access to the networks that facilitate globalisation rather than simply denying access to a domestic market (Farrell and Newman, 2021a, p. 306). Their extraterritorial reach is based on the centrality of Western financial infrastructure, which is why the instrument is only as durable as that infrastructure's continued centrality.

If sanctions derive their coercive power from network centrality, then measuring sanctions through headline success rates is problematic, as it judges them by economic damage rather than whether they achieve political goals. Baldwin argues that an inadequate analytical framework has caused the utility of economic statecraft to be “systematically underestimated primarily because of inadequacies in the analytical frameworks used to make such estimates” (Baldwin, 2020, p.86). He further argues that analysis built on a presumed “normal” economic order is “the worst imaginable background for understanding the role of such policy instruments,” as international relations are “frequently characterised by war, revolution, and anarchy, and seldom by law and order” (Baldwin, 2020, p.89). The effectiveness of sanctions, therefore, cannot be assessed against the assumption of a stable international order; it is contingent upon a financial system whose structure and centrality are themselves evolving.

The relationship between currency fragmentation and contingent effectiveness is presented in Farrell and Newman’s theory of weaponised interdependence. It identifies hubs within the global financial system through which states can weaponise other states’ dependence in two ways. (Farrell and Newman, 2021b, p.29). The first, the “panopticon effect”, is informational: jurisdiction over a hub lets a state “obtain information passing through” it (Farrell and Newman, 2021b, p.29). More relevant to economic sanctions is the “chokepoint effect”. Because hubs are central to global trade and economic dependence is built upon them, a state controlling them can “limit or penalise” their use, so that actors “denied access to hubs can suffer substantial consequences” (Farrell and Newman, 2021b, p.30). Coercion through closing a choke point serves as the underlying theory for secondary sanctions and SWIFT exclusion.

Drezner highlights that “the US use of financial statecraft has served as a wake-up call for US rivals about dependence on the dollar” (Drezner, 2024, p.17). Farrell and Newman reach the same conclusion, warning that weaponising interdependence “is being overused in ways that undermine the economic dominance on which it depends”, as states “will turn to alternative payment systems if the United States

abuses its centrality too much" (Farrell and Newman, 2021a, pp.316-317). Thus, the network from which sanctions derive their strength is simultaneously undermined by sanctions themselves.

Luttwak gave this destructive power of an instrument its shape by describing it as "geoeconomics," or "the admixture of the logic of conflict with the methods of commerce" (Luttwak, 1990, p.18). His description of a "culminating point," at which "weapons that are too powerful are the most likely weapons to be rendered ineffective by enemy countermeasures generated by the very effectiveness of those weapons" (Luttwak, 1990, p.17 n.1), explains why the limits of financial sanctions are nonlinear rather than incremental. Dominance does not decay gradually; it lasts until an adversary has developed and implemented countermeasures.

The incentive to build countermeasures is universal; however, the capacity to build them is not. Conceptually, fragmentation does not result from a single moment of breakage with the old order but instead represents a stage in the lifecycle of an international currency.

Cohen argues that, in order to reach international preeminence which is driven by geopolitical ambition, a currency needs a leading economy surrounding it; its decline begins when the currency's youth gives way to a virtuous circle of domestication (Cohen, 2019, pp. 16, 49, 132). Using the decline of sterling in the 1930s, Cohen argues that as confidence in the pound weakened, governments that had previously linked their currencies to sterling increasingly abandoned it in favour of gold or the rising US dollar, causing the Sterling Bloc to collapse in 1931 and 1939 before the ensuing post-war decline (Cohen, 2019, p. 142-144).

As such, financial power travels along the networks a target uses; therefore, each application of it generates both the motivation and the blueprint for escape. Therefore, the effectiveness of financial sanctions and financial fragmentation is merely a matter of successive stages within a single process. The subsequent section examines this process through its most direct and institutionally observable pathway: the construction of alternative payment and messaging systems, before testing which states can actually travel it through the case studies of Russia and Iran.

Mechanism: Alternative Payment and Messaging Systems

Fragmentation reduces coercive leverage by creating incentives to develop alternative payment and messaging systems that route around the hub, allowing exclusion from it to be circumvented. Coercive leverage is the sender's ability to make sanctions costly enough to prompt a change in conduct; it is highly dependent on the target's adaptive capacity.

