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Georgios Georgiadis, Makram Khalil,
Georg Strasser, Feodora Teti

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Discussion papers

Discussion papers are research-based papers on policy relevant topics, offering a broader and more balanced perspective. While being partly based on original research, they place the analysis in the wider context of the literature on the topic. They also consider explicitly the policy perspective, with a view to develop a number of key policy messages. Their format offers the advantage that alternative analyses and perspectives can be combined, including theoretical and empirical work. The selection and distribution of discussion papers are subject to the approval of the Director General of the Directorate General Research.

Abstract:

We study the role of geoeconomics in shaping globalisation and trade policy. We first review the evolution of world trade since the end of World War II, highlighting the drivers of globalisation and its economic consequences. We then synthesise recent research on geoeconomics, which analyses how countries use trade policy as a tool to pursue geopolitical objectives. Against this background, we argue that the gradual shift in geoeconomic power from the United States toward China since the 2000s has been driving a fragmentation in world trade along geopolitical lines. We provide conceptual policy recommendations for the European Union to navigate an environment characterised by intensifying geopolitical competition.

Keywords: trade policy, interdependence, (de-)globalisation, tariffs, fragmentation

JEL codes: F02, F1, F4, F5, F6

Non-technical summary

World trade expanded strongly after World War II, driven by declining trade costs, technological progress, and large-scale trade policy liberalisation initiatives. While the foundation for this growth in trade lay in the establishment of a rule-based international order by the United States (US), its unprecedented acceleration in the 1990s was caused by the end of the Cold War and China's integration into the world economy as a major manufacturer. Deepening trade integration allowed leveraging efficiency gains from international specialisation and additional utility from greater product variety.

The Global Financial Crisis (GFC) of 2008 marked a turning point. Since then, global trade has started to fragment along geopolitical lines: While trade intensity between geopolitically aligned countries has remained relatively stable, trade between countries in different geopolitical blocs has been declining. Even if the use of trade policy for strategic purposes by especially the second Trump administration is widely perceived as a watershed moment for the international rule-based trading system, it is consistent with this already existing trend. Nonetheless, its explicitly coercive zero-sum framing risks triggering a collectively detrimental escalation of trade fragmentation.

Several factors may explain the general slowdown in world trade in the immediate aftermath of the GFC. First, the scope for further gains from specialisation had diminished as global value chains matured. Second, political support for further trade liberalisation weakened as distributional concerns within countries accumulated. Third, the COVID-19 pandemic highlighted vulnerabilities that arise through complex supply chains. Finally, China's shift towards a more domestically oriented growth model reduced its trade intensity. But while these factors may explain the stalling of world trade in the immediate aftermath of the GFC, they cannot account for the decoupling along geopolitical lines since the 2010s.

Against this background, this paper recounts the evolution of global trade over the last decades through the lens of geoeconomics. Central to geoeconomics is the leveraging of economic dependencies in the pursuit of geopolitical objectives. Trade is used not only to realise efficiency gains and increase available varieties, but also as a strategic lever over trading partners: A country with geoeconomic power uses "threats not to sell" and "threats not to buy" to extract rents. Geoeconomic power is determined by the scale of the dependencies that trade entails, and the ease of circumventing the geoeconomic threats that try to exploit them.

Through the lens of geoeconomics, the increasing fragmentation of world trade along geopolitical lines since the 2010s reflects the growing role of geopolitical objectives in trade policy. Countries around the world reorganise their trade relationships to mitigate geoeconomic dependencies in an environment expected to be characterised by intensifying geopolitical competition. Although an extreme manifestation, the increasing coercive use of trade policy within a more general disregard of the international rule-based order by the Trump administrations since 2018 can to some extent be rationalised by the shift of global geoeconomic power from the US toward China.

To successfully navigate an environment characterised by intensifying geopolitical competition, the European Union (EU) must fundamentally adapt. This requires trading off efficiency gains from trade against risks from critical dependencies more explicitly, strengthening coordination across member states, sustaining economic growth also for strategic considerations, and cooperating with like-minded partners in support of a rule-based international order.

A. Introduction

Trade expanded strongly in the post-World War II period and became increasingly globalised until the global financial crisis (GFC). The earlier period of globalisation coincided with the United States (US) assuming a central role in the Western political and economic order. During this phase, key institutional and policy developments supported trade integration, including the establishment of the General Agreement on Tariffs and Trade (GATT) and later the World Trade Organization (WTO), the emergence of the Washington Consensus as a dominant policy framework, the end of the Cold War coupled with the collapse of the Iron Curtain, and China's rapid integration into the global economy as an emerging manufacturing powerhouse.

Thereafter, world trade first stalled and then even started to show signs of fragmentation along geopolitical lines. Since the 2008 GFC global trade growth has weakened, and increasingly geopolitical considerations have shaped trade patterns. Most strikingly, by imposing sweeping tariffs on China and its European allies under the two Trump administrations since 2018, the US—the principal architect of the post–World War II rule-based international order—has itself become a disruptor of the very system it once established, defended, and promoted for decades.

This paper argues that the evolution of trade patterns since the GFC—the transition from a uniform retreat from globalisation to a more selective form of decoupling—is best understood through the lens of geoeconomics. Geoeconomics refers to the use of economic dependencies to pursue geopolitical objectives, with trade serving as the key instrument for coercion.

Before the GFC, the expansion of world trade was driven by efficiency gains from specialisation, reinforced by declining trade costs resulting from technological progress and successive waves of trade liberalisation. Trade allowed increasing product variety for consumers and countries to specialise in what they produce most efficiently and to source other goods from abroad, thereby raising productivity while lowering prices and markups. These gains accumulated over time as technological advances in transportation and communication steadily reduced the cost of moving goods and coordinating production across countries. At the same time, policy barriers to trade were progressively lowered through multilateral liberalisation under the GATT and the WTO, unilateral trade opening by large emerging economies, and the rapid proliferation of regional trade agreements (RTAs).

In the immediate aftermath of the GFC, world trade growth stalled due to structural factors, shifts in domestic political support for globalisation, and increasing awareness of cross-border supply-chain fragilities. Part of this slowdown reflects the more limited scope for further gains from specialisation, as opportunities for expanding global value chains (GVCs) gradually diminished after a series of largely one-off integration episodes. At the same time, political support for further trade integration weakened as negative distributional effects of trade accumulated within-countries. This trend was reinforced by growing awareness of the economic vulnerabilities associated with GVCs, as highlighted during the COVID-19 pandemic. In addition, China—which accounted for a substantial share of the expansion of world trade prior to the GFC—broadened its industrial base and gradually shifted from an export-led growth model towards greater reliance on domestic demand.

The broad-based stalling of world trade soon morphed into a fragmentation along geopolitical lines. While trade intensity between geopolitically aligned countries has been stable since the 2010s, it has fallen across geopolitical blocs. This pattern is particularly evident for the US, the European Union (EU) and other countries in the Western bloc on the one hand, and China, Russia and several other countries on the other hand. At the same time, trade policy has increasingly been shaped by geopolitical considerations. This selective decoupling is difficult to reconcile with explanations based on structural saturation, global rebalancing, supply-chain vulnerabilities, or domestic political backlash against trade, all of which would be expected to affect trade uniformly across countries rather than in a geopolitically selective manner.

The observed fragmentation implies higher trade costs across geopolitical blocs, and geoeconomic considerations help explain why countries have incentives to erect such barriers in the first place. Geoeconomic leverage can operate through threats to restrict trade or to raise trade costs, for example via tariffs or export controls. The effectiveness of such threats—and thus a country's geoeconomic power—depends on its importance as a trading partner and on the ease with which the target can substitute away from that relationship. As a result, countries with geoeconomic power engage in trade not only to realise efficiency gains, but also to build coercive capacity vis-à-vis other countries while managing their own exposure. The US tariff escalation vis-à-vis China, launched by the first Trump administration in 2018, maintained by Biden, and intensified since 2025, is a prominent illustration of this logic, reflecting a deliberate effort to reduce asymmetric exposure rather than a conventional "protection-for-sale" (Grossman and Helpman, 1994) response to import competition or terms-of-trade rationales.

Global trade fragmentation may arise when an incumbent great power faces the emergence of a geopolitical challenger. In such a setting, third countries may find it attractive to realign towards the rising power, potentially at the cost of reduced market access or higher trade barriers with the incumbent great power and its allies. At the same time, the incumbent great power and its allies may reduce trade with the rising challenger to slow its economic ascent and limit their own geoeconomic exposure. The result is a reorientation of trade flows toward trade within geopolitical blocs.

China's economic rise over the past two decades has shifted global geoeconomic power configurations in its favour. China gained significant leverage over both the EU and the US through "threats not to sell", reflecting its central role in the production of many intermediate goods, and through "threats not to buy", reflecting its importance as an export market for Western manufacturing. Several concurrent developments amplified this shift in geoeconomic power and made it more salient, including growing awareness of vulnerabilities associated with GVCs and the economic and geopolitical repercussions of Russia's invasion of Ukraine.

Beyond any medium-term geopolitical considerations, the weaponisation of trade policy also affects the business cycle in the short run. The macroeconomic effects are heterogeneous and depend on which countries implement trade policy measures, which countries retaliate, and the structure of production linkages through global input–output networks. Direct effects of trade policies may be offset or even reversed by general-equilibrium effects. Moreover, the uncertainty about trade policy may be as important for fluctuations in output and inflation as the actual changes in trade policy.

The EU must embrace the challenges implied by the reshuffling of global geoeconomic power configurations. Most fundamentally, it must recognise the central role of geopolitics in shaping economic interactions between countries. As the main global geopolitical fault line is no longer running through Europe, the geoeconomic interests of the EU and the US are no longer perfectly aligned. Although certainly exacerbated by a Trumpian flavour, the US tariffs on imports from the EU announced in early 2025 and the threats aimed at undermining Greenland's sovereignty can be interpreted as a consequence of increasingly diverging US–EU geoeconomic priorities. For the EU, assuming greater responsibility entails more explicitly balancing the gains from specialisation against the costs associated with asymmetric dependencies in critical inputs (e.g. energy) and key sectors (e.g. financial services), as well as in more fundamental areas such as national security. For it to be recognised as a credible geoeconomic actor requires also a more efficient, synergistic and resilient internal coordination. A key prerequisite is sustained economic growth. As geoeconomic power ultimately rests on economic size, the growth of the EU economic plays a central strategic role. Finally, the EU should seek to form coalitions with like-minded trading partners to sustain a rule-based international order previously anchored in the US.

The rest of this paper fleshes out the main drivers of the evolution of global trade and its effects in more detail. Section B sets the stage by explaining conceptually why countries trade if only for reasons of efficiency and by tracing the evolution of global trade over the past decades. Section C discusses the key mechanisms through which trade is leveraged by geoeconomically powerful countries to maximise their economic welfare and to achieve geopolitical objectives. Against the background of these mechanisms, Section D discusses the evidence for fragmentation in world trade since the 2010s and explains its causes through the lens of the geoeconomics. Section E explores the macroeconomic effects of trade policy measures. Finally, Section F lays out conceptual policy implications for Europe.

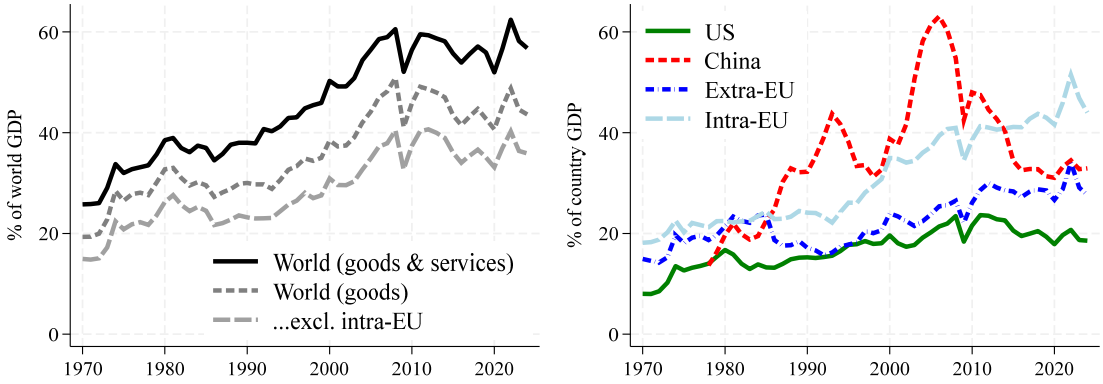
B. Global trade: from hyper-globalisation to fragmentation

International trade expanded at an extraordinary pace in the post-World War II era. From the 1970s to the 2008 GFC, a period referred to as "hyperglobalisation" (Rodrik, 2011, pp. 200-201), international trade growth systematically outpaced global output growth. Between 1970 and 2008 alone, the ratio of world trade to world GDP more than doubled (Figure 1, left panel). World trade expanded across the EU, the US, and especially China (Figure 1, right panel); the Single Market played an important role for the EU, but integration with the rest of the world deepened as well. The bulk of this expansion was accounted for by goods trade. The growth in world trade reflected a combination of economic and policy developments that reinforced each other. Governments around the world pursued extensive trade liberalisation guided by the belief that openness promotes growth, and they locked in these commitments by establishing international institutions to police these achievements. At the same time, technological advances sharply reduced transportation and communication costs, making it

easier and cheaper to coordinate production across borders. Firms responded by fragmenting production internationally, which gave rise to complex global value chains.

Yet this expansion in world trade was not sustained. Since the GFC, the ratio of world trade to world GDP has plateaued (Figure 1, left panel). This halt at the world level hides heterogeneous patterns across the EU, the US and China, however. While trade intensity declined in the US and especially in China, the EU's continued to expand even after the GFC, especially within the Single Market (right panel).

Figure 1: Evolution of world trade (1970-2025)
(exports and imports in percent of GDP)

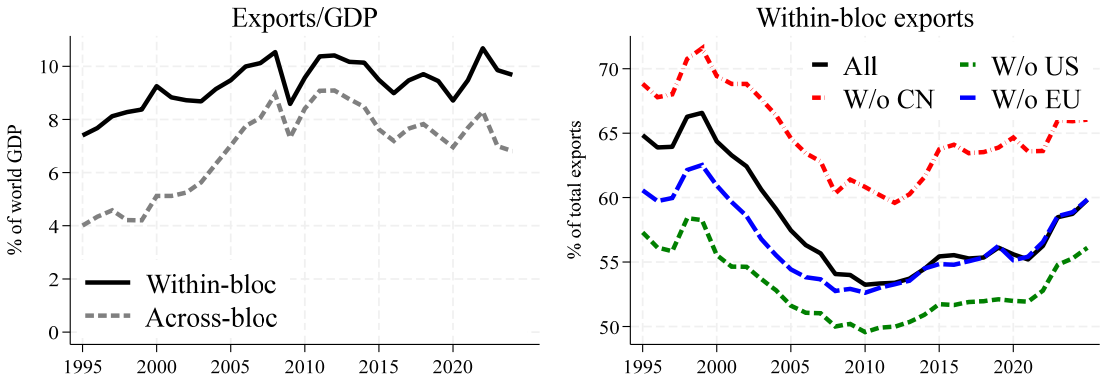


Source: World Bank World Development Indicators (WDI), IMF Direction of Trade Statistics (DoTS); authors' calculations.

Note: In the left panel the black solid line indicates the ratio of world exports and imports of goods and services to GDP obtained from the WDI. The grey short-dashed line indicates the ratio of world goods trade to GDP obtained from the IMF DoTS. Both indicators of world trade include trade between EU countries. The grey long-dashed line indicates the ratio of world goods trade to GDP obtained from the IMF DoTS, excluding intra-EU trade. The right panel depicts the ratio of trade to GDP obtained from the IMF DoTS for the EU (dark blue dash-dotted line), the US (green solid line), and China (red short-dashed line). The light-blue long-dashed line indicates the ratio if intra-EU trade to EU GDP. EU comprises the 27 member states of 2026. The data cover the period from 1970 to 2025.

The post-GFC slowdown in global trade coincides with a growing geopolitical fragmentation of trade. Beginning in 2011, global trade increasingly reoriented toward exchanges between countries within geopolitically aligned blocs (Figure 2, left panel). While within-bloc trade integration has stabilised at its pre-GFC level, across-bloc trade integration has been receding. As a result, the declining trend in the share of trade within geopolitical blocs between 1995 and 2011 has reversed (Figure 2, right panel). This pattern is not an artifact of the US, China, and the EU: even when excluding any these three trade within as compared to across geopolitically aligned blocs displays the same pattern.

Figure 2: Total world exports, within and across-bloc exports (1995—2025)



Source: Trade data from CEPII BACI database (Gaulier and Zignago, 2010); Global Trade Monitor; authors' calculations.

Note: Blocs are defined following Gopinath et al. (2025a) based on UN General Assembly voting patterns (Bailey et al., 2017), with every country assigned to either a US-aligned or China-aligned bloc. The left panel presents the ratio of world within-bloc exports to GDP (black solid line) and world across-bloc exports to GDP (grey dash-dotted line). The right panel presents the share of within-bloc exports in total world exports (black solid line). The red-dash-dotted line presents the same statistic dropping China as importer and exporter from the sample, the blue long-dashed line drops EU countries, and the green short-dashed line the US. EU comprises the 27 member states of 2026. CEPII data cover the period from 1995 to 2023 and are extrapolated to 2025 using data from Global Trade Monitor.

This section recounts the rise of global trade, its stalling after the GFC, and the emergence of fragmentation across geopolitical blocs. The discussion is structured along three broad questions: Why is it mutually beneficial for countries to trade? What led the world economy into a period of rapid globalisation? How has global trade integration evolved since the GFC? Tracing the evolution of global trade integration in the post-war period helps illustrate how the initial drivers of globalisation centred around mutual efficiency gains have been superseded by geopolitical considerations since the GFC. This sets the stage for the discussion of geoeconomics in the following sections.

B.1. Why is it mutually efficient for countries to trade?

Countries trade because it allows them to specialise in what they do best, relying on the world for everything else and thereby using their resources more efficiently. This insight goes back to David Ricardo (1817), who showed that what matters for trade is not how productive a country is in absolute terms, but where its relative productivity advantage is strongest. Even if one country is better at producing every good, it still gains by specialising in the goods it produces relatively most efficiently and importing the rest. In this way, trade raises overall output even when one country has an absolute advantage in everything, which is why the key determinant of the pattern of trade is comparative rather than absolute advantage. Countries gain because they can buy some goods more cheaply from abroad and use the saved resources to expand production in areas where they are most productive. Eaton and Kortum (2002) provide the modern formulation of this idea, building on Dornbusch et al.

(1977), and make it empirically tractable, allowing economists to work with many goods and many countries in a way that the original Ricardian model could not. This extension points to three key benefits of trade: higher overall productivity, lower prices, and greater product variety.

When countries open to trade, overall productivity rises because more efficient firms expand while less efficient firms contract or exit (Melitz 2003). Entering export markets involves fixed costs, such as setting up distribution networks, meeting foreign standards, or marketing to new customers. Only the most productive firms can profitably cover these fixed costs, which means that exporting is undertaken primarily by high-productivity firms. The access to a larger market then allows these firms to grow. At the same time, trade exposes domestic producers to tougher import competition, since only the most efficient foreign firms can export. Domestic firms that cannot match this level of productivity lose market share and eventually exit. The result is a reallocation of resources toward the most productive firms in the economy. This process can benefit workers, provided they can move freely between employers, because expanding high-productivity firms employ more workers and pay higher wages. A large empirical literature confirms that exporters are indeed larger, more productive, and pay higher wages than non-exporters (e.g., Bernard et al. 2007). Conversely, trade barriers reverse this process by sheltering less efficient firms from competition and slowing the growth of the more productive firms.