A key clarification disciplines the claim. The argument concerns coercion rather than harm: a target can be economically harmed and still refuse to be coerced into changing its behaviour (Drezner, 2024, p. 10). Russia's continued war in Ukraine under the broadest sanctions package ever imposed on a major economy is the clearest contemporary example of this distinction.

Consistent with Farrell and Newman's theory of weaponised interdependence, the first pathway attacks the chokepoint head-on. Exclusion from dollar clearing or the SWIFT messaging network has a strong initial impact, as alternatives do not exist; however, that scarcity is temporary, as sanctions themselves are an incentive to develop alternative payment systems. Increasingly, these alternatives are no longer hypothetical. China's Cross-Border Interbank Payment System, built in 2015 in response to the sanctions placed on Iran (Oatley, 2021, p.124), cleared ¥175.49 trillion in 2024, a rise of 43% in a single year (Baker, 2025). Likewise, Russia's System for Transfer of Financial Messages (SPFS) carried 177 foreign participants from 24 countries by the close of that year, its traffic up 23% (TASS, 2025). Neither rivals SWIFT's scale, nor does their significance lie in replacing SWIFT outright but in reducing the exclusivity through which the coercive value of SWIFT exclusion depends.

However, whether a state can take this route depends on its position. This pathway explains why sanctions are most effective against smaller states, whilst failing to coerce large ones where they matter most. They falter further when the target "occupies an alternative choke point that it can use for retaliation" (Oatley, 2021, pp. 125-126). Thus, the impact of sanctions is uneven: the larger and better-connected a target is, the greater their ability to realign and even retaliate through their own chokepoints. Consistent with Baldwin's framework, these developments concern the limits of coercion rather than the absence of economic harm because large states may bear high economic costs while reducing the sanctioning state's ability to force political change.

Four factors indicate a state's adaptive capacity. The first is domestic institutional capacity, the ability of the state to develop appropriate central bank and payments-system infrastructure to establish its own alternative rather than simply shifting its dependence. Secondly, the state's structural market position: if a state holds assets significant enough to draw in partners and to develop a chokepoint of its own. Thirdly is the substitutability of the goods a state needs and how easily they can be rerouted through non-Western intermediaries. Finally, the fourth factor is time: whether anticipation or previous sanctions have provided a state with the leeway to prepare its adaptation before greater sanctions come into place. Together, these four factors determine whether the incentive to fragment can and will be acted upon.

Case Studies: Russia and Iran

Russia and Iran are chosen as case studies because they rank among the most comprehensively sanctioned economies in the world by the scale and duration of their exposure, a fact established by the sanctions imposed rather than by their adaptation. Given this, if adaptation is not seen within these two states, it is unlikely to be seen at all, as both are the most incentivised and possess the resources to make adaptation feasible. They differ, however, in the duration of their exposure, their structural position within the international economy, and the domestic capacity available to them, which is precisely the variation that the gap identified above requires. An important distinction to note is that Iran has faced sanctions for four decades whilst Russia's sanctions have developed over a much shorter period, beginning in 2014. This shapes both the options for fragmentation available alongside limiting how successful it can be.

The Iranian case study is assessed to the start of February 2026, after Operation Epic Fury, the sender's principal instrument changed from financial to force. This shift thus leads Iran's conduct to fall outside of the mechanism.

Russia: Capacity, Preadaptation, and the Planning Advantage

Russia's substitution away from the dollar predates its 2022 invasion. By 2018, Russia had already sold 80% of its US Treasury holdings, "possibly to pre-empt a potential asset freeze," and had drafted a government plan explicitly including measures "to reduce use of the dollar in foreign trade payments" (Gould-Davies, 2018, p. 13). By July 2021, the National Welfare Fund had removed the dollar from its asset structure entirely, with yuan and euro being raised to 30.4% and 39.7%, respectively, and gold to 20.2%, with smaller holdings of the yen and sterling also held (Xu, 2023, p.9). The yuan's share of Russia's foreign exchange reserves rose from 2.8% to 14.4% by the end of 2018, while the dollar's share of Russian trade settlements fell from 61.5% to 48.3% in a single year (Xu, 2023, pp.13–14). This demonstrates the self-reinforcing limit operating: the 2014 sanctions provided the incentive to begin the divestment and de-dollarisation planning of 2018, which meant that in 2022, when comprehensive sanctions were applied, the substitution required to avoid a chokepoint had already begun, and so each round of sanctions blunted the next round.