Stronger competition in domestic markets due to international trade reduces market power and lowers prices. When importers enter a previously closed market, domestic firms can no longer charge the higher markups that were possible under the weaker domestic competition. Even when the Melitz-style reallocation mechanism just described is shut down by holding productivity constant, firms still respond to foreign competition by pricing more aggressively, which directly benefits consumers. Modern trade models with endogenous markups capture this mechanism by allowing competition to influence how firms set prices. Feenstra and Weinstein (2017) show that lower domestic market shares for home firms—caused by import competition—can lead to lower markups and lower prices. Empirically, they find that roughly half of the gains from trade for the US between 1992 and 2005 came from these pro-competitive effects, with the remainder coming from access to a wider range of product varieties. In short, trade generates welfare gains not only through specialisation and productivity improvements, but also by reducing the pricing power of domestic firms.

Trade also raises welfare by giving consumers and firms access to a wider range of goods than those produced at home. Many goods come in differentiated versions: different car models, different breakfast cereals, or different smartphone designs, each appealing to the needs and preferences of small subgroup of consumers. Likewise, some niche products are so special that it is not profitable to produce them for the small customer base in an isolated market. Measuring these gains is challenging because new varieties did not exist and thus had no prices before trade. Broda and Weinstein (2006) apply a method proposed by Feenstra (1994) to overcome this problem to the US and estimate the value to US consumers of the expanded import varieties between 1972 and 2001 to be 2.6 percent of GDP. Ossa (2015) shows that these variety gains are especially large for smaller economies because of their more limited domestic product range.

B.2. The era of hyperglobalisation

Central to explanations of the growth of global trade since the 1970s is the decline in trade costs. These costs include both policy barriers (e.g., tariffs, quotas, standards, export controls) and non-policy costs such as transport costs or insurance (Anderson and van Wincoop, 2004). Together, these forces redefined the geography of production, allowing firms to spread value chains across borders and integrate procurement and sales markets internationally. The following subsections examine how each category of trade cost evolved and how their joint decline reshaped global production.

Policy-related trade costs

Policy barriers to trade include not only tariffs but also a wide range of non-tariff barriers. Beyond tariffs, governments deploy contingent protection such as anti-dumping duties or safeguards. They apply quantitative limits such as import quotas, tariff-rate quotas, or voluntary export restraints. They create administrative frictions, for example through customs procedures, certification requirements, or rules of origin. They impose standards and regulatory measures—in themselves not necessarily aimed at trade (e.g. sanitary and phytosanitary measures, technical barriers to trade[3], environmental or labour standards)—that raise compliance costs for foreign suppliers. Domestic policies also shape trade outcomes indirectly, for example in the form of subsidies, domestic-content rules, and "buy national" procurement preferences. Finally, firms face uncertainty about future trade policy, which can depress entry and investment even in the absence of immediate policy changes. Bown and Crowley (2016) provide an excellent survey.

Motivated by the view that openness was a prerequisite for growth, many governments implemented large-scale trade liberalisation programs during the 1970s and 1990s. These reforms—often promoted by the IMF and the World Bank and reflected in the Washington Consensus—dismantled import licensing regimes, sharply reduced tariffs, and eased restrictions on inward investment.[4]

In line with theory, a large empirical literature documents substantial gains from these large-scale trade liberalisations. Estevadeordal and Taylor (2013) link liberalisation episodes to higher long-run growth. Reductions in tariffs on final goods and exposure to foreign competition are associated with productivity improvements (Pavcnik, 2002; Fernandes, 2007; Muendler, 2004), while lower input tariffs generated large cost reductions and efficiency gains for domestic producers (Topalova and Khandelwal, 2011; Goldberg et al., 2009; Amiti and Konings, 2007). Trade liberalisation also expanded the range of available varieties for firms and consumers, leading to additional welfare gains (Arkolakis et al., 2008).

[3] Technical barriers to trade include, for example, certification requirements, technical standards or product labelling requirements.

[4] The numbers were striking: For instance, Colombia cut average tariffs from 27% to about 10%; Chile reduced its uniform tariff from around 100% in 1974 to 10% by 1976; in Brazil, 38% of tariff lines were eliminated and were subsequently liberalised; and India lowered average applied tariffs from roughly 87% in 1987 to 45% by 1994 as part of its balance-of-payments reform program.

While many of these reforms were unilateral, multilateral liberalisation through WTO rounds spread the changes much more broadly. The GATT had already delivered substantial tariff reductions through successive negotiating rounds since the late 1940s. The creation of the WTO in 1995, following the successful conclusion of the Uruguay Round, locked in substantial tariff reductions and extended trade rules to new domains such as services, agriculture, and intellectual property. Membership expanded rapidly—from 128 countries in 1995 to 166 by 2025—with the accessions of China in 2001 and Russia in 2012 marking significant steps in integrating large transition economies into the multilateral trading system.

The central purpose of the GATT and WTO is to internalise terms-of-trade externalities (e.g., Staiger, 2021; Bagwell and Staiger, 1999). The underlying intuition is easiest to grasp by contrasting how a tariff affects small versus large countries. In a small open economy, a unilateral tariff does not affect the world price, and therefore only redistributes surplus domestically and creates a deadweight loss; absent redistributive motives, the optimal tariff is zero. For a large country, the logic changes: a tariff reduces import demand enough to depress the world price, so part of the tariff burden is shifted to foreign exporters. This produces a terms-of-trade gain for the large country, which partially offsets domestic efficiency costs but also implies a negative externality on trading partners—a "beggar-thy-neighbour" effect. Empirically, even narrowly defined markets can confer market power: Broda et al. (2008) show that countries impose systematically higher tariffs on products where they have such market power and are not constrained by multilateral agreements under the GATT/WTO. The logic illustrated in the context of tariffs applies equally to non-tariff barriers, such as import licensing and quantitative restrictions.

The GATT/WTO core principles of reciprocity and non-discrimination provide the mechanism through which terms-of-trade externalities are internalised. If countries with market power bargain bilaterally over tariffs, each loses the incentive to engage in unilateral terms-of-trade manipulation. The GATT/WTO's non-discrimination principle "multilateralises" these bilateral commitments from members with market power to all members. The result is self-enforcing: any attempt to deviate can be met with retaliation by at least one partner with market power, neutralising the gain (Bagwell and Staiger, 1999). This logic helps explain why actual tariffs are far below countries' unilateral optimal tariffs. For example, Ossa (2014) estimates that for the US the optimal non-cooperative tariff would be around 60%, yet in practice it applied until 2025) tariffs of on average only about 3%—a gap sustained by the discipline of the GATT/WTO framework. Importantly, these institutional features were binding and covered an increasingly larger share of world trade through country accessions to the WTO. By providing a common rulebook and lowering uncertainty, the GATT/WTO architecture reduced governments' incentives to impose high tariffs and thus contributed to the reduction of trade barriers.

Despite the success of the WTO/GATT in locking in past gains, further multilateral liberalisation stalled. The Uruguay Round—concluded in 1995—remains the last fully completed multilateral trade round. Some of the reasons are related to domestic politics. High-income countries had already reduced tariffs to very low levels, while low-income countries still maintained comparatively high tariffs because they were granted special and differential treatment. Given this asymmetric treatment,

not much mutually valuable market access remained to exchange. In the few remaining protected sectors in high-income countries, domestic political economy considerations made further cuts infeasible, especially in agriculture. Coordination costs within the WTO also rose as membership grew, making consensus decision-making increasingly unwieldy. Finally, the WTO's enforcement credibility eroded: the US began blocking WTO Appellate Body appointments already under the Obama administration, and the practice was continued from 2016 onward; by late 2019, the Appellate Body no longer had enough judges to issue rulings. The US argued that the Appellate Body had exceeded its mandate, particularly in rulings that constrained US trade remedies (Bown, 2019; USTR, 2020). Section D discusses the fading commitment of the US to a rules-based world trading system from a geopolitical perspective.

As multilateral liberalisation stalled, countries increasingly turned to preferential trade agreements (PTAs) to liberalise bilaterally or regionally. The number of PTAs increased sharply from three in 1970 to 45 by 1995, to nearly 180 by 2008, and to 375 by 2025 (WTO, 2026). Unlike WTO negotiations, PTAs lower trade barriers only vis-à-vis partner countries, raising trade among members but also diverting trade from non-members (Baier and Bergstrand, 2007; Nagengast and Yotov, 2025).[5] Theory highlights additional motives for PTAs, such as locking in domestic reforms (Maggi and Rodríguez-Clare, 1998; 2007) and reducing policy uncertainty (Limao, 2016; Handley and Limao, 2017). Quantitatively, however, the welfare impact of PTAs is modest compared to MFN-style multilateral liberalisation: The MFN tariff cuts between 1990 and 2010 generated world welfare gains of about 3.2%, while PTA tariff cuts added only a meagre 0.4% (Caliendo et al., 2023). Consistent with this, reforms applied on an MFN basis—for example simplifying customs procedures for all trading partners—tend to deliver larger gains than preferential liberalisation targeted only at PTA members (Mattoo et al., 2022; Felbermayr and Teti, 2023).

Non-policy trade costs

While trade policy barriers fell sharply over the past decades, an equally important development was the steep decline in non-policy trade costs driven by advances in transportation, logistics, and communication technologies. These innovations fundamentally reduced the cost of distance, making it faster and cheaper to move goods and information across borders, which in turn made it economically viable to spread production across countries. Ganapati and Wong (2023) estimate that average transport costs declined by roughly 48% to 62% between 1965 and 2020, with comparable reductions across all major modes—land, sea, and air (Ardelean et al. 2022).

Delivery speed is a key component of effective trade costs. Hummels and Schaur (2013) quantify the importance of delivery speed by showing that each additional day in transit is equivalent to an ad valorem tariff of 0.6% to 2.1%, based on US import data. Time sensitivity is highest for trade in parts and components. Two innovations were particularly transformative: containerised shipping and air freight. Containerisation refers to the standardised use of a 40-foot steel box transferable among ships,

[5] There is considerable heterogeneity across PTAs in the breadth of issues they cover. Some agreements focus narrowly on tariff concessions, whereas "deep" PTAs also regulate investment, services, competition, or intellectual property (Hofmann et al., 2019; Baier et al., 2014; Mattoo et al., 2020).

trucks, and trains. The cost of air transport fell by more than an order of magnitude between 1955 and 2004 (Hummels, 2007), and container prices dropped rapidly after the mid-1980s.

By vastly reducing handling time and improved reliability, containerisation made just-in-time production feasible on a global scale. Lower and more predictable shipping times allowed firms to synchronise deliveries with production, thereby reducing inventories and waste. In manufacturing in the US, for instance, the inventory-to-sales ratio fell from about 1.7 before 1990 to 1.3 between 2000 and 2019 (Ganapati and Wong, 2023). Coşar and Demir (2018) estimate that, absent containerisation, overall Turkish and US maritime exports would have been about 14%-21% lower. Containerisation exhibits strong scale economies: denser routes and added port capacity enable larger vessels and more frequent service, further lowering average shipping costs and improving reliability. Consistent with this, Heiland et al. (2025) show that the 2016 Panama Canal expansion, by allowing larger ships to pass, generated global real-income gains over three times greater than Panama's own by reducing shipping costs worldwide through network effects.

Lower communication costs increased international trade by reducing information frictions. The advances in digital communication reduced the cost of transmitting information across borders sharply. In particular, the expansion of broadband communication networks and the broad availability of real-time coordination tools lowered both fixed and variable costs of maintaining relationships with suppliers, customers, and affiliates abroad.[6] Using data from the late 1990s, Freund and Weinhold (2004) show that greater internet penetration increased bilateral exports, consistent with online communication lowering fixed entry costs by improving information about foreign markets. This parallels a mechanism proposed by Arkolakis (2010), who interprets Melitz-type fixed export costs as marketing expenses that new technologies can reduce. As Rauch (1999) emphasises, such information frictions matter most for differentiated goods, where identifying suitable partners is critical.[7]

Emergence of global value chains

The joint decline in trade policy barriers, transportation costs and communication costs reshaped not only the volume but also the structure of global trade. As goods, capital, and information began to move more freely across borders, firms could coordinate complex production processes internationally and locate each stage of production where it could be performed most efficiently, in line with the mechanisms of comparative advantage. As a result, the production process became increasingly fragmented across countries (Antràs and Chor, 2022). The value chain of Apple's iPhone, for instance, shows this pattern clearly: it is designed in the US, relies on components from Japan,

[6] These technologies diffused rapidly: global internet adoption rose from virtually zero in 1990 to more than 60% of the world's population by 2020, reaching close to 90% in high-income countries but only about 20% in low-income economies (Hjort and Tian, 2025).

[7] Complementing this evidence, Bernard et al. (2019) show that high-speed rail expansion in Japan improved the quality of supplier-buyer matches, suggesting that lower face-to-face communication costs enhance firm performance by enabling better and more efficient matches. Akerman et al. (2022) find that better internet access reduces information frictions and broadens firms' trading networks using Norwegian data—a pattern consistent with both the fixed-cost channel of Freund and Weinhold (2004) and the variable-cost mechanism of Rauch and Trindade (2003), in which improved information lowers matching costs.

South Korea, and Taiwan, and is assembled in China before being exported worldwide. As a result, intermediate goods and components cross borders multiple times before they are eventually assembled into final goods. The rise of global value chains (GVCs) thus represents both a consequence of lower trade costs and a driver of even deeper global integration (see Antràs and Chor, 2022, for an overview).

GVCs amplify both the gains and the potential losses from trade. When intermediate inputs become cheaper, cost reductions propagate through production networks, generating successive rounds of productivity gains. Costinot and Rodríguez-Clare (2014) show that incorporating such linkages raises estimated welfare gains from trade from about 4% in a one-sector model to between 27% and 40%. At the same time, these interconnections increase the economies' exposure to external shocks, as disruptions in one node of the value chain can propagate globally, a vulnerability highlighted during the COVID-19 pandemic (see e.g., Bonadio et al., 2021).

The globalisation of production has reshaped the political economy of trade policy. Firms that operate within GVCs—especially multinational enterprises—often have incentives to support trade liberalisation abroad as well as at home, seeking lower tariffs on intermediate inputs and on components re-imported for final assembly. Empirically, governments use fewer protective measures when GVC linkages are strong, consistent with theory predicting that greater cross-border input dependence reduces protectionist incentives (Blanchard and Matschke, 2015; Blanchard et al., 2026).

The same interconnections make protectionist measures, when they occur, more damaging than in a less connected world. Tariffs imposed on upstream or intermediate inputs raise production costs for downstream firms and cascade through supply chains, domestically and abroad. Bown et al. (2026) show that US antidumping duties on Chinese imports between 1988 and 2016 significantly reduced employment in downstream US industries without offsetting gains in protected sectors. Similarly, Cox (2025) and Lake and Liu (2025) find that the 2002 Bush steel tariffs in the US had negative and persistent effects on exports and employment in steel-using industries, while Handley et al. (2025) document that firms expanded more slowly as input costs rose during the first Trump administration. Strikingly, Cox (2025) finds these negative effects persisted for up to seven years even after the tariffs were lifted. This persistence reflects the fixed costs of establishing supplier relationships and the difficulty of re-establishing disrupted value-chain links.

GVCs thus act as a liberalising force, aligning firm interests with openness but also creating new vulnerabilities when trade becomes weaponised. Section E illustrates how tariff shocks transmit across countries at the business-cycle frequency, including through GVCs.

Trade in services

The reduction in communication and coordination costs expanded the range of services that can profitably be traded across borders. The advances in digital technologies—such as broadband communication networks, cloud computing, and real-time communication tools—now allow firms to deliver business, professional, and information services remotely, turning activities once considered non-tradable into internationally supplied products (Ariu and Cristea, 2026). Examples range from the remote delivery of accounting, design, software, and data-processing services to the cross-border

consumption of education, health, and tourism, the provision of financial and business services through foreign affiliates—such as banks offering lending abroad—and the international supply of specialised professional services through short-term mobility of experts.[8] Nevertheless, trade costs in services remain almost twice as high as in goods (WTO, 2019).

The high trade costs in services amplify the standard selection mechanism among firms, resulting in an even smaller and more concentrated group of exporting firms compared to the case of goods trade. Firm-level evidence shows that far fewer firms export services than goods, and those that do typically serve fewer destinations and product markets, consistent with the higher frictions involved in cross-border services transactions (Ariu, 2016). Services traders also display higher entry and exit rates, but surviving firms grow faster by increasing the number of transactions within product-destination pairs. Firms that trade both goods and services are even fewer in number but account for a disproportionate share of total trade.

A distinctive feature of services trade is its resilience during global downturns. Because traded services rely less on inventories, physical logistics, or trade finance, they are also less exposed to the amplification mechanisms that drive collapses in goods trade. Consistent with this, services exports declined far less than goods exports during the GFC: Ariu (2016) documents this pattern for Belgium, and Borchert and Mattoo (2010) show similar evidence for the US and India. Borchert and Mattoo (2010) attribute the relative resilience of services to three factors: less cyclical demand, less dependence on external finance, and fewer explicit protectionist measures in services. Services trade can even cushion domestic labour markets. For example, using UK data, Magli (2022) shows that services offshoring raises local employment and wages by increasing productivity within offshoring firms and generating positive spillovers to competitors. Finally, firms can adjust how they supply services relatively easily when trade barriers rise. In the context of Brexit, Breinlich and Magli (2024) find that UK firms shifted toward supplying services through foreign affiliates, which helped maintain foreign sales during a period of heightened policy uncertainty.

Within the EU, services markets remain less integrated than goods markets because of fragmented labour-market institutions. Muñoz (2024) shows that the EU's system for temporarily sending employees abroad to perform services for clients enables substantial cross-border trade in labour services that had remained largely unrealised despite the absence of formal regulatory barriers.[9]

[8] For an early overview of the literature on trade in services, see Francois and Hoekman (2010). Given the rapid evolution of the field their survey is necessarily incomplete from today's perspective but remains a useful starting point.

[9] Most of these assignments involve firms in lower-wage EU countries sending workers to deliver services in higher-wage member states, raising sales and profits for firms in sending economies and reducing employment in exposed sectors of receiving countries. This pattern underscores how differences in labour costs and regulations continue to shape competitiveness in services even within the EU's Single Market. In related work, Muñoz (2025) shows that differences in minimum wages and payroll taxes further segment the EU's Single Market: trade in labour-intensive services responds strongly to labour-cost changes, with elasticities above one.

B.3. The stalling of globalisation

Since the GFC, global trade growth has slowed markedly and even stalled (Figure 1, left panel). This change is the result of several causes, with different roles across the EU, the US and China (Figure 1, right panel). Some of the drivers of rapid globalisation were one-off, reached satiation, or waned gradually over time. Other causes for the stalling of trade are related to politics: For example, as the distributional consequences of trade became more salient, the support for further liberalisation weakened, especially in the US. This section reviews how these factors have contributed to the post-2008 slowdown in trade growth.

Structural one-off drivers

Many of the forces that drove hyperglobalisation were one-off in nature. The exceptional expansion in trade during the 1990s and early 2000s resulted from historically unique, non-repeatable events, including the integration of major emerging economies—China in particular—into world trade, the removal of a large part of tariffs, and the reduction of barriers to trade more broadly. Similarly, the scope for additional production fragmentation narrowed as GVCs matured. Once the first big wave of major production reorganisation was completed, the space for further cost-saving relocations declined mechanically. This point is emphasised by Antràs (2020) and supported by evidence that the post-GFC stagnation in global trade largely reflects the deceleration of production unbundling (WTO, 2019). The post-2008 slowdown therefore cannot be attributed to the GFC alone: while it triggered a sharp but temporary collapse in trade, about half of the subsequent weakness reflects a structural deceleration rather than cyclical demand effects (Constantinescu et al., 2020).[10]

Political backlash against globalisation

Political support for liberalisation has weakened especially in the US as voters have increasingly linked their partisan choices to how trade affected them. In the context of the NAFTA, Choi et al. (2024) show that US counties experiencing manufacturing losses shifted persistently away from the Democratic Party—which was closely identified with the agreement—and toward the Republican Party, with especially strong effects among union households and socially conservative voters. Méndez and van Patten (2025) document a similar pattern in a nationwide referendum on the US-Costa Rica FTA: voting outcomes closely mirrored the exposure of voters' employers through direct industry ties and upstream-downstream relationships. Stantcheva (2022) finds that consumers fail to perceive gains from trade, while even modest perceived job risks sharply reduce support for liberalisation. Beliefs about the broader consequences of trade also matter: respondents who think that trade harms workers or raises inequality adopt more protectionist views unless they are confident that

[10] The emerging consensus is that the collapse was driven primarily by a sharp contraction in aggregate demand concentrated in highly trade-intensive sectors, amplified by inventory effects and trade-finance constraints (Bems et al., 2013), and that trade fell more than GDP because the sectors hit hardest, such as durables and capital goods, are disproportionately traded (Levchenko et al., 2010).

redistribution will offset those losses.[11] Taken together, the evidence shows that voter reactions to trade reflect deeper ideological attitudes as much as direct economic exposure.

Trade liberalisation also contributed to broader ideological shifts and rising polarisation. In the US, Autor et al. (2020) show that greater exposure to Chinese import competition led to persistent rightward shifts in voting behaviour, increased consumption of the right-leaning Fox News channel and greater polarisation in campaign contributions. Similar patterns arise across Europe, where import penetration increases support for far-right parties (Malgouyres, 2017; Dippel et al., 2022) and predicts votes for Brexit (Colantone and Stanig, 2018).[12] These results indicate that trade liberalisation can reshape political views at a broad scale, not only because voters blame specific parties for economic losses they associate with trade policies, but also because such experiences trigger deeper and more lasting ideological shifts.

Politicians respond to swings in voters party affiliations and ideological attitudes. Conconi et al. (2014) show that US legislators systematically become more protectionist as elections approach, because the voters who care most about trade tend to be strongly opposed to liberalisation and to place a heavy weight on recent policy choices that they have experienced shortly before elections.[13]

Increased salience of the fragilities implied by cross-border value chains

Repeated global shocks have exposed how the globalised production network depends on a few critical suppliers, a few critical routes, and a few critical inputs. Lockdowns around the world during the COVID-19 pandemic created shortages of medical equipment, some consumer goods, and industrial inputs as firms struggled to replace suppliers. Another type of fragility became apparent when the Suez Canal got blocked due to an accident in 2021, which briefly interrupted a key shipping route. Although these two shocks differed in origin, they both illustrated very visibly that global production is vulnerable to disruptions in specific segments of cross-border supply chains.

Production networks transmit shocks across firms, sectors, and borders, amplifying the effects of local disruptions. For example, while the Great East Japan Earthquake and the resulting Fukushima disaster hit only a small group of Japanese firms directly, many more experienced losses through their links to the affected region (Carvalho et al., 2021).[14] Boehm et al. (2019) document similar patterns across borders: US firms that relied on Japanese intermediates affected by the earthquake reduced

[11] Building on this, Alfaro et al. (2023) show that brief, research-based statements on the benefits of trade—for example scientific evidence that trade lowers prices or raises employment in competitive sectors—can backfire, especially among voters of the Republican Party, increasing support for protection and widening partisan divides.
[12] Colantone et al. (2022) provide an overview of the political consequences of trade and the backlash against globalization, along with a cross-country descriptives for 23 advanced-economy democracies.
[13] Facing this recency-weighted pressure, even generally pro-trade politicians retreat from liberalisation when re-election nears. Hillary Clinton provides a prominent example: during her first term as senator, she voted in favour of four trade-liberalising bills during the early years of her mandate but opposed two similar bills in the two years before she was up for re-election.
[14] Firms with disaster-hit suppliers saw sales growth rates fall by 3.8 percentage points and firms with disaster-hit customers experienced a decline of 3.1 percentage points. The disruption spread through the network, with customers of customers facing a reduction of 2.8 percentage points and suppliers of suppliers experiencing a fall of 2.1 percentage points. These dynamics were not confined to domestic networks.

imports and production because they could not replace the disrupted inputs, and these adjustments caused a noticeable decline in US manufacturing output. Bonadio et al. (2021) study the COVID-19 lockdowns and show that the sudden reduction in labour supply following the COVID-19 lockdowns generated large contractions in global economic activity. Their model implies an average drop in GDP over all countries of about 30%, and they find that foreign shocks account for roughly 23 percentage points of this decline.

Disruptions in one node of the cross-border supply chain network quickly transmit to many others because firms cannot easily switch intermediates suppliers. Empirical studies consistently find very small short-run substitution elasticities across suppliers, including in the context of the Great East Japan Earthquake (Boehm et al., 2019) and the COVID-19 lockdowns in India (Fujiy et al., 2025). Fujiy et al. (2025) attribute this limited substitutability to the high degree of customisation in intermediates, small inventories, and the time buyers need to adjust. The network structure itself amplifies vulnerability: Firms with concentrated sourcing or long upstream chains suffer more when disruptions hit (Khanna et al., 2025). Maintaining redundancy is costly and does not pay off when severe disruptions are rare, which explains why most firms do not diversify much their suppliers. However, firms do engage in multi-sourcing when shocks occur more frequently. For example, following repeated floodings in India firms diversified and relocated their sourcing at substantial cost (Castro-Vincenzi et al. 2025).

China's industrial upgrading and rebalancing

China's rebalancing has lowered its trade intensity. As China moved away from an export and investment-led model centred on manufacturing toward one focusing on consumption and services, a growing share of output shifted into activities that are inherently less trade-intensive. This transition, together with the maturation of domestic supply chains, also led to a substantial decline in China's reliance on imported intermediates: the share of imported parts and components in total exports fell from about 60% in the mid-1990s to roughly 35% by the mid-2010s (Constantinescu et al., 2020).

Much of this reflects the maturation of China's domestic supply chains and industrial upgrading. China's 2015 "Made in China 2025" initiative explicitly aimed at raising domestic content in strategic sectors, reducing reliance on foreign technology, and upgrading core manufacturing capabilities. Because China was a main driver of hyperglobalisation (Figure 1), this inward shift exerts a significant drag on world trade growth.

B.4. Fragmentation of global trade along geopolitical blocs

Changes in global trade patterns since the 2010s reflect a reorganisation of cross-border linkages rather than a uniform reduction (Figure 2). Besides trade, also financial linkages have increasingly reorganised along geopolitical lines. Trade policy has increasingly been driven by geopolitical motivations. This section documents these trends.

The world exhibits increasing *geopolitical* fragmentation. While the number of newly signed multilateral treaties has been declining since the 1970s, the number of new bilateral treaties has also fallen over time (Broner et al., 2025a). Although this decline could reflect saturation rather than

fragmentation, geopolitical alignment measures point to the latter. For example, Boz et al. (2025) show that clusters of countries are drifting apart geopolitically as the cross-country distribution of UN General Assembly voting similarities to China and the US are becoming increasingly bimodal and more concentrated around each pole.[15]

Evidence for increasing *geoeconomic* fragmentation is accumulating. Geoeconomic fragmentation refers to the policy-driven reversal and reshuffling of global networks and the reemergence of economic blocs guided at least in part motivated by geopolitical considerations (Aiyar et al., 2023). Consistent with this pattern, the Global Fragmentation Index of Fernández-Villaverde et al. (2024) shows a recent increase, especially for the sub-component of political fragmentation.

Starting from the 2010s and accelerating after Russia's invasion of Ukraine, within-bloc trade has been growing relative to between-bloc trade. Blanga-Gubbay and Rubínová (2024) show that trade between countries that vote similarly in the UN General Assembly has grown faster than between countries that vote differently, a pattern that holds even when Russia, Belarus, and Ukraine are excluded. Consistent with this, Conteduca et al. (2025) find that between 2021 and 2023 both the US/EU-aligned "West" and the China/Russia-aligned "East" increased import shares from their blocs while sharply reducing imports from the opposite bloc, especially after Russia's invasion of Ukraine (see also Bosone and Stamato, 2024). Gopinath et al. (2025a) estimate that trade between geopolitical blocs has fallen by roughly 12% relative to within-bloc trade since early 2022. Consistent with this, Bonadio et al. (2025) find rising trade costs between and falling trade costs within blocs. Similar patterns extend beyond trade, for example, to cross-border banking and investment-fund activities (Aiyar et al. 2024; Converse and Mallucci, 2026; Niepmann and Shen, 2025).[16]

Developments in foreign direct investment (FDI) may foreshadow future trade fragmentation. Trade patterns reflect past FDI in sourcing and distribution strategies with a time lag. If firms expect the geopolitical environment to change permanently, they adapt their FDI strategy accordingly and thereby contribute to future trade fragmentation. Evidence of fragmentation in FDI along geopolitical lines and the ongoing trend towards reshoring and friend-shoring suggests that the pace of geoeconomic fragmentation in trade might accelerate going forward (Aiyar et al., 2024; Gopinath et al., 2025b; Hudecz et al., 2024).

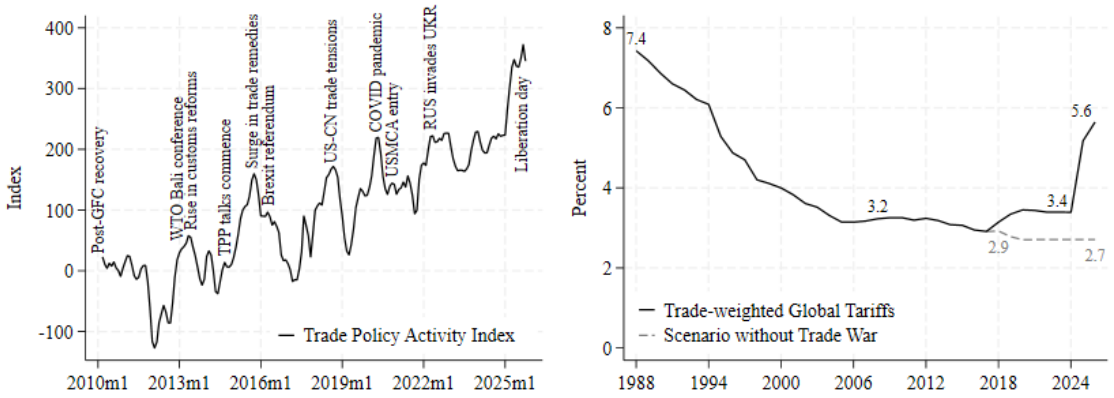
B.5. The rise of geopolitical trade costs

The reorientation of trade along geopolitically aligned blocs implies that the cost of trading across blocs has risen. In a standard gravity framework, trade flows are determined by costs, which means that a persistent change in trade patterns away from geopolitical rivals and toward allies must be driven by a corresponding shift in the underlying cost structure. We refer to these frictions that arise not from geography, tariffs, or regulatory differences as "geopolitical trade costs". The remainder of this section discusses how these costs become manifest in the data.

[15] The EU is commonly viewed as part of the US bloc and Russia as part of the China bloc (Baqaee et al., 2024).
[16] A more comprehensive overview of this emerging literature is provided by ECB (2024) and Colantone (2025).

One indication that geopolitical trade costs have risen is the sharp increase in overall trade-policy activity since 2018. Reflecting the trade-policy interventions by more than 150 countries, the Trade Policy Activity (TPA) Index of Centorrino et al. (2025) has been increasing since the early 2010s. (Figure 3, left panel). This rise does not reflect a generalised tariff surge; for most countries, non-tariff measures have become the preferred margin of adjustment. Non-tariff measures allow more targeted action than tariffs, fit more easily within WTO rules, and attract less diplomatic scrutiny, making them the instrument of choice for governments seeking to act without inviting retaliation (Evenett, 2011). Most of this activity originates in G20 economies, with smaller countries intervening far less.

Figure 3: Trade-policy activity and global tariff rates index over time (2010-2025, 1988-2025)



Source: Centorrino et al. (2025); CEPII BACI database (Gaulier and Zignago, 2010) and Teti (2024).

Note: The left panel plots the Trade-Policy Activity (TPA) Index of Centorrino et al. (2025). The index reflects a global factor estimated using the block structure by trade policy measure category (facilitating and other). The factor is normalised relative to January 2010-December 2011. Positive values indicate heightened activity relative to the baseline and negative values reduced activity. The right panel shows trade-weighted average tariff rates from 1988 to 2025. The solid black line plots observed tariff levels, incorporating all US tariff changes and resulting retaliatory tariffs implemented through August 15, 2025. The dashed grey line shows a counterfactual path that excludes the additional tariffs associated with the trade war escalation starting in February 2018.

The US tariff announcements in 2018 and 2025 are illustrative examples of geopolitical trade costs. US tariffs first rose sharply in 2018, initially concentrated on Chinese exports. In 2025 they were extended to virtually all trading partners. The geopolitical motivation is visible in the context in which tariffs were raised. For example, the US administration conditioned the removal of a 25% tariff threat in early 2026 on Denmark's willingness to cede Greenland, and it imposed secondary sanctions on countries which maintain trade ties with Russia and Venezuela. The timing of the increases in global average tariff rates reflects these US actions and the retaliation they triggered (Figure 3, right panel). For the rest of the world, tariff levels have remained close to their long-run trend.

C. Geoeconomic interaction

While standard trade theory takes geopolitical trade costs as given, geoeconomics explains why they arise. Gravity models recover the increase in bilateral trade costs along geopolitical lines from observed trade flows, and standard trade models can replicate the resulting fragmentation well once those costs are fed in. But neither framework speaks to why those costs emerge in the first place. In standard trade theory, policy is used either to shift relative prices in the home country's favour, exploiting terms-of-trade externalities, or to redistribute income toward politically favoured groups. In both cases the foreign country's behaviour is taken as given. Geoeconomics introduces a qualitatively different motive: the deliberate coercion of foreign governments into actions they would not otherwise take (Mohr and Trebesch, 2025; McGuirk and Trebesch, 2025; Clayton et al., 2026a).

Geoeconomic interactions follow a simple logic: a powerful country steers the behaviour of a target country by issuing credible trade policy threats. The powerful country gives the target country a choice between submitting to its demands and being rewarded or resisting and being punished, and the target country subsequently picks whichever option yields the higher payoff. The powerful country designs the payoffs so that the target country finds it optimal to submit to the powerful country's demands. This section sketches the key ingredients of what Myerson (1991) calls "mathematical models of conflict and cooperation between intelligent rational decision-makers" and shows how the geoeconomics literature deploys these tools to analyse trade policy.

C.1. The basic setup

We start with a stylised two-country setup with fixed endowments and geoeconomic power configuration, full information, and perfect foresight. Countries maximise national welfare in a rational, forward-looking manner. Welfare functions may feature economic and geopolitical components. The geopolitical component captures what the literature calls "geopolitical valence" (Thoenig, 2024; Clayton et al., 2026a): preferences over national pride, moral values, the geopolitical alignment of other countries, or leader ego rents. Geopolitical valence introduces the possibility that the welfare of a small group within a country's political elite can override the general population's welfare in determining geoeconomic interactions. Preferences may differ across countries.

Payoffs and strategies

Countries' payoffs are interdependent: each country's payoff depends not only on its own trade policy choices but also on those of the other country. Each country has a wide range of trade policy actions at its disposal, including tariffs, export controls, subsidies, and sanctions on the restrictive side, and tariff reductions, trade agreements, and market-opening measures on the liberalising side. For simplicity we consider only two policy choices: "collaborating" or "not collaborating", interpreted as reducing or increasing trade barriers. If both countries collaborate, the outcome is cooperation (and potentially integration); if neither does, it is non-cooperation (and potentially fragmentation); if one collaborates and the other does not, the latter behaves opportunistically. Because cooperation can increase the joint surplus, the game is not necessarily zero-sum. When both countries choose

strategies from which neither has an incentive to deviate unilaterally, they have reached a Nash equilibrium. Crucially, both cooperation and non-cooperation can be Nash equilibria for the same underlying game, meaning that fragmentation and integration are both stable outcomes once that equilibrium is selected.

Powerful and target countries

One country may be able to act before the other and credibly commit to a specific policy action for every possible choice of the other country and hence associated payoffs. For example, one country may commit to impose tariffs if the other country does not submit to certain demands. Intuitively, the ability to move first and commit may be rooted in one country being in a geoeconomically powerful position. For example, its geography may be such that it is a bottleneck for other countries' trade, it may control a chokepoint in international supply chains, or it may feature a political system that facilitates domestic coordination on trade policy. We discuss such geoeconomic power in more detail in the following subsections. The ability to credibly commit to a strategy makes this country "powerful" and the other country a "target".[17]

The powerful country commits to offer to the target country the choice between collaborating or not, sometimes referred to as an "inside" and an "outside" option. By doing so, the powerful country implicitly commits to both countries' payoffs for each of the target country's actions. As the powerful country is credibly committed to its strategy, the target country can calculate its payoff for each option. The outside option offered by the powerful country can be viewed as a credible threat. If the threat is credible and calibrated well it remains off-equilibrium, meaning that the powerful country never has to follow through with it.

Geoeconomic interaction

The powerful country calibrates the threat so that the target country prefers collaboration to the outside option. This condition—that submitting to the powerful country's demands and collaborating is preferable to not collaborating and being punished—is the *participation constraint*. When the collaboration payoff strictly exceeds the outside option payoff, the constraint has slack; when the two are equal, the target country is indifferent between collaborating and not collaborating. The powerful country calibrates the threat to make the participation constraint bind. It sets the payoff for the outside option just low enough so that the target country strictly prefers collaboration, steering it towards the equilibrium the powerful country prefers. The slack between the two payoffs is the rent the powerful country can extract: it can, for example, threaten unilateral tariffs unless the target country makes a transfer, but cannot demand more than the slack without violating the participation constraint. In a one-period deterministic setup, a rational powerful country commits to a strategy that leaves no slack in the participation constraint.

[17] Clayton et al. (2026c) study the distinction between coercing the government of a foreign country and individual private firms in a foreign country.

Geoeconomic power

A powerful country has geoeconomic power—the ability to coerce—when there is slack in the target country's participation constraint (Clayton et al., 2026a). The powerful country can extract that slack by threatening to restrict the supply of inputs, limit access to networks or technology, raise tariffs, suspend foreign aid, or freeze foreign assets. Box C.1 describes these geoeconomic tools in detail.

In the short term, geoeconomic power is fixed and shaped by endowments and production technologies. Relevant endowments include natural resources and geographic location. For example, l geography may equip a country with tight control over trade routes. The relevance of production technologies rests on market shares and substitutability, which determine whether the powerful country is a crucial export market or supplier of inputs. Box C.2 explains the causal links between economic dependencies and the exposure to foreign geoeconomic power.