Even as traffic to alternatives such as SPFS and CIPS grew, curbing this adoption further would require the West to enforce SWIFT against SPFS and CIPS at the messaging and clearing level, for example Visa against UnionPay and Mir at the card level, a process which would fragment the global financial system in its own right (Snegovaya, Fenton and Dolbaia, 2025, p.8-9). This further highlights the fragmenting nature of sanctions. OFAC and the EU now sanction any foreign institution that uses SPFS at all (Giumelli, 2025, p.9), in effect, a tacit admission that Russian adaptation is limiting the coercive value of sanctions. Rather than deny Russia access to the hub, they are seeking to raise the cost of adaptation. Russia's adaptation, however, relies heavily on Chinese systems such as UnionPay and CIPS, linking the Russian and Chinese economies (Snegovaya, Fenton and Dolbaia, 2025, p. 8). Thus, Russia's adaptation away from Western hubs has created a dependency on Chinese-controlled ones, indicating that even a state as large as Russia, which is seemingly able to adapt towards Western sanctions, is only able to do so by submitting to dependence on another state. In Luttwak's terms, this illustrates the beginning of a "culminating point": the effectiveness of Western financial sanctions has generated the countermeasures that progressively reduce their future coercive value.

The outcome of this capacity is measurable. The realignment towards China, India and Turkey has meant that Russia's GDP dropped only by 2.1% in 2022; buffered by a fiscal stimulus worth 3% of Russia's GDP, capital controls and a record current account surplus of \$227 billion generated by the surge in commodity prices caused by the war itself (Connolly, 2023, pp.6, 10). Sanctions proved insufficient to impose intended coercive pressure because Russia could redirect trade, mobilise domestic policy, and exploit alternative partnerships. Whilst the economic damage cannot be ignored, Russia has not made any concessions to Ukraine as of writing; thus, the sanctions have raised the costs but not changed Russia's behaviour.

As mentioned previously, when a sanctioned target itself occupies an alternative chokepoint, it can retaliate through that chokepoint, weakening the coercive grip of the sanctions imposed on it. Russia served as an alternative choke point because the Europeans needed time to find alternative energy suppliers. This gave Russia some ability to influence the terms of their economic disengagement from the West, something a target without an equivalent chokepoint could not do. This further illustrates the

uneven limits of sanctions: larger states possessing structural leverage are better able to absorb coercive pressure and reduce the effectiveness of future sanctions.

Fundamentally, the Russian case demonstrates this paper's central argument: sanctions imposed to maximise short-term coercive pressure accelerate the development of alternative payment infrastructure, thereby reducing the coercive leverage available to future rounds of sanctions.

Iran: Incentive without Capacity

Iran's experience in developing alternative payment systems is markedly limited by two factors. Firstly, its domestic platform, SHETAB, has been linked to Russia's Mir system, allowing Iranian cardholders to transact inside Russia (Snegovaya, Fenton and Dolbaia, 2025, p.8), this simply shifted dependence similar to Russia's own dependence on Chinese financial infrastructure. Iran's exposure to this pathway predates Russia's by a decade, as the EU's 2012 removal of Iranian banks from SWIFT was the "decisive push" that first demonstrated the coercive potential of weaponising interdependence (Giumelli, 2025, p.10). However, Iran failed to use that decade to build fully independent alternative payment systems, becoming dependent on a neighbour's infrastructure, highlighting the uneven capacity to adapt. Secondly, even EU support in the form of the Instrument in Support of Trade Exchange (INSTEX), a vehicle designed specifically to preserve sanctions-compliant trade with Iran and limited to only humanitarian goods, failed due to several reasons. Its closed-loop barter system was structurally weaker than a bank-integrated payment system such as CIPS or SPFS, while European firms were unwilling to risk secondary sanctions from the US despite the vehicle's institutional backing (Akın, 2025, pp. 1383-1384).

Considered against the four factors of adaptive capacity, Iran's shortfall can be attributed to structural conditions rather than a lack of will. In contrast, Russia, after being blocked from accessing international capital markets in 2014, was able to build out an ecosystem based upon its sanctions experience, demonstrating an advantage of time rather than motivation or ability.