Geoeconomic power reflects both size and criticality. Larger countries tend to have more power because size reduces dependence on foreign sales and foreign inputs and because it provides the economies of scale needed to develop own technologies, infrastructure, and financial networks. But a country can also wield considerable power by controlling something critical that others cannot easily source elsewhere, regardless of its overall size. The two dimensions need not move together. For a discussion of economic power measures see Section D.2.

Box C.1: Geoeconomic promises and threats

A wide range of geoeconomic promises and threats can be mapped into a static small open economy framework. In the model of Clayton et al. (2025b) the target country has separable preferences over consumption and geopolitical action. Its representative producer needs both domestic and imported intermediate inputs. The country can become the target of a wide range of geoeconomic threats (or promises) from a powerful country, ranging from threats of reducing trade over threats of limiting access to technology to outright financial threats.

"Threats Not to Buy" refer to import tariffs, price caps, product regulation, and import quotas. They aim at depressing the export revenue of the target country. The power of such threats hinges on their ability to depress the price of exports of the target country. If no buyer in the world market has market power, then this threat entails no power either.

"Threats Not to Sell" refer to export taxes, export controls, and quantity restrictions. They aim at increasing the cost of imports (and in case of intermediates, the cost of production) for the target country. The power of these threats is larger the harder it is for the target country to source elsewhere or to substitute, and the larger its import share is. On the one hand, if the country issuing the threat has no market power in the world market for a particular product, then this threat is vain. On the other hand, if the exporter is a monopolist and the product is a critical input for the target country—as in the case of a Leontief production function--then the power is large. This makes the rationing of scarce intermediates particularly effective.

"Technology threats" include blocking technology transfers, licensing, and network access. They aim at impairing the productivity of the target country, i.e. affect its production function directly. The power of these threats hinges on the ability of the target country to substitute the technology, develop or build it on its own, or obtain it without licensing by other means. The larger the contribution of the technology in question to the target country's productivity, the more serious is the threat. Examples of critical technologies are cross-border payment and settlement systems as well as global positioning signals.

"Financial threats" include foreign aid, asset freezes, and limits to foreign investment. These aim directly at manipulating the target country's resource constraint by increasing or decreasing the country's (liquid) wealth. It includes direct transfers in the form of foreign aid, cash, credit, and investment. All forms of insurance against shocks affecting the resource constraint, such as lines of credit or central bank swap lines, fall in this category. Inversely, it includes all shades of expropriation ranging from asset freezes over withholding interest up to outright confiscation. The power of these threats is stronger the lower the remaining wealth of the target country, the higher its marginal propensity to consume, the tighter its overall credit constraint vis-à-vis other lenders, and the larger the amount of its assets controlled by the country issuing the threat.

In a dynamic multi-country framework, many additional threats are possible. First, in a dynamic setup, regulatory threats as part of industrial policy have long-term effects. Selective subsidies, for example, are no longer just transfers but shape future dependencies. The same applies to a threat of discriminating FDI. Second, in a multi-country setup, indirect threats are possible. Such a threat to a given country could be, for example, destabilising its trading partners, e.g. by financial transfers to belligerent third countries. Federle et al. (2026) show that trading partners carry a substantial cost of a war even if they are not involved directly.

Box C.2: From dependency to exposure

Mutual dependencies are a defining feature of the international division of labour. At a sufficiently disaggregate level, specialisation inevitably creates trade imbalances across industries. Any such imbalance entails some form of mutual dependency.

Not every dependency implies geoeconomic exposure. The coercion potential of the dependency of a country on a trading partner is limited if national welfare is shielded against coercive action by the trading partner. In this spirit, Baldwin et al. (2023) distinguish securing robustness, i.e. the safeguarding via backups to avoid disruptions (e.g., manufacturing sites in multiple, independent countries, buffer stocks, standardised designs) from achieving resilience, i.e. minimising the time needed to work around the disruption by adaption.

The exposure hinges on how long a country can operate self-sufficiently and on how quickly it can resolve the dependency by substitution. If a shortage of certain products has immediate effects on the target country and if it takes a long time to secure alternative sources or substitutes, then such products, inputs, or entire industries are "critical". The criticality is amplified by an input's relevance

(e.g. via indirect input shares) in a country's output. Criticality can be assessed along the following three criteria:

1. Self-sufficiency, i.e. the duration of existing buffer stock (e.g., supplies, orders), which mirrors lead times, storage life and storage cost.
2. Short-term substitutability

   - across time, i.e. the urgency of demand (e.g., medication vs. wine),
   - across sources, i.e. the immediate availability of alternative goods and service providers or of alternative funding sources,
   - across products, i.e. the immediate availability of alternative (potentially entirely different) products, services or technologies satisfying the same need (Alfaro et al., 2025; Liu et al., 2025).

3. Long-term substitutability, i.e. the time needed for designing substitute products, services, technologies or funding sources, the time needed for reconfiguring the supply chain, and the time to build a national industry.

The exposure to geoeconomic threats is limited if dependencies are not critical. In this vein, there is also no point in reducing "imbalances" as such. To avoid exposure to coercion, it is key to reduce *critical* dependencies or ensure a *balance* in critical dependencies in any fragile bilateral relationship. Accordingly, every country has an incentive to gain control over critical inputs, encompassing not only the control of critical raw materials, but also the control of critical equipment and technology, especially those that are strategic military enablers (Burilkov et al., 2025).

C.2. Anti-coercion and trade-offs

When the one-shot interaction with fixed initial endowments and technologies is extended by a pre-interaction stage, both the target and the powerful country can attempt to widen their strategy space. Both countries can prepare for the interaction stage by taking policy actions that modify payoffs and strategy spaces. Put differently, both can take actions to tilt the geoeconomic power configuration in the later stage when the actual interaction takes place in their favour. Both countries understand that the pre-interaction stage can be used for this purpose. The subsequent one-shot interaction takes the payoffs and strategy spaces set in the pre-interaction stage as given (Clayton et al. 2025a; Becko and O'Connor, 2025; Liu and Yang, 2025).

Anti-coercion policies

In the pre-interaction stage, the target country anticipates coercion and adopts anti-coercion trade and industrial policies to improve its outside option. Such policies take the form of bans or distortions through taxes and subsidies that tilt producers' and consumers' incentives away from dependence on the powerful country. For example, the target country may diversify across supplier and customer

destinations, impose tariffs on critical inputs, or subsidise the development of domestic alternatives to financial services provided by the powerful country (see also Box C.2.).[18]

The powerful country anticipates that the target will try to improve its outside option and therefore has an incentive to preserve or widen its geoeconomic power over the target. It does so through bans, tariffs, or subsidies that reduce the value of the target country's outside option before alternatives can emerge. For example, it may subsidise its own financial services to maximise their market share abroad, thereby locking the target country in and making the development of its domestic alternatives prohibitively expensive.

Exogenous shocks can alter geoeconomic power configurations. A country that was not previously in a powerful position may suddenly find itself controlling coercive power and a target country may find its carefully built anti-coercion strategy obsolete. The shift to electrification and digitalisation illustrates this: China did not cause global rare earth demand to surge, but the surge made its endowment strategically decisive, forcing other countries to scramble to hedge against a dependency they had not anticipated.

Trade-offs in building geoeconomic power

Building geoeconomic power in the pre-interaction stage is costly, as anti-coercion policies distort production and trade away from their efficient allocation. For example, home-shoring or friend-shoring intermediates raises input costs relative to a world without geoeconomic interactions, with significant output effects (Aiyar et al., 2023) and distributional consequences (Clayton et al., 2025c). Whether these costs are worth bearing in part depends on how much weight countries place on geopolitical payoffs relative to economic ones: for countries that prioritise national security or geopolitical alignment, the distortion costs may be a price worth paying (Thoenig, 2024; Clayton et al., 2026a).

Both the powerful and the target country face a cost-benefit trade-off in the pre-interaction stage. For the target, anti-coercion policies reduce the scope for rent extraction by the powerful country (see Box C.3) but also generate losses by distorting trade away from its efficient allocation. The target adopts them only if the reduction in rent extraction outweighs these losses, even if remains nevertheless worse off compared to a world without geoeconomic interactions. For the powerful

[18] Empirical evidence is consistent with precautions and adjustments in response to geoeconomic threats. Clayton et al. (2025d) document that firms typically respond to both the actual application and threats of tariffs by adjusting their supply chains, products, and pricing, and ultimately by exiting markets. According to surveys conducted during 2023, around half of EU manufacturing companies sourcing critical inputs from China were actively reducing supply chain risks (ECB 2023a, p.23), most frequently by substituting Chinese with EU suppliers. Alfaro et al. (2025) document increased innovation aimed at reducing dependency on rare-earth elements after China imposed export restrictions in 2010. Flynn et al. (2025) document increased innovation in response to increases in political risk related to firm imports of critical metals, especially if sourced from non-allied countries. Likewise, Chinese firms become more innovative when they lose access to intermediate inputs due to US export bans (Liu et al., 2025; Han et al., 2024). Crosignani et al. (2024) document that Chinese firms losing access to intermediates due to US export controls reshore supply chains and replace US suppliers by other foreign suppliers relatively quickly. In the same vein, trade via neighbouring economies has been used to circumvent the sanctions imposed on Russia after its invasion of Ukraine (Chupilkin et al., 2025).

country, the rent extracted from the target country must justify the costs of building geoeconomic power (see Box C.3), including distortions that result from industrial or trade policy and non-productive spending such as military expenses. Tariff threats that pursue geopolitical alignment alongside terms-of-trade gains may call for higher optimal tariffs compared to a world without geoeconomic interactions (Becko et al., 2025). Unlike the target, the powerful country can in principle come out ahead if the extracted rent overcompensates the reduction in joint surplus.

The optimal response to coercion is rarely complete decoupling. Attaining complete independence from the powerful country typically incurs prohibitively high. Instead, optimal anti-coercion policy explicitly acknowledges the interdependence between countries, taking the goals and incentives of the powerful country as given and hedging strategically.

Box C.3: Benefits of geoeconomic power

Countries build geoeconomic power to maximise their national welfare. Geoeconomic power contributes to national welfare directly by extracting rents from other countries and, conversely, shielding against such coercion by other countries. In addition, it provides options to flexibly respond in future interactions.

1) Extracting rents from other countries

The fundamental benefit of geoeconomic power is a reduction of the exposure to coercion by other countries, and, conversely, an increase in the ability to coerce other countries. Own geoeconomic power can counterweight own geoeconomic exposure. As the bilateral outcome depends on the relative geoeconomic power of the two countries, investment in geoeconomic power shields against geoeconomic coercion (Liu and Yang, 2025).

The main motivation for using geoeconomic power is the extraction of economic rents. Economic rents can be outright transfers (including payment of excessive prices), but more common are indirect transfers via consumption, production or investment distortions, including a larger share of the gains from trade, and even non-economic rents in terms of geopolitical valence. For example, when bilateral tariffs are already at the bilateral efficiency frontier, a balance of geoeconomic power is necessary to avoid one country enforcing a zero-sum move along this frontier to its own benefit by using, e.g., bargaining tariffs (Mattoo and Staiger, 2020).

Another motivation can be the desire to establish a set of values or other geopolitical valence terms outside of the own legislative sphere. Enforcing a set a code of conduct within a group of countries which are indifferent vis-à-vis these values requires an implicit or explicit coalition. Exclusion from the coalition provides a punishment for violating the coalition's rules, which ensures that the actions expected from coalition members are in line with their incentives. Even within a coalition building geoeconomic power can matter: A powerful country might aim at being a veto power within its sphere of influence, ensuring that no coalition can be built without it. Smaller countries might do the same, with the more modest goal of being a pivotal member.

2) Increasing the option value of future rents

Geoeconomic power has investment characteristics. For the powerful country, it increases the option value of future rents by increasing the slack of the target country's future participation constraint. For the (potential) target country, it reduces the amount exposed to future rent extraction by a more powerful country by shrinking the slack in its participation constraint. Geoeconomic power thereby increases the potential future rents (more positive or less negative).

Geoeconomic power has an option value. Future rent extraction is an option, as it can be adjusted flexibly. This reduces own uncertainty by constraining the set of feasible actions of other countries, which not only reduces the variance of future rents but can more broadly be viewed as an improvement of "national security". For example, additional slack in the participation constraint of other countries makes it more robust to shocks, for example to advances by other powerful countries.

Geoeconomic power has insurance features. By reducing the exposure to foreign threats and creating the prerequisites for own threats, geoeconomic power reduces the slack in the own participation constraint. It thereby acts like an insurance against future rent extraction attempts by other countries.

C.3. The hegemon and multipolarity

A hegemon is a unique, particularly powerful country. The literature uses various definitions of a hegemon. A geopolitically focused definition links hegemony to the ability to coordinate threats across many firms or even countries.[19] For example, Clayton et al. (2025a, 2025b, 2026a introduce a hegemon in a setup with limited enforceability of contracts between firms that trade with each other. The hegemon can coordinate joint threats across many firms against non-compliant firms, potentially beyond its own legal jurisdiction. The capacity to coordinate joint threats is an assumption and may be rationalised with reference to off-model considerations. These may include domestic political economy (Frieden, 2025; Clayton et al., 2025c)[20] and economic size that underpin scale effects that lead to military superiority or ownership of critical networks.[21]

Hegemony

In general, the presence of a hegemon as the single most dominant powerful country reduces the welfare of target countries. Just as in case of the interaction between some more powerful and a less powerful—that is target—country, the hegemon extracts rents from target countries to raise its own welfare. While this lowers the welfare of target countries, it may result in welfare increases for the

[19] Other definitions focus on the size as an export market for smaller countries (Broner et al., 2025; Becko et al., 2025). Smaller countries depend on access to the hegemon's market, and the hegemon exploits this dependency to maximise its welfare by demanding geopolitical concessions.
[20] This includes the difficulty to form—more or less democratic—domestic political consensus for the country's administration to wield geoeconomic power.
[21] See also Pflueger and Yared (2025) and Kim (2025).

hegemon, depending on whether the extracted rents overcompensate the welfare reduction in the inside option that results from anti-coercion policies.

However, the presence of the hegemon may also entail positive externalities that benefit the rest of the world. The hegemon may act as a contract enforcer and thereby improve welfare for some—even if not necessarily all—countries (Snidal 1985; Frieden, 2025; Broner et al., 2025a). Such positive externalities include, for example, facilitating cross-border transactions in payment and settlement networks or international coordination as "world police" (Clayton et al., 2025b). Through its behaviour the hegemon coordinates the world into an equilibrium in which positive production or consumption externalities are realised (Clayton et al., 2025a).[22]

The hegemon itself may benefit from credibly committing to limit its use of coercion, for example through the establishment of institutions that police a rule-based international order (Clayton et al., 2025a). Without such commitment the result may be "over-fragmentation". For example, suppose the hegemon subsidises the use of its financial services abroad. In response, target countries individually adopt anti-coercion policies to develop domestic alternatives. Such uncoordinated anti-coercion policies do not internalise their spillovers on other target countries and end up establishing many small and thereby inefficient financial service industries. This is welfare reducing because of the network-based economies of scale in financial services. To avoid this "fragmentation doom loop", the hegemon may credibly commit to limiting its coercion. For example, the hegemon may establish international organisations that outlaw coercion, such as the World Trade Organization (Clayton et al., 2025a).

The hegemon's geoeconomic power over other countries grows with the size of its coalition. Once coordination among a group of countries in a coalition is established, the hegemon's power is amplified by the expansion of its effective size and criticality. Clayton et al. (2025a) show that more than half of US geoeconomic power rests on amplification of its own power via a "US coalition".

Multipolarity

There can be several hegemons at a given moment in separate spheres of influence. As by definition a hegemon dominates its sphere of interest, there can be at most one global hegemon. Under "political dualism" there are two regional hegemons whose spheres of interest overlap. Some geoeconomic frameworks explore setups in which the incumbent hegemon is challenged by a second, rising great power. These setups give rise to a reshuffling of geopolitical configurations across countries.

The emergence of a challenger hegemon can fragment the world economy into blocks and spheres of influence (Becko et al., 2025; Broner et al., 2025a; Camboni and Porcelacchia, 2025; Clayton et al., 2026b; Meyer and Wesseler, 2026). As a challenger hegemon emerges, target countries weigh the costs and benefits from submitting to one of the two or remaining neutral by not collaborating with any of the two. The optimal choice depends on the relative sizes of the incumbent and challenger hegemon, and the costs to submitting to one or the other, or to none. If the challenger hegemon is

[22] The hegemon is free to decide whether to use its power to exploit the target country or to coerce it to a commonly beneficial outcome. An example of "coercive but still beneficial" (Snidal 1985) use of power is forcing non-performing allies to build up own (e.g., military, technologically, supervisory) capabilities and to strengthen the capabilities of the alliance with it—like in a paternalistic "tough love" challenge.

small and has limited geoeconomic power, only few target countries find it optimal to realign from the incumbent to the challenger. Once the challenger hegemon is sufficiently large the world can fragment into two blocks.

Because of strategic complementarities in target countries' alignment decisions the world economy may exhibit inertia for a long time, but once fragmentation starts it may unfold quickly. Alignment decisions are subject to strategic complementarities because the benefit of (re)aligning for a given target country depends on whether other target countries also (re)align. To prevent realignment, the incumbent hegemon may issue new trade policy threats against target countries that historically aligned, which may appear as alienating former allies. It could, alternatively, also issue promises, or align its own preferences somewhat with those of the courted target countries.[23] Lock-in effects due to networks under the legacy "inside" option delay fragmentation.[24]

A trade war between two hegemons is likely to entail global welfare losses. First, each hegemon may issue equally serious counter-threats, which either leads to a stalemate or even a lose-lose outcome. Second, in the absence of retaliation by one of the hegemons the sheer combined size of the affected third countries may have general equilibrium effects that reduce the welfare not only of the hegemons but also of uninvolved third countries (Mayer, 2025).

Dynamic extensions

The real-world interaction between powerful and target countries is more complex than what the geoeconomics literature has analysed so far. Many aspects of the interactions between countries have a direct counterpart in game theory and will likely be integrated into the geoeconomics literature over time.[25]

Repeated interaction between countries increases the set of possible strategies and gives rise to reputation and robustness considerations. The basic setup introduced in this paper covers the case of a one-shot interaction, potentially with a pre-interaction stage. Box C.4 discusses two consequences of generalising this setup by allowing for repeated interactions. For example, adopting trade policy measures that are sub-optimal in a one-shot interaction may be optimal dynamically as they are necessary to build reputation which underpins credibility. Another example is the robustness of collaboration in the presence of shocks under uncertainty. If the powerful country calibrated its trade policy threats so that it extracts the entire slack in the target country's participation constraint, it might become optimal for the target country to choose the outside option when a negative shock hits.

[23] The success of coordination threats is an important topic in hegemonic stability theory in political science. Due to the inertia of international networks (Keohane, 1982) a hegemon may keep its status even when its relative size shrinks, if it continues to provide key public goods. See Snidal (1985) for an early critique.
[24] Lock-in effects exist both for inside and outside options. For example, any diversification (to increase the value of the outside option) not only incurs the immediate cost of reshuffling the supply chain, but also a future cost of re-specialisation if ever switching back to the inside option.
[25] Consider, for example, the problem of choosing appropriate precautionary measures if the powerful country is known to occasionally act irrationally, i.e. if it chose with a small but positive probability an unintended strategy. Taking the possibility of off-Nash-equilibrium actions into account leads to the concepts of a "(trembling-hand) perfect" (Selten, 1975) and "proper" (Myerson, 1978) equilibria.

Leaving some slack in the participation constraint, i.e., not maximally coercing the target country and appearing benevolent, may be optimal for the powerful country in this case.

A key parameter in a dynamic game is the discounting of the future, which might reflect a key aspect of political preference. The present value of future payoffs determines the effectiveness of threats directed toward future periods, in particular punishment strategies. Furthermore, the stronger the future is discounted, the fewer cooperative equilibria among countries exist according to the folk theorem.

Box C.4: Reputation and robustness

In the following we briefly sketch two issues related to reputation and robustness that seem highly relevant in the current geoeconomic context. Both surface in dynamic games and have not been formally examined in the geoeconomic literature yet.

1) Reputation

Threats and promises can refer to future action, such as e.g. imposing tariffs in the future. A key assumption of a Nash equilibrium and its refinements is that countries, as they are rational, hold correct beliefs about the strategy of the other country. The effectiveness of threats referring to the future thus hinges on their credibility and entails a commitment problem.

With pertinent reputation even unspoken threats have effects. In this case the mere existence of geoeconomic power can change the outcome, acting like a catalyst. Already a shift from unawareness to awareness of its existence, and likewise a variation in the perceived probability of its use changes the relative value of the target country's options for action. The framework of geoeconomics (à la Clayton et al., 2025b) clarifies that it is the expected value of each option that shifts the target country's participation constraint, and thus also credible threats related to the future imply a form of coercion.

In repeated games, investing in commitment and reputation may be profitable. Investing in geoeconomic power signals commitment in carrying out threats and promises in future periods as applicable. Carrying out excessive threats in early periods may build reputation (Kreps and Wilson, 1982), that will pay off in later periods of such a repeated game. This makes excessive threats, which could be viewed as aggression, in early periods more likely.

If the costs of precautionary measures are path-dependent, the country moving first has an advantage. The first mover, for example, could build alliances with countries or secure resources that are thus subsequently not or less easily available for the country moving second. If the time gap between the first move and the second move is sufficiently long, the country moving first might accumulate sufficient geoeconomic power to bring it in the position of a powerful country. This might happen if there is no political consensus in the other country for the need for taking the necessary precautionary measures.

2) Robustness

The geoeconomic equilibrium is stable if neither country has an incentive to deviate from the initially chosen option, often evidenced by the chosen coalition. Yet, in the dynamic game, random shocks such as shifts in political attitudes towards free trade or action by third countries, can continuously change the constraints and preferences of countries, and thereby their payoffs.

For continuous collaboration the participation constraint must always be satisfied. Even if one country has never left the inside option before, its decision not to do so at a given point in time depends in part on the outside payoff from that point in time onwards. In other words, this seemingly cooperative country continuously calculates its counterfactual outside payoff to verify that its participation constraint is satisfied. Even if the inside payoff was unchanged, it would switch to the outside option, if the outside payoff increased sufficiently.

Extracting slack from participation constraints may weaken coalitions and increase thereby overall uncertainty. Less slack increases the risk that a previously binding participation constraint will be violated after some shock. Therefore, the coalition is more fragile, and thus the uncertainty is higher for both countries. A multiperiod notion of stability thus requires some robustness to shocks, which is an issue that has so far not been formally examined by the geoeconomics literature.

In a general setting with shocks to payoffs, it is therefore plausible that under some conditions maintaining slack in the participation constraints is optimal to buttress the robustness of coalitions. Under binding participation constraints, the hegemon would have to monitor the participation constraint of each coalition member country continuously and reduce rent extraction instantaneously if it was violated after a shock. In effect, the hegemon faces a trade-off between rent extraction, monitoring cost, and coalition stability. It might therefore be optimal for it to forgo some rent extraction as shock buffer and deterrent of third countries aiming at breaking the coalition.

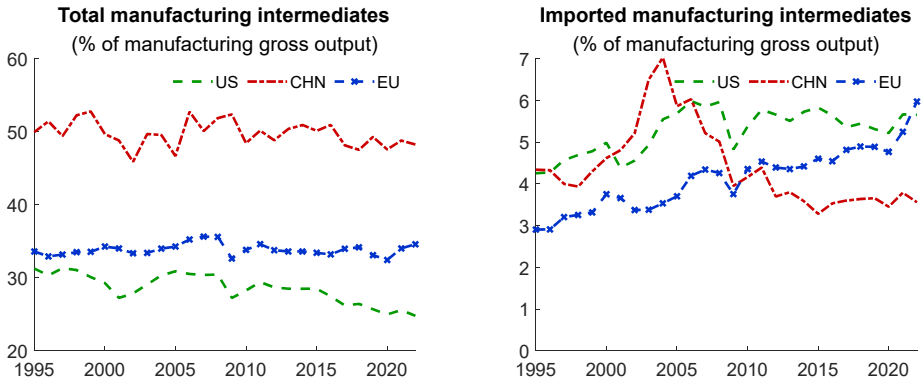
D. Geoeconomic power shifts

This section confronts geoeconomic theory with evidence on shifts in global geoeconomic power configurations to explain the increase in geopolitical trade costs documented in Section B. We first document how trade in intermediate goods between the EU, the US, and China has evolved since the 1990s and show how these patterns have translated into shifts in geoeconomic power. As China has become a critical supplier of intermediate inputs that are difficult to substitute, it has gained leverage over trading partners. We argue that the rise in geopolitical trade costs reflects the response to this shift in power configurations: as the global geoeconomic power balance tilted towards China, the US raised trade barriers in a defensive reaction, contributing to the gradual reorganisation of the world economy into competing geopolitical blocs.

D.1. Trends in intermediates trade

While the US has de-industrialised, China and the EU have not. The decline in the ratio of manufacturing intermediates to total gross output reflects that the US economy has been gradually de-industrialising since the 1990s and until 2022, the last year for which data are available as of 2026 (Figure 4, left panel). For China and the EU this ratio has remained stable, indicating that the industrial base continues to play an important role.

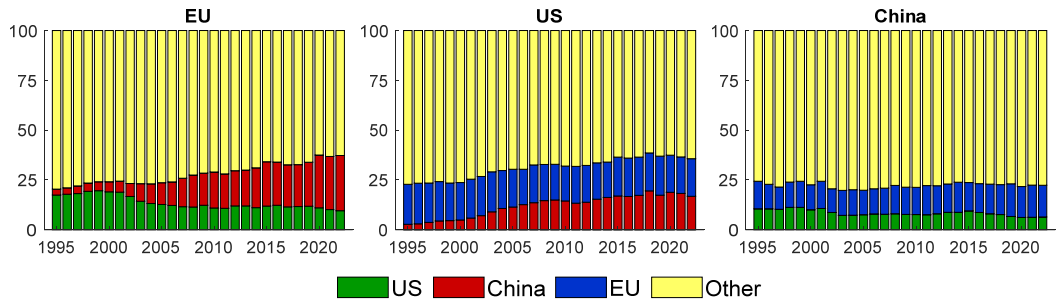
Figure 4: Total and imported manufacturing intermediates (1995-2022)



Notes: The figure adapts Figure 9 in Baldwin et al. (2023) to include the EU and to 2025 ICIO data. The left panel presents the ratio of manufacturing intermediates used to gross manufacturing output, and the right panel the ratio of imported manufacturing intermediates to gross manufacturing output. The data cover the period from 1995 to 2022.

China has reduced its reliance on imported intermediates, while the US and the EU have increased their dependency on the rest of the world. While de-industrialising, the US has become more reliant on imported manufacturing intermediates (Figure 4, right panel). The increasing reliance on foreign manufacturing and domestic de-industrialisation are to some degree two sides of the same coin.

Figure 5: Imported manufacturing intermediates shares by source (1995-2022)

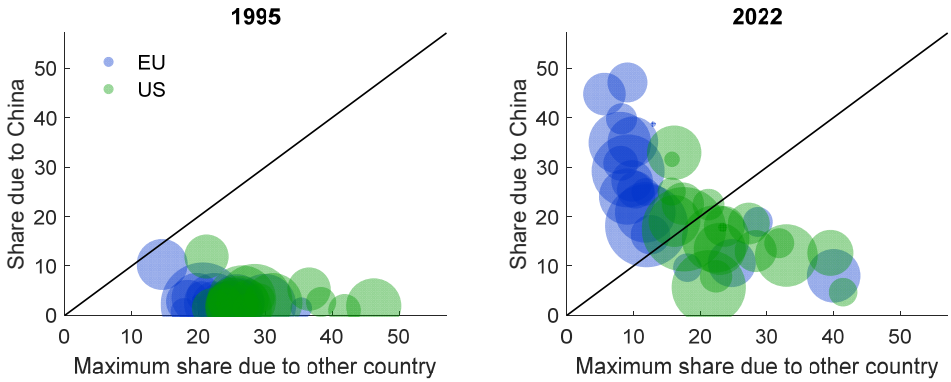


Notes: The figure is based on 2025 ICIO data. Each panel presents the distribution of the origin of imported manufacturing intermediates. Direct bilateral input-output linkages only. The data cover the period from 1995 to 2022.

The EU has been increasing its reliance on imported intermediates even more than the US, but without the de-industrialisation observed in the US. This reflects an increasing specialisation of EU manufacturing, which underlies the EU's prominent role as exporter of manufacturing intermediates. In contrast to the US and the EU, China has reduced its reliance on imported manufacturing intermediates since the early 2000s, driven by the spectacular growth of its economy and the increasing domestic diversification this entailed.

Dependencies between the US, the EU and China due to the sourcing of manufactured intermediates have shifted in China's favour, especially vis-à-vis the US. The share of imported manufacturing intermediates sourced from China strongly increased over time for both the US and the EU after 1995 (Figure 5, left and middle panels). Interestingly, while the EU's dependency on China has been increasing continuously, US dependency on China has plateaued since 2018, which coincides with the trade policy conflict between the US and China that started under Donald Trump's first presidency. The role of the US as manufacturing intermediates supplier to the EU has decreased in parallel with its de-industrialisation, whereas the EU continues to be an important supplier to the US. China's dependency on US manufacturing intermediates has declined, while its dependency on the EU has slightly increased (right panel).

Figure 6: China's role as manufacturing intermediates supplier for US and EU manufacturing sectors
(share of imported manufacturing intermediates)

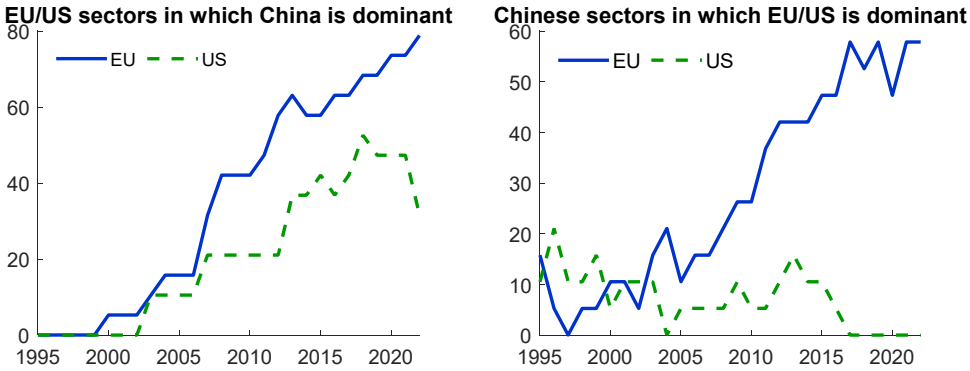


Notes: The figure is based on 2025 ICIO data. The panels compare the share of imported manufacturing intermediates supplied by China to the largest share of imported manufacturing intermediates supplied by all other countries. Blue bubbles present these shares for EU manufacturing sectors, and red circles for US manufacturing sectors. The size of a bubble is proportional to the sector's value added. The left-hand side panel shows statistics for 1995 and the right-hand side panel for 2022. Direct bilateral input-output linkages only.

China has achieved a key role as manufacturing intermediates supplier for the US and the EU in most sectors. In 1995, no US and EU manufacturing sector had China as top foreign supplier (Figure 6, left panel). In 2022, in contrast, China was the top foreign supplier for almost 80% of EU manufacturing sectors. In the US, the share of manufacturing sectors in which China was the top foreign supplier increased too, albeit not as much as in the EU. Continuously increasing since 1995, China's rise as

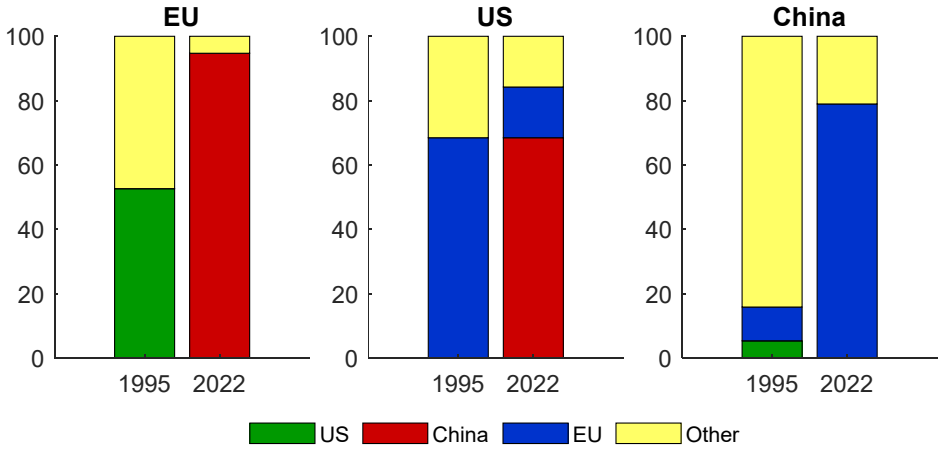
foreign intermediate supplier for the US halted in around 2018, while it increased further for the EU (Figure 7, left panel).

Figure 7: Top foreign manufacturing intermediates supplier shares over time



Notes: The figure is based on 2025 ICIO data. The left panel shows the share of EU or US manufacturing sectors, respectively, for which the top foreign supplier sector is from China. For a given sector in the EU or the US, the top supplier sector is that sector which among all foreign manufacturing supplier sectors supplies the largest share of imported intermediates. The right panel presents analogous statistics for Chinese manufacturing sectors and the number of top manufacturing supplier sectors from the EU and the US, respectively. Direct bilateral input-output linkages only. The data cover the period from 1995 to 2022.

Figure 8: Top foreign supplier shares across manufacturing sectors looking through indirect input-output linkages



Notes: The figure adapts Figures 8 and 9 in Baldwin et al. (2023) and based on 2025 ICIO data. In each panel, the bars are based on the foreign exposure through imports (FPEM) measure of Baldwin et al. (2022). FPEM is constructed at the dyadic sector level. Intuitively, FPEM indicates how much additional inputs a manufacturing sector would need from a manufacturing supplier sector to increase gross output by one unit. For a given manufacturing sector, the top manufacturing supplier sector is that sector which among all foreign manufacturing supplier sectors features the largest FPEM.

For China, the EU has become a more important foreign intermediates supplier across manufacturing sectors, while the US has become largely irrelevant. Just as in the aggregate (Figure 6), the EU has become the top foreign supplier for almost 70% of China's manufacturing sectors (Figure 7, right panel), while the US does not play a key role as supplier in any Chinese sector.

The increasing reliance of the US and the EU on Chinese supplies and of China on EU supplies stand out even more when accounting for indirect cross-border input-output linkages. For example, while in 2022 for about 35% of US manufacturing sectors China was the top foreign supplier based on direct trade linkages (Figure 7, left panel), this share almost doubles to 65% when accounting for indirect production linkages (Figure 8, middle panel). Accounting for indirect production linkages also reveals a somewhat greater mutual dependency between the EU and China, in part at the cost of the US (left and right panel).

D.2. Geoeconomic power based on trade

Any measure of geoeconomic power based on trade needs to account for differences in the criticality of sectors. A sector is more critical if its output is harder to substitute, meaning that the target country's import demand is less elastic in this sector (see Box C.2). In other words, some sectors are more consequential chokepoints in cross-border value chains and can therefore be weaponised more effectively. Furthermore, the criticality of US firms in digital and financial services calls for their inclusion in such a measure.

We measure geoeconomic power using the sufficient statistic introduced by Clayton et al. (2025a), which captures the lost profit of a target country if cut off from the powerful country's supplies. In this measure a low substitution elasticity amplifies the loss. We classify information technology, finance, and telecommunication as critical services because network externalities and scale effects make switching suppliers particularly costly. Accordingly, we assign very low substitution elasticities to (supplies from) these sectors (see Box D.1).

Geoeconomic power configurations between the EU, the US and China based on "threats not to sell"

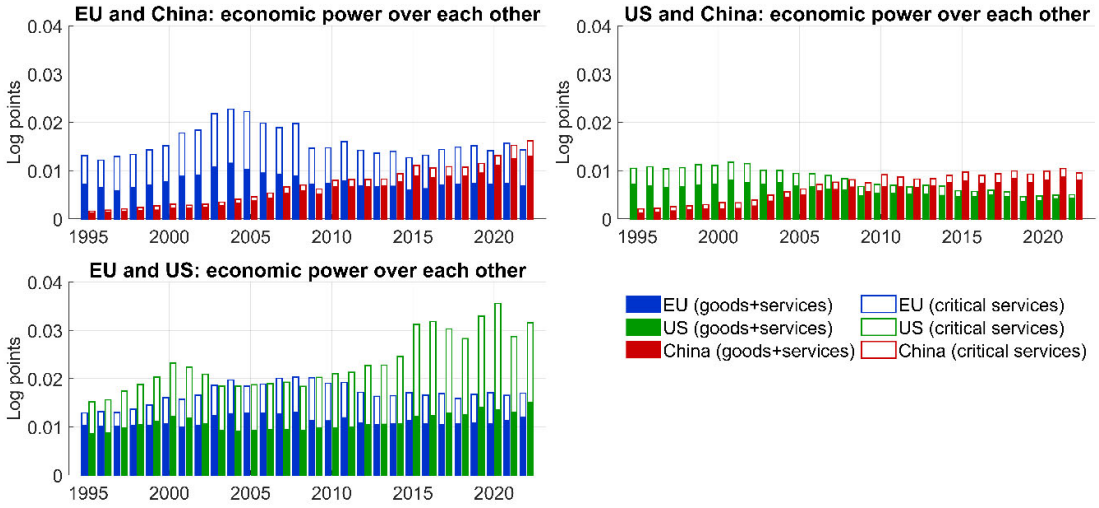
The increasing dependency of the EU and the US on China also stands out when accounting for the criticality of sectors. China has continuously built power over the EU and the US since 1995 (Figure 9, top panels). Almost all this power is based on China's role as an intermediate goods producer, and only very little on its provision of critical services. Many new technologies favour China because they raise demand for critical raw materials (Aiyar et al., 2023). For example, following the principle of comparative advantage, rare earth mining industries prefer to concentrate in countries with abundant deposits, low labour cost, and—if the environmental damage of extraction is large—low environmental standards.

The EU holds geoeconomic power over China due to trade in intermediate goods and critical services. Interestingly, the EU has preserved some geoeconomic power over China through trade. In critical services, it is underpinned mainly by the telecommunication sector and to some extent by information

technology, while finance plays less of a role. In 2022, the geoeconomic power balance between the EU and China based on intermediates trade is roughly balanced.

Since the mid-2010s the US has built considerable geoeconomic power over the EU. Before 2010, for many years the geoeconomic power between the EU and the US was roughly balanced. After that, the US increased its geoeconomic power over the EU especially through critical services. New technologies facilitate the evolution of global economic networks, in particular financial and informational networks. Farrell and Newman (2019) argue that asymmetric network structures create not only new interdependencies between countries, but also power levers for countries controlling the hubs of these networks. Through its control of central nodes, this technology provides the US with a powerful threat to cut off the EU from important network services.