Iran also lacked the leverage Russia had over its senders. In 2012, the EU imposed an import ban on Iranian oil and prohibited European insurance companies and reinsurers from providing coverage for tankers carrying Iranian oil and petrochemicals (Massol et al., 2024, p. 643). Europe was able to stop buying Iranian oil at a pace that suited them, as it was deemed replaceable. Iran consequently shifted exports eastward towards China, which purchased 700,000 and 780,000 b/d of Iranian oil by 2021-22 (Ehteshami, 2023, p. 12). By the first six months of 2025, Iran provided approximately 12.3% of China's imported oil, but still below regional rival Saudi Arabia at approximately 13.1% (Snegovaya, Fenton and Dolbaia, 2025, p.4). In a highly diversified market where China purchases both Russian and Iranian barrels at a competitive price (Snegovaya, Fenton and Dolbaia, 2025, p. 4), Iran lacked the bargaining position necessary to dictate its own disengagement. The senders of Iran's sanctions could thus act quickly and cohesively, in contrast to the implementation of sanctions against Russia.

Iran's economy was too small to force major trading partners to adjust their trade position. Iran accounts for less than 0.5% of China's total international trade and is just a fraction of China's trade with the rest of the Gulf Cooperation Council (GCC) nations (Ehteshami, 2023, p. 10). Greer and Batmanghelidj's analysis of the 2020 leaked draft of the Comprehensive Strategic Partnership highlighted Iran's frustration with its comparatively weaker bilateral ties with China than those of its neighbours, (Greer and

Batmanghelidj, 2020, p. 2). This can be attributed to Iran's inability to finance its trade deficit with China due to limited access to foreign currency reserves (Greer and Batmanghelidj, 2020, p. 7). Russia was a large enough trade partner to cause China to bring Russian Banks into UnionPay and CIPS; Iran, on the other hand, could only be accommodated on terms dictated by China.

Where state capacity was absent, adaptation devolved to the level of the firm. Iran's companies replaced European intermediate products denied under the sanctions regime with those supplied by Turkish and UAE intermediaries and/or direct imports from China, allowing them to maintain inventories, albeit at a higher cost (Batmanghelidj, 2021, cited in Farzanegan and Batmanghelidj 2023, p216). Methanol provides a good example of the impact on supply chains. Under the sanctions imposed between 2012 and 2016, Iran's methanol exports to Republic Korea ceased entirely, while China and India increased significantly, because Chinese and Indian firms obtained cover from domestic insurers something Republic Korea could not do (Massol et al., 2024, p.643). As a result, average price per tonne rose by 19.9% in Korea and 24% in Southeast Asia compared to an increase of just 11% in China and 14.6% in India, resulting in a division of what was previously a unified regional market into two poorly connected markets (Massol et al., 2024, p.649). This highlights the importance of substitutability; Iran had a narrow set of intermediaries willing to bear the lack of insurance involved with facilitating trade, resulting in the price difference seen as a key indicator of fragmentation. Production is able to continue through these firm-level adaptations; however, a permanent alternative infrastructure is not developed. This supports the paper's argument on the uneven capacity to adapt. Fragmentation is not equally available to all states but depends upon the economic, geopolitical, and institutional resources available. Russia's partnership with China, discussed previously, was able to absorb what proved to be decisive for Iran due to Iran's comparatively low leverage when compared to Russia. The ability to develop adaptation mechanisms is highly contingent on the state's capabilities rather than independent of them. Although Iran's adaptation was weaker than Russia's, the direction of change was the same. Sanctions accelerated the development and consolidation of alternative payment arrangements, illustrating that fragmentation is a structural response to financial coercion even where its scale is different.

The 2015 Iran Nuclear Deal is of note. Sanctions imposed in 2012 excluded Iranian banks from SWIFT and introduced secondary sanctions, including the aforementioned EU crude oil-related actions. However, all of these were lifted following the JCPOA (Massol et al., 2024, p.643). Iran had failed to mitigate the economic pressure placed upon it, and its GDP fell 19% compared to its synthetic counterfactual by 2015 (Ghomi, 2022, cited in Farzanegan and Batmanghelidj, 2023, p. 210). Nephew, who was part of the US negotiating team, emphasised the ability to turn on and off both economic and psychological pressure, forcing compromise by creating the expectation that suffering will be relieved (Nephew, 2018, p. 63). However, we have seen that this is effective only if the state does not have alternative channels through which they are able to process transactions, and between 2012 and 2015 Iran had no independent channels of its own, and later European attempts to build an alternative failed (Akın, 2025, pp.1383-1384). Therefore, the relief gained was minimal and failed to meet government expectations (Nephew, 2018, pp.68-69). It was the US withdrawal in 2018 that led to Iran pivoting towards China and the Shanghai Cooperation Organisation (Ehteshami, 2023, p. 11). The same asymmetry held following the E3's triggering of the JCPOA snapback, which sought to restore the 1737 Sanctions Committee, this reimposition is viewed as void by China, Russia, and Iran as Resolution 2231 expired in October 2025 this has allowed them to block enforcement measures (Security Council Report, 2026). Given that a

significant part of Iran's adaptation was done through Russia and China, the snapback essentially brought back the 2012 legal framework without the previous chokepoint dominance which the coercive value rested.