Figure 9: Bilateral geoeconomic power configurations based on "threats not to sell" (1995-2022)



Notes: The figure shows bilateral geoeconomic power arising from "threats not to sell" based on Clayton et al. (2025a). The data cover the period from 1995 to 2022. See Box D.1. for details on the construction.

The bilateral power balance with the US has shifted in China's favour. China's power over the US overtook US power over China in the early-2010s. This also coincides with the evidence of trade fragmentation along geopolitical lines, as indicated by the simple within-bloc trade shares in Figure 2. Interestingly, while US geoeconomic power over the EU has increasingly been based on the provision of critical services, it has not increased power on China through these sectors.

Because the EU is not a federal state, our application of the measure of Clayton et al. (2025a) might overstate its geoeconomic power. Because EU trade policy must be decided jointly by all sovereign member states, the coordination of geoeconomic strategies is more difficult than in the US or in China. A more general caveat is that the trade elasticities used in the calculation of this geoeconomic power measure are hard to pin down in the data. A further challenge is quantifying the trade in services. Finally, the measure does not account for additional hegemonic power levers: US geoeconomic power

in Figure 9 might be understated given its ability —not least due to its unrivalled military capabilities— to coordinate trade policy threats beyond its own legal jurisdiction and across a coalition of countries (see the discussion in Clayton et al., 2025a).

On the other hand, the measure of Clayton et al. (2025a) might understate the EU's geoeconomic power because it abstracts from leverage that results from regulatory power and financial dependencies. For example, under the EU's financial prudential framework Solvency II and the Capital Requirements Regulation US Treasuries carry a risk weight of zero. As this increases the demand for Treasuries, it effectively reduces the cost of financing the large US national debt. This favourable treatment of US Treasuries also entrenches the dominance of the US dollar in the international monetary system, which is a source of US geoeconomic power in itself (and mostly not captured by the measure of Clayton et al., 2025a). Petroulakis and Saidi (2026) estimate that removing the zero-risk weight would reduce demand for US Treasuries by 200 billion US dollars, which corresponds to roughly a quarter of the Fed's major asset purchase program "QE2" launched in 2010. The associated estimated yield increase of more than 10 basis points would raise US Federal interest payments by more than 30 billion US dollars per year.[26]

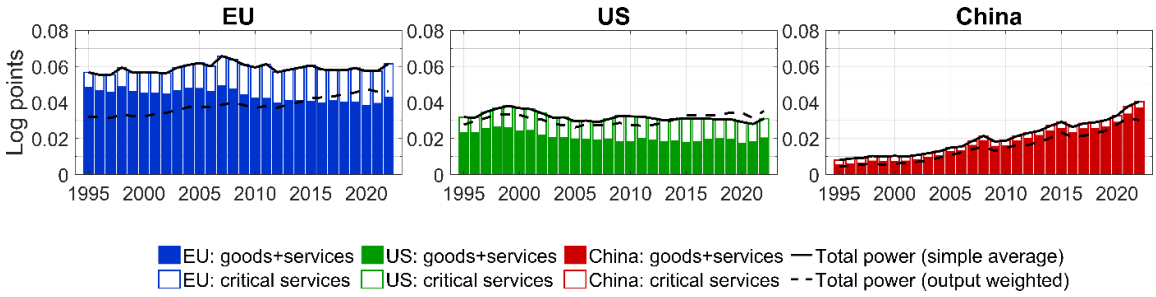
Global geoeconomic power based on "threats not to sell"

The key trends in the bilateral geoeconomic power configurations between the EU, the US and China generalise to the rest of the world. Vis-à-vis countries other than the EU and China, US geoeconomic power has not changed much over time (Figure 10, middle panel). China, in contrast, has gained considerable geoeconomic power over the rest of the world—exceeding US power by 2022--predominantly though the provision of intermediate goods and (right panel). The EU has gained geoeconomic power somewhat; it is noteworthy that the increase in EU power has been disproportionately strong vis-à-vis larger countries (dashed line).

The EU holds geoeconomic power over a large set of countries other than the US and China (Figure 11). Keeping the caveats mentioned above in mind, the EU's geoeconomic power over the rest of the world is larger than for the US and China. It is largest and has grown most strongly over non-EU Europe, sustained by a growing importance of critical services. In Africa, and to a lesser degree also in the Middle East and Russia, the EU's geoeconomic power is large as well, but has declined somewhat over time. While lower on average, the EU's geoeconomic power has increased in the Americas. The EU has least power over the geographically most distant Asia/Pacific region.

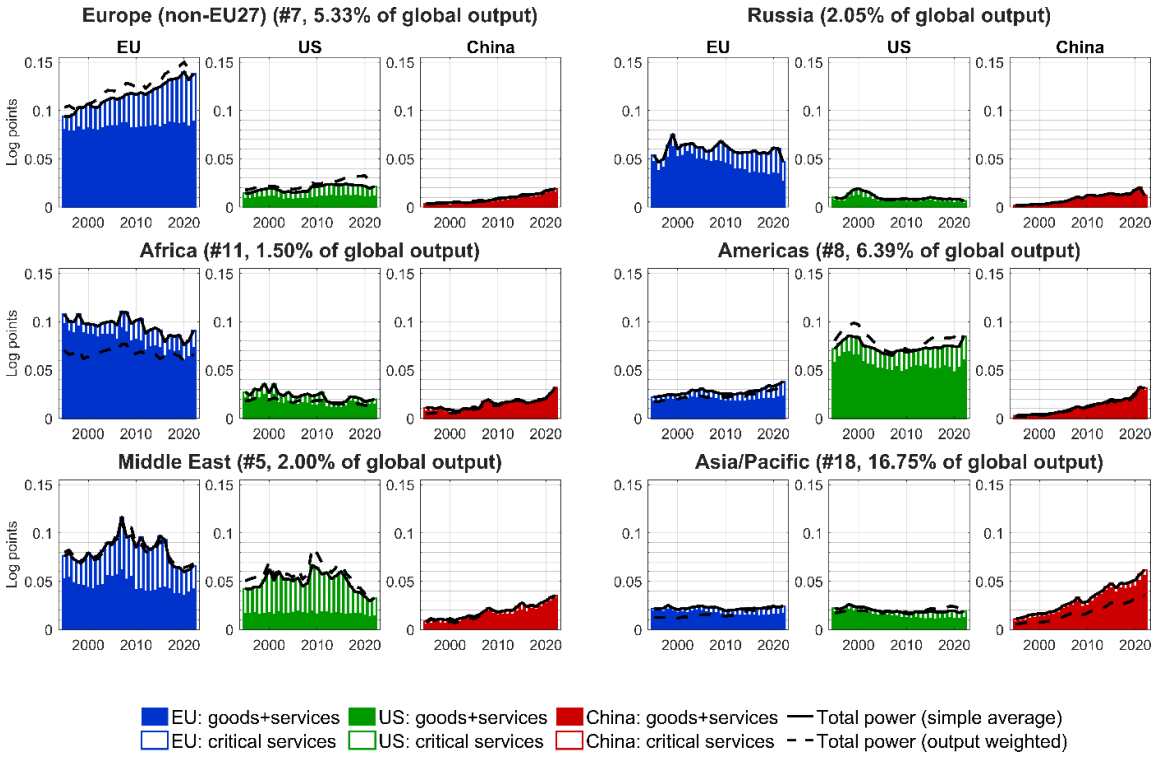
[26] The losses would be much greater if the US dollar were to lose its reserve currency status, as some investors may have feared following the Liberation Day announcement (Itskhoki and Mukhin, 2025; Jiang et al., 2025; Acharya and Laarits, 2026). Jiang et al. (2026) calculate that a loss of reserve currency status would be followed by a depreciation of the dollar by about 10%, and that about 50% of GDP in US dollar bonds currently held abroad would have to be reabsorbed by US investors. This would raise the US real interest rate by 90 basis points, with a welfare loss equal to roughly one year of US GDP. Chahrour and Valchev (2024) and Benguria et al. (2026) provide theoretical analyses of how geoeconomic fragmentation undermines US dollar dominance. Clayton et al. (2026d) discuss conceptually the strategic interaction between the US and China using financial dependencies as power levers, including a potential Chinese threat to sell off US Treasuries.

Figure 10: Global geoeconomic power of the EU, the US and China over other countries in the rest of the world based on "threats not to sell" (1995-2022)



Notes: The figure shows cross-country average geoeconomic power arising from "threats not to sell" over all other individual countries in the sample (excluding the US, the EU, and China) based on Clayton et al. (2025a). These 50 countries account for 34% of global output. The measure indicates the maximum welfare loss a target country would be willing to sustain by satisfying demands from the coercing country before it would be optimal to resist. The data cover the period from 1995 to 2022. See Box D.1. for details on the construction.

Figure 11: Geoeconomic power of the EU, the US and China over selected country groups based on "threats not to sell" (1995-2022)



Notes: The figure shows cross-country average geoeconomic power arising from "threats not to sell" over individual countries in the rest of the world (excluding the US, the EU, and China) based on Clayton et al. (2025a). The measure indicates the maximum welfare loss a target country would be willing to sustain by satisfying demands from the coercing country before it would be optimal to resist. The data cover the period from 1995 to 2022. See Box D.1. for details on the construction.

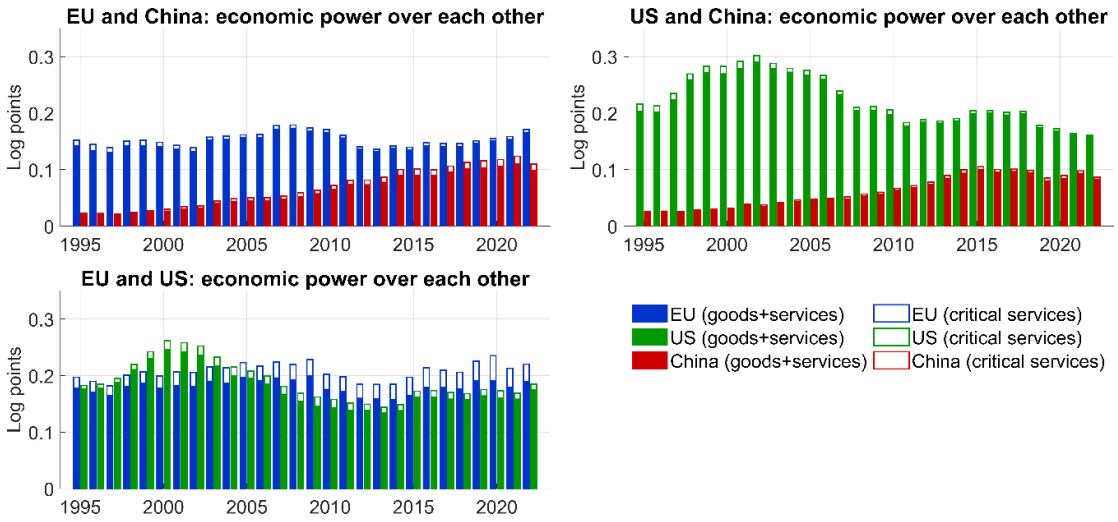
Overall, US geoeconomic power based on critical services over countries other than the EU and China has not grown. This contrasts with the growing prominence of these services in US geoeconomic power against the EU (Figure 9). About one third of US geoeconomic power rests on critical services (Figure 10) and has been largely stable. Digging deeper, Figure 11 reveals that, US geoeconomic power over non-EU European countries and the Americas based on these services has grown only little. US power over the rest-of-the-world has overall even shrunk somewhat (Figure 10).

China's geoeconomic power was low historically but has been rising in all regions of the world. This includes Africa, where Europe continues to have greater geoeconomic power than the US and China. Interestingly, until the end of the sample period in 2022, China's geoeconomic power over Russia remains small compared to that of Europe but is larger than that of the US. In the Asia-Pacific region--in the economically most relevant region outside of the three blocs—China has been holding the strongest geoeconomic power position for more than a decade (Figure 11, lower right panels).

Geoeconomic power configurations based on "threats not to buy"

Just as with "threats not to sell", countries can also wield geoeconomic power by exploiting the role of their markets for foreign exporters using "threats not to buy". In an integrated and specialised world economy a concentration of exports in one market provides that country with a power lever over foreign producers. Shutting down access to its market is costly for its trading partners. This is especially impactful if their exports cannot easily be absorbed elsewhere and even more if the destination country is a large enough market to influence world prices.

Figure 12: Bilateral geoeconomic power configurations based on "threats not to buy" (1995-2022)



Notes: The figure shows geoeconomic power arising from "threats not to buy" measured as a coercing country's market share in the target's exports. We use data from OECD ICIO. The data cover the period from 1995 to 2022.

While China has increased geoeconomic power based on "threats not to buy" strongly over both the EU and the US, the corresponding power of the EU and the US over China remains greater (Figure 12). We measure "threats not to buy" as a coercing country's market share in the target's exports.[27] Especially the US market is much more important for China's exports than vice versa. The less impactful "threats not to buy" might explain why China often refrained from responding to US import tariff threats with retaliatory import tariffs of similar scale. The EU is also a more important export market for China than vice versa, but the resulting power difference is smaller than for the US.

Between the US and the EU the geoeconomic power based on "threats not to buy" is roughly balanced. In contrast to its weak position based on "threats not to sell" discussed above, the EU holds substantial power over the US based on "threats not to buy". In fact, the mere possibility of deploying the EU's Anti-Coercion Instrument in this spirit and the associated financial market responses may have been one reason for the US administration's backtracking from its coercive rhetoric about the seizing of Greenland in early 2026.

Box D.1: Quantifying geoeconomic dependencies through trade within a structural framework

Building on Clayton et al. (2025a), we compute a sufficient statistic measure of bilateral geoeconomic power based on "threats not to sell". In the framework of Clayton et al. (2025a), a powerful country can coerce a target country via a "threat not to sell": it can credibly suspend access to a subset of inputs (potentially inputs from a coalition it coordinates), which leads to profit losses in the target country. As the target country can attempt to substitute to domestic and other foreign sources, the magnitude of its loss depends on the expenditure shares and substitution elasticities of the affected inputs. While these threats are very effective, it is important to keep in mind that these are only one of the many geoeconomic levers available (see Box C.1).

The measure quantifies a target country's lost profit if cut off from the powerful country's supplies. The degree of leverage of the powerful country therefore depends on the target country's ability to substitute the missing inputs (see Box C.2). The ability to substitute, in turn, depends on the share of the powerful country in the target country's imports and the respective elasticities of substitution. It is therefore important to distinguish between sectors whose output is easy to substitute from those for which this is difficult.

We distinguish geoeconomic power arising from the provision of critical services and from power arising from other goods and services trade. Critical services that give rise to network externalities play a pivotal role. Accordingly, we classify information technology, telecommunication and financial services as *critical services*. Firms in each country use these critical services as inputs to production in

[27] This does not into account trade deflection, i.e. the possibility that exporters divert their sales to other destinations.

addition to an aggregate of all other goods and services. Inputs can be sourced domestically or from a range of trading partners. More specifically, consider two sectors $G \in \{C, B\}$, where C denotes critical services and B denotes the bundle of all other goods and services.[28] The final good of a representative producer x_n in target country n is produced with Cobb-Douglas technology using C-sector and B-sector intermediate inputs

$$f_n(x_n) = A\left(x_{nC}^{\alpha_{nC}} \; x_{nB}^{(1-\alpha_{nC})}\right)^{\beta},$$

where α_{nC} is the share parameter, β governs returns to scale and A is the level of aggregate technology. The input bundle of each subsector x_{nG} is a CES bundle of home and foreign varieties

$$x_{nG} = \left(\alpha_{nGn} x_{nGn}^{(\varsigma_G-1)/\varsigma_G} + \alpha_{nGR} x_{nGR}^{(\varsigma_G-1)/\varsigma_G}\right)^{\varsigma_G/(\varsigma_G-1)}.$$

The foreign input composite x_{nGR} aggregates varieties from countries $k \neq n$

$$x_{nGR} = \left(\sum_{k \neq n} \alpha_{nGk} x_{nGk}^{(\sigma_G-1)/\sigma_G}\right)^{\sigma_G/(\sigma_G-1)}.$$

Here ς_G is the elasticity of substitution between home and foreign inputs in sector G, and σ_G is the elasticity of substitution across foreign origins for that sector.

Bilateral geoeconomic power of a powerful country over a target country depends on the latter's expenditure shares and its options for substitution. The target country is assumed to be a small open economy, so prices are fixed.[29] Under this assumption, the loss from being cut off from powerful-country-controlled inputs maps into a reduction of the final-good producer's profits, yielding a tractable sufficient statistic for power. Let Ω_{nG} be the expenditure share of sector G, Ω_{nGR} the share of sector-G spending on foreign inputs and ω_{nGRm} the share of foreign input spending in sector G that is controlled by coercing country m (or by a coalition led by m). The sufficient-statistic for bilateral power takes the form

$$Power_{mn} = -\frac{\beta}{1-\beta} \sum_{G \in \{C,B\}} \Omega_{nG} \log\left[\left(1 - \Omega_{nGR} + \Omega_{nGR}(1 - \omega_{nGRm})^{\frac{\varsigma_G-1}{\sigma_G-1}}\right)^{\frac{1}{1-\varsigma_G}}\right].$$

Power rises in the foreign spending share Ω_{nGR} and in the powerful-country-controlled share ω_{nGRm}, and is amplified when substitution is difficult (low ς_G or low σ_G).

For a given country pair, the power statistic quantifies a target country's aggregate profit loss if completely cut off from the powerful country's supplies. We use the OECD Inter-Country Input-Output (ICIO) tables to calibrate the spending shares. In calibrating the elasticities, we follow Clayton et al. (2025a) and set the elasticity of the composite bundle $\sigma_B = 6$. For parameterising the elasticity

[28] We follow Clayton et al. (2025a) in abstracting from individual subsectors and specifying the elasticities, i.e., in constructing our empirical measures we combine information technology, telecommunication and finance to a single sector C and all other sectors in an aggregate sector B.

[29] In our application, we compute bilateral power among powerful regions as well, e.g. for the EU vis-à-vis the US. For these cases, the measure provides an upper bound.

of substitution for critical services, we use the estimates in Clayton et al. (2025a) and Rouzet et al. (2017). We weight each sector by output according to ICIO data for 2019 to arrive at a composite elasticity of $\sigma_C \approx 2.1$.[30] Also just as in Clayton et al. (2025a), we set $\varsigma_G = \sigma_G/2$, which implicitly assumes that inputs originally provided by the coercing country are easier to substitute by products from other exporting countries than by products from domestic sources.

D.3. What is behind the rise in geopolitical trade costs?

The game-theoretic considerations that underpin geoeconomic interactions have not changed since the 1990s, but the payoffs have. Payoffs can shift exogenously, through changes in the economic environment or in preferences, or endogenously, through policy. When exogenous shifts improve a target country's outside option, a previously effective threat may no longer suffice to coerce it, and the powerful country may escalate to restore its leverage. At the root of the rise in geopolitical trade costs lie exogenous shifts in the economic environment and in preferences. These have altered who controls critical inputs and markets and the perceived strategic significance of dependencies. Together, they have triggered the shifts in foreign and economic policy described in Section B.5 that shape the current geoeconomic landscape.