Therefore, coercion worked as Iran was a weak adapter and was still conditional on the US's maintenance of it, and this conditional reliance in fact raises the costs of remaining reliant on the West. Iran's experience supports the broader proposition that states least capable of adaptation are those most likely to come to the negotiating table.

Comparative Analysis

In both cases, a similar imbalance is evident across the factors of adaptive capacity. Russia's fragmentation is maintained by a great power that views this relation as uniquely strategic and rests on a central bank, with close to a third of its holdings denominated in yuan (Xu, 2023, p.15). On the other hand, Iranian fragmentation is supported by regional middlemen, widespread smuggling and false invoicing among firms and a multilateral project it cannot influence. It is not just that Russia is bigger; Russia occupies a structural position, notably as an energy exporter attractive to Beijing, that Iran does not.

Secondly, a pattern common to both cases strengthens the causal claim. Sanctions did not build the adaptable structures from nothing. Russia's treasury divestment, gold reserve acquisition and de-dollarisation plans were set up by 2018 (Gould-Davies, 2018, p.13). What the post-2012 and post-2022 sanctions packages did for both countries was speed up, formalise and extend those existing adaptations, in some instances compressing changes that would have otherwise occurred in several years into months. The yuan's rise from less than 1% of Russian export settlements prior to the war to 16% settlements by the end of 2022 and to 35-37% by the end of the following year is perhaps the clearest example of this type (Baghdasaryan, 2023). Fragmentation doesn't merely coincide with sanctions but rather both are enforcing each other: each previous round of sanctions created infrastructure that would blunt the effects of subsequent rounds, which is precisely the sequence hypothesised and observed through dated documentation and cases.

Additionally, the substitutability of Russia allowed them to redirect entire sectors towards China, India and Turkey whilst minimising GDP losses (Connolly, 2023, pp.6, 10). In contrast, Iran had fewer buyers prepared to assume the insurance risk (Massol et al., 2024, p.649). Russia also benefited from sanctions staggered over 8 years from 2014 to 2022 whilst Iran's began in 2012, three years prior to the launch of CIPS (Snegovaya, Fenton and Dolbaia, 2025, p.8). Iran therefore lacked the preparation advantage of Russia.

Yet neither case confirms an absolute escape. Russia's substitution has resulted in a new form of dependence rather than eliminating an older one; likewise, Iran's longer exposure to sanctions allowed it to plug into Russian infrastructure instead of creating anything comparable itself. Both therefore demonstrate Luttwak's "culminating point" from a different perspective; countermeasures can diminish

sanctions without eliminating the original vulnerability. Instead, they simply redistribute the vulnerability across new financial relationships according to who had sufficient structural weight to generate those countermeasures in the first place and thus is determined by the target state's structural position within the international economy. In both cases presented here, therefore, the constraint on sanctions has been shown to exist, although it is partial, contested, and distributed, consistent with the structural differences identified in this paper's uneven limit.

Counter-Argument

Despite all the fragmentation described, the U.S. dollar remains overwhelmingly dominant in world finance, with no realistic alternative. Considerable evidence supports this position; data collected by the International Monetary Fund indicate that while the percentage of the dollar held globally decreased from 71.5% in 2001 to 57.8% in 2024 (Giumelli, 2025, p.11), it still represents a majority of the total foreign exchange reserves more than two decades into what this paper defines as an acceleration of the trend of fragmentation. In fact, Giumelli states outright that "no realistic alternatives to the US dollar currently exist" (Giumelli, 2025, p.11). This paper also referenced the failure of the INSTEX to demonstrate how even a Western government-backed vehicle designed to facilitate trade with Iran could not survive exposure to the dollar-based financial systems. If a cooperative effort among like-minded nations can be rendered unusable by the use of U.S. monetary power, then its significance cannot be dismissed. While the movement of Russia towards China appears to have taken place on terms set by Beijing, and Iran has spent over a decade adapting its economy to include reliance on Russian infrastructure, neither development represents any form of economic or political independence.