Shifts in geoeconomic power configurations

Changes in the economic environment shift geoeconomic power by reshaping who controls critical inputs, networks, and markets. Greater economic size reduces dependencies on foreign intermediates and export revenues, increasing coercive leverage. Technological progress matters too: a new technology that raises demand for inputs concentrated in one economy can abruptly elevate that economy to a critical supplier, conferring substantial power without any deliberate policy action. Both forces have operated in China's favour.

China's economic rise and technological progress since the 1990s shifted the geoeconomic power balance away from the US and EU. As China grew relative to Western economies, it became less reliant on foreign intermediates and export revenues, accumulating coercive leverage both as a critical supplier of intermediates that others could not easily source elsewhere and as a large enough market to credibly threaten “not to buy” (see Section D.2; Baldwin et al., 2023; Liu and Yang, 2025). China's growing role as an intermediate input supplier undermines US military robustness and resilience (Kooi, 2025). Mayer et al. (2025) estimate that the cost of a bilateral military conflict has increased for the US but fallen for China. Technological progress amplified this shift as new technologies have made China a key supplier of critical intermediates. Economies relying on inputs predominantly produced in China, such as processed rare earth materials for electrification and digitalisation, have found their dependencies deepening.

[30] More specifically, the corresponding weights in the composite of critical services are 63.8% for finance, 18.8% for telecommunication and 17.4% for IT. The corresponding elasticities are 1.78 in finance (see Clayton et al., 2025a), 2.7 for telecommunication and 2.1 for IT (see Rouzet et al., 2017).

The evolution in relative economic size and industrial capacity of countries changed the incentives for free trade, especially for the US. During the US-led trade liberalisation after World War II geoeconomic interests were temporarily closely aligned across the US and Western Europe. At the time, promoting Western Europe's economic growth through free trade within a rule-based international order was crucial in the US's pursuit of its goals as it generated useful allies in its geopolitical rivalry with the Soviet Union. Furthermore, by submitting to a rule-based regime the dominant hegemon US might have reassured others to open their markets to US imports (Mattoo and Staiger, 2020). In the current situation, however, where China and the EU as larger exporters of manufactured goods reap the larger benefits of free trade, promoting free trade and US interests might be diverging.

The US tariff announcements in 2018 and 2025 illustrate its declining interest in free trade within a rule-based international order as China has been gaining geoeconomic power. US tariffs on Chinese exports rose sharply under the first Trump administration in 2018. These tariffs were maintained and extended by the Biden administration, even if it lifted some tariffs that had previously been imposed on allies such as the EU, Japan, Canada, and Mexico. The bipartisan continuity in trade policy vis-à-vis China across subsequent US administrations reflects the attempt to reduce geoeconomic exposure. The second Trump administration's tariffs on EU goods announced in early 2025 alongside threats over Greenland's sovereignty can similarly be understood as an illustration of a divergence in interests in an environment of shifting global geoeconomic power configurations: After previous US administrations had long asked Europe to gradually assume the costs for defending its interests, only the second Trump administration's escalating trade policy threats resulted in visible initiatives.

Learning about geopolitical preferences of trading partners

Changes in preferences can alter the geopolitical relevance of existing dependencies, changing the payoffs even without a change in trade patterns. A country may learn—sometimes gradually, sometimes abruptly—that a trading partner it treated as like-minded is in fact a geopolitical rival, turning dependencies that once seemed benign into sources of vulnerability.

A country's geopolitical preferences are not directly observable, so the revelation that a trading partner has become adversarial may not come until much later. What game theorists call a country's "type" must be inferred from its behaviour, and this inference is genuinely hard. Due to within-country heterogeneity and leadership turnover the preferences can themselves vary over time. In addition, governments may actively obscure their type through disinformation. Given these complications, gradual learning is the rule. In the West, for example, trade integration with China was long premised on the belief that a growing Chinese prosperity would bring political liberalisation and normative convergence with the West. This prior proved sticky. Large shocks, however, can force abrupt revisions.

Preference revelation has recast the geopolitical relevance of existing dependencies and triggered costly policy responses. Russia's invasion of Ukraine forced a rapid reorientation: energy dependencies that had seemed like mutually beneficial trade relationships were revealed as instruments of coercion, forcing the EU to rapidly and costly unwind its dependence on Russian gas. An example of a more or less genuine preference change is the US, the long-time a guarantor of the

rule-based international order, as it began to show signs of defecting from it.[31] The sustained bipartisan hawkishness on China points to a deeper realignment of the US domestic political economy, driven in part by the distributional consequences of globalisation, while the Trump administration's questioning of Greenland's sovereignty shows how a single leadership change can recast an alliance, i.e. a deliberately chosen structural dependency, into a source of geoeconomic risk.

Bipolarity and threats of realignment

Exogenous shifts in both the economic environment and preferences triggered endogenous policy responses that have reshaped the geoeconomic landscape. Eroding Western leverage prompted defensive action by the US, while China simultaneously built alternative alliances that gave third countries a credible outside option. The result is the bloc-level fragmentation documented in Section B.

The shift in the geoeconomic power balance between China and the US has raised the outside option of third countries, making a change of bloc affiliation a credible threat. Countries in the "Global South" that previously had little choice but to align with the Western-led order can now credibly threaten to realign, weakening the coercive leverage of the US and EU and contributing to the fragmentation documented in Section B (Becko et al., 2025; Broner et al., 2025a; Camboni and Porcelacchia, 2025; Clayton et al., 2026a; Meyer and Wesseler, 2026).

China has actively reinforced its role as an alternative pole through a range of policy initiatives that expand its influence in regions traditionally dominated by the US and its allies. Infrastructure development under the Belt and Road Initiative aims at deepening economic dependencies and cultivating new political alliances (Rolland, 2017). The expansion of China's role as a global lender (Horn et al., 2023; Horn et al., 2025; Gelpern et al., 2025; Kondo et al., 2025) raises its influence in regions traditionally dominated by the US and its allies. The creation of the Asian Infrastructure Investment Bank (AIIB), for example, allows China to challenge historically Western-dominated institutions such as the World Bank by offering alternative funding for infrastructure projects. Through instruments such as the "petroyuan", currency swap lines with foreign central banks, the Cross-Border Interbank Payment System, and the digital yuan, China increasingly embeds the renminbi within global trade, investment, and payment infrastructures, which at the same time reduces its own exposure to US dollar weaponisation (Taylor, 2025). Taken together, these initiatives make China a credible alternative for countries in the Global South seeking to diversify their dependencies, raising their outside option and weakening the coercive leverage of the US and EU.

[31] Country actions laying bare outright contempt for international treaties undermine the availability of binding contracts going forward and thereby the potential of cooperation. For example, US threats of reneging on its NATO obligations or of annexing Greenland cast doubt on its commitment to a rule-based world order. Likewise, the disregard for the security assurances granted to Ukraine by the signatories of the Budapest Memorandum casts doubt on the bindingness of international treaties with explicit guarantees. With the US dropping out as guarantor, contracts between third countries might no longer be binding, which complicates collaboration.

E. Macroeconomic consequences of new trade barriers

Even if the primary motivation for imposing tariffs and other trade barriers was related to medium-run geopolitical goals, they still have consequences for the business cycle. This section explores how different types of trade policies that can be adopted for geoeconomic reasons affect the macroeconomy at home and abroad at business-cycle frequencies and horizons. Throughout the section we focus on import tariffs to illustrate the main transmission mechanisms. The discussion builds on a large literature examining the macroeconomic consequences of import tariffs—a literature that is evolving rapidly in view of repeated US tariff threats.

We start with a discussion of the key mechanisms in the transmission of import-tariff shocks. This is insightful for grasping the role of new trade barriers in general and the role of monetary policy in shaping their effects. As the macroeconomic literature on tariffs focuses on the import-tariff-imposing economy, we pay special attention to the effects of import tariffs on the target economy. In this spirit, Box E.1 illustrates the main transmission channels in a suite of models routinely employed at the ECB for policy analysis, focusing on the euro area as targeted exporting economy in US import-tariff scenarios. Finally, we discuss the macroeconomic consequences of other policy-induced trade barriers, such as sanctions and other fragmentation shocks such as shifts in trade preferences.

E.1. Macroeconomic effects of import tariffs for the imposing economy

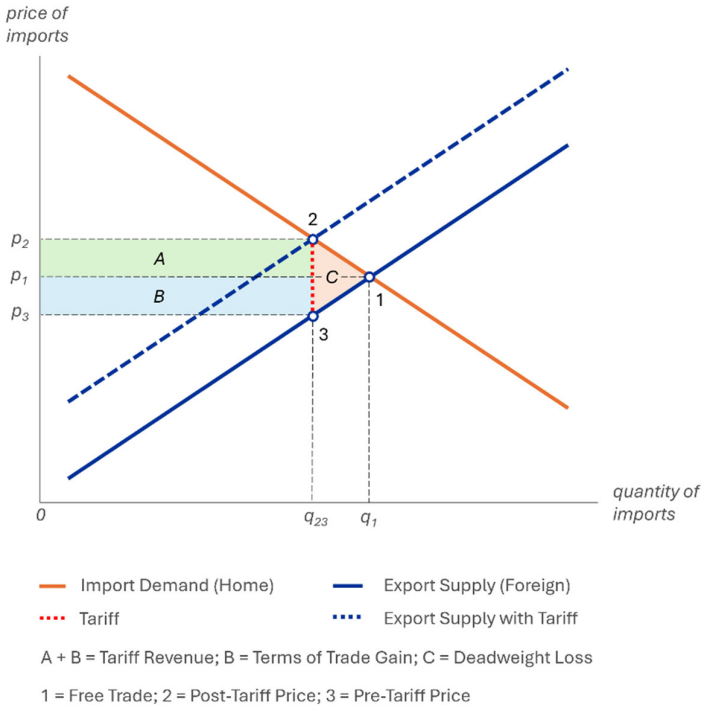
Import-tariff shocks transmit through multiple channels. While their effect on the terms-of-trade is central for the trade balance, their effect on the domestic economy is better understood by viewing them as heterogeneous cost-push shocks with important differences between intermediate and final goods.

Import prices, exchange rates, and the terms-of-trade

Import tariffs reduce import volumes and can shift the tariff-exclusive terms-of-trade. Mechanically, an import tariff on a certain product raises the tariff-inclusive price of that import. This lowers the importer's demand. On the other side of the trade, lower demand for their products may lead exporting firms to consider a price cut, depending on market conditions. (See Figure 13: The corresponding price cut is marked by the difference between free-trade prices, p_1, and prices in the equilibrium under tariffs that firms receive excluding the tariff add-on, p_3.) For an importing country, due to lowering tariff-exclusive import prices, the tariff-exclusive terms-of trade, i.e. the ratio of export to import prices, improve. Interestingly, evidence on the 2018-2019 US import tariffs on Chinese goods suggests that the resulting decline in tariff-exclusive import prices was relatively small, such that tariff-inclusive import prices for US importers increased almost one-to-one with tariffs. At the same time, import tariffs led to a notable decline in US imports from China (Fajgelbaum et al., 2020; Amiti et al., 2019).[32]

[32] The leading explanation for this pattern is reallocation rather than price adjustment. Fajgelbaum et al. (2024) show that China's global exports of tariffed goods remained stable even as shipments to the US fell. Firm-level

Figure 13: Terms of trade gains due to import tariffs



The currency of the import tariff-imposing economy tends to appreciate. How an economy's aggregate terms of trade respond to import tariffs depends not only on tariff pass-through to import prices, but also on general equilibrium forces, such as exchange rate adjustment. When a country imposes a tariff on imports, it reduces demand for foreign goods. All else equal, this causes an increase in net exports, which raises demand for the domestic currency relative to the foreign currency, leading to nominal appreciation. The appreciation of the domestic currency may offset some of the initial effect of tariffs on tariff-inclusive import prices by making imports cheaper in domestic currency terms.[33] In models that incorporate monetary policy (e.g. Lindé and Pescatori, 2019), the response of the nominal exchange rate to a tariff is closely tied to how the central bank reacts to inflation and the

evidence from Jiao et al. (2024) indicates that much of this displaced supply was redirected to the EU, while prices to other destinations remained broadly unchanged. How the EU absorbed this inflow remains unknown, as no study examines whether EU prices adjusted or whether other suppliers simply shifted their sales elsewhere. Survey evidence in Jiao et al. (2024) provides evidence why Chinese firms did not cut prices in the US market: most reported that margins had already been too small to allow further reductions, while others cited contractual rigidity, fear of anti-dumping actions, or confidence in their pricing power.

[33] The strength of this channel depends on how sensitive local-currency import prices are to nominal exchange rates, i.e. the exchange-rate pass through to import prices. For the US, on average, exchange-rate pass-through is relatively small (see, e.g. Amiti et al., 2019; Cavallo et al., 2021) as US imports are typically invoiced in US dollars. Yet, exchange-rate pass-through is heterogeneous across countries and product groups, as, e.g. import prices for intermediate goods sourced from China are very responsive to the dollar exchange rate (Khalil and Strobel, 2025).

output gap. For example, if the central bank follows a Taylor-type rule and responds to an increase in inflation by raising nominal interest rates, as predicted by the uncovered interest rate parity the exchange rate appreciates through capital inflows seeking higher returns. Empirical evidence on the effect of import tariffs on the exchange rate focuses on the US dollar during trade war episodes, confirming that unilaterally imposed import tariffs induce a dollar appreciation (for evidence based on tariff announcements see Jeanne and Son, 2024; Khalil and Strobel, 2024; Ostry et al., 2025; for evidence based on tariff shocks identified in structural vector autoregressions see Boer and Rieth, 2024).[34]

Consumer prices

The extent and persistence of the consumer-price effects of tariffs vary across channels. Consumer prices paid by households are typically not increasing one-to-one with import tariffs. Foreign exporters have incentives to lower their pre-tariff prices (Figure 13). In addition, some of the cost from tariffs may be absorbed in domestic firms' margins along the supply chain, for instance in the retail sector. For tariffs on intermediate goods that are used very upstream in the supply chain, pass-through to consumer prices may be even more constrained. This can be seen by interpreting tariffs as cost-push shocks for the imposing economy, as they affect an economy's production cost (Werning et al., 2025). In such a framework, the extent to which tariffs are passed on to consumer prices depends on real and nominal rigidities in the production and distribution network. Inflationary effects of tariffs hinge on frictions that constrain substitution and markup adjustments (e.g., Auclert et al., 2025).

Product-level evidence on US import tariffs suggests very heterogeneous pass-through to retail prices. Using daily web-scraped prices, Cavallo et al. (2021) find a limited pass-through of imports tariffs on online prices of two large US retailers in 2018-19. Retail prices rose by less than 5% despite full pass-through at the border, which likely reflects a gradual transmission and lingering uncertainty about the persistence of the tariffs. The washing-machine sector provides a different picture: Flaaen et al. (2020) find near-complete pass-through in a highly concentrated market, demonstrating that consumer-price pass-through differs substantially across sectors.[35] Notably, even when price pass-through is incomplete and low, unchanged markups in multi-stage supply chains can amplify cost shocks in absolute terms and leave consumers bearing more than the tariff in absolute dollar terms. Flaaen et al. (2025) demonstrate this in the context of US tariffs on European wine. Using confidential data on prices along the entire distribution chain, they show that foreign suppliers absorbed part of the 25% tariff by cutting export prices by about 5%. Because importers, distributors, and retailers kept their fixed percentage markups at each stage unchanged, the remaining increase in border prices

[34] Ostry et al. (2025) furthermore find that the US dollar tends to depreciate when retaliation by other countries is expected, consistent with the depreciation of the dollar following the US tariff announcements in April 2025. They admit, however, that the accompanying surge in long-maturity US Treasury yields is difficult to explain. Jiang et al. (2025) argue that the observed patterns in this episode are consistent with investors starting to question the role of the dollar as the world's dominant reserve currency.

[35] Early evidence from 2025 is mixed: Cavallo et al. (2025) document retail price increases of 14%–20% after six months, much larger than in 2018, yet still far from full pass-through. Minton and Somale (2025) document full pass-through for that episode in prices underlying the personal consumption expenditure index.

resulted in a larger absolute price increase for consumers than the tariff itself: A wine that cost $5 at the border before the tariff saw a $1.59 rise in its retail price, compared with $1.19 in tariff paid.

The effect of import tariffs on consumer prices also depends on general-equilibrium forces. Tariffs are sector or product-specific shocks that affect prices of products in the tradeable sector on impact, while prices in the non-tradeable sector are not necessarily affected. There are several shock absorbers that could dampen the effects of import tariffs on consumer prices. These include the nominal exchange rate and commodity prices determined globally, which both typically move fast and have the potential to lower aggregate import and thereby consumer prices.[36] Schmitt-Grohe and Uribe (2025) assess the effects of US import tariffs for the domestic economy and find rather short-lived and small inflationary effects in the case of permanent tariffs. Interestingly, in the case of transitory import tariffs, they even find deflationary effects on consumer prices associated with a drag in consumption, indicating intertemporal substitution of forward-looking households.

Trade diversion, reshuffling of supply chains, and FDI

Tariffed imports may be sourced from third countries. According to standard trade theory, import tariffs not only reduce import flows from the directly affected countries. In the case of bilateral import tariffs, as relative prices change, demand shifts toward alternative suppliers in third countries which have not been tariffed. This channel, referred to as trade diversion, induces shifts in trade flows and thereby reallocates production across countries (Caliendo and Parro, 2015; Baqaee and Farhi, 2024). When tariffs are imposed, the possibilities of households and firms to substitute and switch to alternative origins are, however, more limited in the short run (Boehm et al., 2023). They also vary across products and origins (Fajgelbaum et al., 2024; Freund et al., 2024). Recall that this difficulty to substitute in the short run is the foundation of geoeconomic cower discussed in Sections C and D.

Breaking established supply-chain dependencies is hard to do and costly. Reshuffling existing supply chains is costly as sourcing intermediate inputs typically constitutes a matching process that involves negotiations and contracting (Grossman et al., 2024). Imposing bilateral tariffs may lead to costly trade diversion, while not necessarily affecting foreign supply-chain dependencies. Evidence on the US–China tariff episode in 2018-19 shows that they triggered a "Great Reallocation" rather than a reduction in total trade. Selective decoupling from China, for example, often coincided with longer supply chains, as imports of Chinese products increasingly arrive via third countries where an additional production step is performed, rather than directly from China. This pattern is especially pronounced in sectors heavily targeted by US import tariffs, where indirect trade in Chinese goods has grown the most (Alfaro and Chor, 2025). Alfaro and Chor (2023) document that US imports tariffs on China led to a decoupling from China but not from the world, with much of the displaced sourcing shifting to Vietnam, Mexico, and Taiwan. Complementary evidence shows that countries with low

[36] As tariffs typically induce an appreciation of the tariff-imposing economy's currency, import prices decline. A slowdown in goods trade and declining global production of manufactured goods typically coincides with a drop in oil prices (Khalil, 2022), which reduces aggregate import prices. The relative role of these channels in shaping consumer prices in general equilibrium following a tariff hike is unexplored.

wages, strong links to Chinese supply chains, or similar export baskets gained market shares in the US (Freund et al., 2024; Dang et al., 2023; Utar et al., 2023).[37]

Import tariffs may attract FDI as exporters try to avoid tariffs, but they distract FDI when domestic productivity suffers. Tariffs can induce foreign exporters to build up local production through FDI inflows to avoid the tariff ("tariff-jumping", see, e.g. Brecher and Diaz-Alejandro, 1977; Bhagwati et al., 1987). Yet, as import tariffs increase production cost and create inefficiencies, existing FDI in the tariff-imposing economy might be reevaluated and repatriated. Empirical analyses of the relative strength of these two channels are scarce, and the evidence that exists is inconclusive, as it varies across samples and across product categories.[38] FDI might also be redirected as investors choose alternative locations abroad. For example, Xue (2024), Iyoha et al. (2024) and Schulze and Xin (2025) document a rise in FDI in emerging markets in Asia in response to US import tariffs on Chinese goods. This reflects Chinese multinationals' expansion of FDI abroad and now exporting to the US through their foreign affiliates.