However, this objection attacks a position this paper has never taken. This study investigates when sanctions will erode the networks that enable them to be effective, not whether sanctions have already displaced the U.S. dollar as the world's most widely held reserve currency. Thus, "coercive leverage" as defined in the section on payment systems rather than "reserve currency share" was used to assess the extent of the impact of sanctions. Therefore, a target does not need to acquire or rely upon a rival global currency to successfully evade the pressures exerted through sanctions; it needs to find a viable way to circumvent the chokepoints created to target it. The distinction between coercion and harm therefore allows for the possibility that dollar primacy may coexist with the thesis presented here. That is, the argument concerns the erosion of coercive control at the margin, not the collapse of the dollar-centred system as a whole.

Additionally, the objections measure a "stock" when this paper addresses the impact of changes over time, a "flow." The current share of reserves held by the U.S. dollar is a snapshot; however, the point of contention is the direction and speed of these changes, as well as the chronological sequence described in the comparative section. That sequence demonstrates how each new wave of sanctions provided the infrastructure that caused subsequent sanctions to have less coercive effect. Historical experience indicates that currency dominance is typically a trailing indicator of structural changes within networks that influence coercive power. In accordance with Cohen's (2019) theoretical framework regarding a currency's reserve status and its lifecycle, it was possible for sterling to remain a leading reserve currency long after the dynamics that would end its dominance were already in motion; only when confidence shifted did the Sterling Bloc contract (Cohen, 2019, p.142). Using Cohen's lifecycle model, the critical

issue is not whether the U.S. dollar remains dominant today, but whether its coercive value is moving in the direction predicted by the fragmentation thesis. The evidence presented here suggests it is. Fragmentation has not prevented sanctions; it has increased the costs associated with those sanctions, while decreasing the coercive returns generated by them.

Conclusion

The purpose of this paper was to analyse the conditions needed to adapt towards sanctions and develop alternative payment systems. The findings suggest that sanctions have a significant but conditional limitation due to financial fragmentation, determined by variation in states' capacity to adapt. The limit operates in three related ways. Firstly, it is unevenly distributed among different types of economic actors; sovereign-level adaptations such as state-level payment infrastructure and reserve restructuring, as well as state-based retaliatory capabilities, were available to Russia, whereas Iran used firm-level improvisations, such as unofficial exchange rates and re-routing trade through regional intermediaries. These different levels of adaptation corresponded with each country's position relative to other actors in the global economy. Secondly, the limits on sanctions are nonlinear; sanctions have coercive power based on their ability to prevent those entities from accessing Western financial infrastructure. Once alternative financial infrastructure options become viable, then sanctions lose some of their coercive power. Thirdly, the limits of sanctions also appear to be self-reinforcing. The progression from the first round of sanctions imposed on Russia in 2014 to Russia's Treasury divestment and pre-war reserve restructuring in 2018 to increased sanctions activity after 2022 demonstrates how earlier rounds generated capabilities that blunted the impact of subsequent rounds. Iran's development of informal currency channels and their later institutionalisation reflect the same process, although at a weaker level. The fact that the U.S. dollar continues to dominate foreign reserves does not diminish the paper's analysis since the focus of the study was on the leverage generated by sanctions at the margins.

This paper expands on current literature on sanctions and interdependence by specifying conditions under which the incentive to adapt may be hampered. The four factors of domestic institutional capacity, structural market position, substitutability, and time can be analysed across the two case studies of Russia and Iran. This paper shows how, following a round of sanctions, adaptive measures are put in place which limit the coercive returns of the second round; it cannot show what the coercive returns would have been if the adaptive measures had not come into place.

These findings suggest there are additional studies that could be completed. If the self-reinforcing limit functions as indicated, there will exist an empirical hypothesis for sanctions against highly connected states. Subsequent rounds of sanctions should produce faster adaptations and generate smaller coercive returns, as targets benefit from the adaptive infrastructure built in response to earlier rounds. Thus, the speed of adaptation across successive sanctions episodes, versus the effectiveness or ineffectiveness of individual sanctions events, will be the focal area of interest for subsequent studies. It is also possible that studying sanctions applied to a mid-sized state, one without Russia's ability to exert structural influence, nor Iran's level of isolation, may determine where the uneven limit truly exists, and if the constraints noted above extend beyond the heavily sanctioned major economies studied here.

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