Domestic output, labour market and consumption

Local substitution may give rise to expansionary effects. A classic motive for imposing import tariffs is to relocate production to domestic producers. When tariffs are imposed, the relative rise in the cost of foreign products leads to a shift of demand toward domestic alternatives. As with trade diversion, the possibilities to substitute shape the strength of this channel. When substitution towards domestic goods is easier, the aggregate output effects of import tariffs may therefore be more positive or at least less adverse (Kalemli-Özcan et al., 2025). Such expansionary forces are tied to the imposition of targeted import tariffs on final goods (Deutsche Bundesbank, 2020; Imura, 2023; Antonova et al., 2025; Gnocato et al., 2025).

Import tariffs increase costs and lower production in the tariff-imposing economy by raising prices of intermediates. When import tariffs are imposed broadly, they also apply to intermediates, which account for a large share of trade. As intermediates cannot be substituted easily within global production networks—recall again Sections C and D—broadly imposed import tariffs raise their prices and, consequently, production costs for domestic firms.[39] These supply-side effects turn out to be a powerful channel in business-cycle models with intermediate inputs in production and domestic production networks, giving rise to recessionary impacts in tariff-imposing economies (Auray et al., 2025a; Auclert et al., 2025; Kalemli-Özcan et al., 2025; Gnocato et al., 2025; Guerrieri et al., 2025). Evidence on the transmission of US import tariff shocks including the period of the US-China trade

[37] Data from early 2025 indicate that the April 2025 tariff announcements further accelerated this shift. Taken together, the evidence suggests that the tariff shocks unwound much of the US sourcing integration with China, while its global supply chains reorganised rather than contracted.

[38] Empirical studies FDI responses to import tariffs focus mostly on anti-dumping duties (Blonigen 2002; Belderbos, 2004). Moder and Spital (2025) find mixed evidence for the effect of import tariffs on FDI.

[39] Even if (domestic) substitutes were available, (domestic) suppliers could anticipate demand from substitution and raise prices, amplifying the cost pressure for domestic final good producers. The role of strategic complementarities in price setting in response to import tariffs are not yet explored much. Cole and Eckel (2018) study this channel in retail pricing.

tensions in 2018-2019 points to a predominant role of this intermediate input channel for US manufacturing output (Khalil et al., 2026), highlighting the relevance of complementarities in production.

Due to complementarities in production Import tariffs are a drag on labour demand. The effect of higher import tariffs on employment can vary depending on labour market frictions and the configuration of tariffs, yielding, a priori, ambiguous effects on aggregate employment. Relocation of production due to domestic substitution might increase the demand for labour at home. However, when labour is utilised as a complement to imported capital and materials, cost-raising import tariffs depress output and thereby labour demand. Flaaen and Pierce (2024) and Javorcik et al. (2025) show that during the 2018-2019 US-China trade tensions higher input costs and disrupted supply chains outweighed the protectionary effects on domestic producers, inducing firms to reduce employment. This evidence highlights that labour in the domestic manufacturing sector can hardly be supported by import tariffs.

Consumption typically falls in response to tariffs due to higher import prices and reduced real income. Tariffs shift prices for imported goods immediately. Given that retailers pass the price to their customers, consumers face higher prices, which erodes their purchasing power. In addition, consumers may postpone purchases, especially when tariffs are not perceived to be permanent. Consequently, macroeconomic models predict that households lower their consumption (Auclert et al., 2025; Auray et al., 2025a).

E.2. Policy choices and welfare consequences in the imposing country

The effect of import tariffs on the imposing country hinges on other policy choices. In the short run, the imposing country trades off tariff revenue with inflation and a wider output gap. In the longer run, however, potentially positive terms-of-trade effects may be more than offset by capital misallocation and a reduction of varieties.

Usage of tariff revenue

Targeted revenue rebates potentially counteract negative output effects from tariffs. Governments may use import tariffs to generate fiscal revenue. How this revenue is spent, for instance whether it is used for reducing distortive taxation or for lump-sum transfers to households, shapes the transmission of tariff shocks. For example, Alessandria et al. (2025a) show that output is boosted when tariff revenue is funnelled into investment subsidies rather than redistributed lump-sum. Thus, a targeted use of tariff revenues may undo some of the negative domestic output effects previously discussed. If the tariff revenues were successfully used to remove an existing distortion that is larger than the new distortion created by levying the tariffs, then such tariffs could even be expansionary.

Monetary policy response

Monetary policy plays a key role in shaping the macroeconomic transmission of import tariffs. Contractionary effects from import tariffs may be accentuated by a restrictive monetary policy response, for instance if the inflation-targeting central bank of the tariff-imposing economy anticipates

upward pressures on consumer prices while paying less attention to domestic output. More generally, the specification of the monetary policy reaction function is crucial for the transmission of import tariffs (Monacelli, 2025). Against this background, a growing literature focuses on the optimal domestic monetary policy response to import tariffs in New Keynesian models. Werning et al. (2025) argue that tariffs act as cost-push shocks that challenge monetary policy, as the divine coincidence—when stabilising inflation automatically also stabilises the output gap—breaks. The optimal monetary policy reaction is then characterised by a partial accommodation of the shock to smooth the transition to the new (tariff-distorted) equilibrium at the cost of higher short-run inflation. Building on related mechanisms linked to higher production cost due to tariffs, Bianchi and Coulibaly (2025) and Monacelli (2025) arrive at similar conclusions, while stressing the role of fiscal revenues and exchange rates, respectively.[40]

Optimal "macro" tariffs and welfare

Terms-of-trade externalities and tariff revenues are traditional motives to impose import tariffs. For large countries, which have market power in the global economy, unilateral non-zero tariffs are desirable from a welfare perspective (see Section B.2). For instance, the models of Ignatenko et al. (2025) and Itskhoki and Mukhin (2025) imply optimal multilateral tariffs for the US of 19% and 34%, respectively. The intuition for the optimality of tariffs for a large economy goes back to Johnson (1953), who showed that each country acts on its unilateral incentive to improve its terms-of-trade given others' policies. The gains from tariffs materialise in the form of tariff revenues (see Figure 13). Building on this idea, it becomes clear that, if the initial tariff level is low, raising tariffs unilaterally can increase welfare in the domestic economy.[41] Setting the optimal import tariff solves the trade-off between, on the one hand, improving the terms-of-trade and fiscal revenue and, on the other hand, loosing efficiency in the domestic economy due to the higher cost imposed on trade.

Optimal tariffs are closer to zero once short-run effects of tariffs are taken into account. Auray et al. (2025a) find that import tariffs generate a sharp recession in output and reduce consumption, although they still raise welfare as households' utility increases in leisure and so they benefit from the lowering labour supply. In contrast to standard trade models, however, welfare analysis in macroeconomic models recognises that agents dislike recessions. Crucially, as demonstrated by Auclert et al. (2025), when the adverse impact of import tariffs on the output gap is incorporated, the optimal import tariff is closer to zero. Focusing on a different channel, Itskhoki and Mukhin (2025) show that in presence of large initial trade imbalances and foreign-currency liabilities, import tariffs appreciate the exchange rate and induce costly valuation effects, thereby implying much lower optimal tariffs.[42]

[40] In Bianchi and Coulibaly (2025) the optimal monetary policy response is expansionary, giving rise to a depreciation of the currency of the tariff-imposing economy.
[41] In quantitative exercises, these welfare gains may arise due to shifts in the factoral terms-of-trade—that is, the shift in relative wages across countries—as real wages in the tariff-imposing economy rise relative to the tariff-target (Ignatenko et al., 2025).
[42] Itskhoki and Mukhin (2025) also show that the convenience yield on US debt liabilities raises tariff incentives, but if a trade conflict erodes this privilege, low tariffs become preferable. Calibrated to the US, the model implies that with large external dollar liabilities the optimal tariff falls from about 34% to 9%.

The monetary policy rule interacts with optimal tariffs. Auray et al. (2025b, 2025c) highlight that monetary policy can either mitigate or exacerbate the welfare losses from tariffs due to its role for terms-of-trade movements. In their framework, a key motive of governments to impose tariffs is to affect the terms-of-trade, and thus the level of welfare-maximising tariffs critically depends on the monetary policy rule: inflation targeting relative to discretionary monetary policy implies lower optimal tariffs; consumer-price inflation targeting dominates producer-price inflation targeting.

Long-run effects

Rising tariffs limit consumer access to foreign varieties and constrain firms' ability to exploit scale effects. In the *love-of-variety* framework (Krugman, 1980), tariffs, as other trade barriers, shrink the effective size of the market, which reduces the number of available product varieties and raises markups. Firms lose the ability to spread fixed costs across larger sales volumes, which reduces efficiency and competitiveness. As domestic markets become more insular, consumers face higher prices and reduced variety, while firms experience lower productivity due to scale fragmentation. This mechanism highlights that tariffs reverse the static gains from trade integration (see Section B).

The long-run toll of tariffs for the tariff-imposing economy becomes more severe when effects on the capital stock are taken into account. Tariffs on imported investment goods raise their relative prices compared to labour, which reduces demand for capital and shrinks the long-run capital stock (Baqaee and Malmberg, 2025). Eventually this depresses both real wages and consumption. Applying their dynamic quantitative trade model to the US import tariff announcements in April 2025, they show that allowing capital to adjust leads to a 2.6% drop in long-run consumption compared to just 0.6% in a fixed-capital scenario, underscoring that accounting for capital drastically amplifies the negative effects of tariffs. Boer and Rieth (2024) support the role of this capital adjustment channel by evidence that investment in a tariff-imposing country declines persistently.

Import tariffs prevent allocation of capital to the most productive firms and dampen innovation. In the presence of tariffs, less efficient firms remain sheltered from competition (Melitz, 2003). Restricting access to GVCs reduces the exposure to some advanced technologies, which stifles innovation (Aghion et al., 2024). Notably, these channels are typically not captured in welfare analysis on optimal tariffs, which mostly focuses on terms-of-trade externalities and tariff revenues (see Section B).

E.3. Macroeconomic effects of import tariffs for the target economy

In the tariff-targeted economy, lower export demand results in output declines and welfare losses. Higher import tariffs imposed by the trading partner contract external demand for the tariff target, which compresses production and labour income, thereby weakening consumption. The associated inward shift of supply may dampen domestic price pressure. Overall, the tariff acts as a contractionary shock for the domestic economy (Bergin and Corsetti, 2023; Monacelli, 2025).

In the very short run, the anticipation of import tariffs and the build-up of precautionary inventories can boost demand. The sign of the macroeconomic effects of trading-partner-imposed tariffs on exports depend, however, on the timing of policy and policy announcements. Tariffs may be—like

other fiscal policy measures—anticipated as they are often announced in advance. As in anticipation of higher future tariffs firms and households in the tariff-imposing country frontload purchases of durables and investment decisions, export demand in the tariff-targeted economy rises. This is particularly relevant for durable capital goods as well as for products that can be stored in inventories. At the same time, this implies large counteracting effects after tariffs have eventually been implemented (Alessandria et al., 2025a).

The exchange rate and monetary policy play a central role in mediating the effects of tariffs also in the target economy. A decline in export revenues exerts depreciation pressure on the nominal exchange rate of the tariff-targeted economy, which can offset part of the demand loss by improving competitiveness. However, depreciation also raises import prices and inflation, creating a policy dilemma for the central bank (Bergin and Corsetti, 2025).[43]

General-equilibrium effects can cushion the shock. Besides the nominal exchange rate, several other general-equilibrium forces shape the transmission of the tariff shock to the target economy. Even in the most basic setup, tariffs do not just reallocate production from the tariff-targeted economy to the tariff-imposing country in net-zero terms but entail world output losses. This implies lower global demand and, e.g., less upward price pressure in global commodity prices. Likewise, the tariff-imposing economy might experience shifts in sectoral allocation and relative prices. Box E.1 discusses in more detail the role of such general-equilibrium effects—capturing also trade diversion—using a suite of ECB models.

Welfare losses consolidate as productivity in the export sector of the tariff-targeted economy suffers from smaller market size. The negative consequences of higher import tariffs imposed by the trading partner materialise in the long run. Tariffs undermine productivity growth: High-productivity firms lose expansion opportunities through exporting, which weakens selection and factor reallocation toward more productive producers, impairing total factor productivity (TFP) and industry-level growth (Melitz, 2003). Moreover, restricting the export market curtails learning-by-exporting and thereby innovation (Lileeva and Trefler, 2010).

Box E.1: Effects of US import tariffs: Insights from ECB models

Written by Pablo Aguilar García, Alistair Dieppe, Nicolò Gnocato, Makram Khalil, Baptiste Meunier and Carlos Montes-Galdón.

Based on several structural business-cycle models routinely employed at the ECB, we illustrate how US import tariffs affect the euro area macroeconomy. The analysis highlights the major mechanisms that shape euro area output and inflation when the US imposes import tariffs. It also contrasts the effects for the euro area with those for the US.

[43] Like the tariff-imposing country, higher import prices may be amplified domestically in the target country in the presence of pricing complementarities, i.e. when domestic firms respond to prices of competitors abroad. In the same vein, foreign firms may be reluctant to increase prices too much, e.g. in light of an appreciation of the foreign currency, as they compete with domestic firms (Amiti et al., 2014).

Table B.E.1: Baseline scenario: US import tariffs on the euro area and China

Scenario 1: 10 pp US import tariff on EU goods

		ECB-Global	ECB-Base	Aguilar et al. DSGE	Gnocato et al. DSGE	Baqaee-Farhi
GDP (real, %)	**EA***	**-0.11**	**-0.07**	**-0.06**	**-0.08**	**-0.18**
	US	-0.06	.	-0.03	.	0.05
Inflation CPI (pp)	**EA***	**0.06**	**0.01**	**0.02**	**0.01**	.
	US	0.04	.	0.03	.	.
Imports (vol., %)	US from EA*	-7.93	.	-10.99	.	-15.43
	China from EA*	1.08	.	0.00	.	1.80

Scenario 2: 20 pp US import tariff on Chinese goods

		ECB-Global	Aguilar et al. DSGE	Baqaee-Farhi
GDP (real, %)	**EA***	**0.00**	**0.00**	**-0.01**
	US	-0.07	-0.08	0.09
	China	-0.14	-0.12	-0.39
Inflation CPI (pp)	**EA***	**-0.03**	**0.00**	.
	US	0.10	0.08	.
	China	0.07	0.03	.
Imports (vol., %)	US from EA*	1.42	-0.05	3.59
	US from China	-20.21	-28.15	-30.59
	EA* from China	1.75	-0.01	3.60
	EA* from US	-0.40	0.05	-2.60

*Notes: Output and import responses in deviation from steady state, inflation CPI as annual inflation rate. Reported values are the geometric means over a three-year horizon. Tariffs are imposed on all goods except mining. *All models feature the euro area as a separate region, except the Gnocato et al. DSGE model that is calibrated for the EU, consequently the euro area results for the Gnocato et al. model are approximated by the results for the entire EU. The Baquee-Farhi model abstracts from nominal rigidities and is static, i.e. it does not feature dynamic variables such as inflation.*

The models are adapted and calibrated to facilitate an illustration and comparison of mechanisms. Their application in the ECB exploits more model features and uses more nuanced calibrations than we do in this Box. We use a suite of five key ECB models to capture a wide range of channels, which include—depending on the model—bilateral trade flows and trade diversion, nominal rigidities and nominal exchange-rate adjustment, amplification within production networks, as well as sectoral

heterogeneity. We consider two semi-structural models[44], namely ECB-Global (Georgiadis et al., 2021)[45] and ECB-Base (Angelini et al., 2019). ECB-Global covers the world's largest regions, including the euro area, the US, and China, while ECB-Base focuses on euro area dynamics. Additionally, we use two dynamic stochastic general equilibrium (DSGE) models with a detailed production network structure and multiple sectors: the model of Aguilar García et al. (2026) features regions (including euro area, US, and China), while the model of Gnocato et al. (2025) specialises on the EU in a two-county setting with sticky prices and sticky wages, and trade in consumption, investment, and intermediates. Finally, we use the current multi-country, multi-sector workhorse model of international trade developed by Baqaee and Farhi's (2024).[46]

We explore two baseline scenarios, which describe moderate tariff tensions as opposed to a full-fledged trade war. In Scenario (1) the EU is the direct target of US import tariffs as the US increases bilateral tariffs only on EU goods by 10 pp. In Scenario (2) the EU is a third country, as the US increases bilateral import tariffs on goods from China by 20 pp. Throughout the discussion, we refer to results for the euro area instead of the EU.[47]

US tariffs on euro area goods translate into marked declines in euro area exports to the US, lower euro area output and higher consumer price inflation (Table B.E.1). Across models, when the US imposes tariffs on the euro area (scenario 1), US imports from the euro area drop. Consequently, euro area production and output shrink. While the decline of euro area exports to the US is substantial, output repercussions in the euro area remain comparatively modest. Lower demand on the export side may come with dampened price pressure for the euro area. Yet, the semi-structural and DSGE models, both featuring nominal rigidities, predict the overall impact of US tariffs on euro area goods to be mildly inflationary. This reflects higher import prices, which are the result of the dollar appreciating against the euro. The euro depreciation arises from a more restrictive US monetary policy driven by rising inflationary pressures.[48]

Tariffs are sector-specific distortions, which affect some euro area manufacturing sectors more than others, while services slightly benefit. The sectoral models reveal that beyond the mild overall output effects, tariffs reallocate production across sectors. In line with intuition, value added in the more export-exposed manufacturing sector is most heavily affected. In the predictions based on Gnocato et al. (2025), under scenario 1, euro area manufacturing value added declines by 0.33%—a decline more

[44] Semi-structural models capture core structural relationships (e.g., Phillips and IS curves) to give shocks clear economic interpretations while also layering in reduced-form equations to improve empirical fit.
[45] See also Darracq Pariès et al. (2025), who study tariff scenarios with ECB-Global.
[46] ECB staff employed the Baqaee-Farhi (2024) in several applications, see, e.g., Attinasi et al. (2024) and Boeckelmann et al. (2025). The calibration in this box follows Boehm et al. (2023), adopting their estimates for consistency with other models to a three-year horizon.
[47] The euro area results for the Gnocato et al. (2025) model are approximated by the results for the entire EU. Tariffs are imposed on all goods except mining but not on services. We focus on the average responses of deviations from steady states—or annual growth rates in the case of inflation—over a three-year horizon. Tariffs are assumed to persist beyond that horizon. As ECB-Base does not feature an open-economy structure, the ECB-Base simulation builds on the ECB-Global scenario simulation, specially incorporating the path simulated by ECB-Global for the euro exchange rate and global oil prices.
[48] The Baqaee-Farhi model does not include a nominal exchange-rate channel.

than four times larger than for overall euro area output (0.08%). At the same time, value added in the services sector slightly increases (0.03%). This is in part due to households reallocating their labour supply and consumption from manufacturing towards services. Even within euro area manufacturing the effect is markedly heterogeneous. The Baqaee-Farhi model predicts particularly severe output contractions in sectors for which the US is a major export market, such as pharmaceuticals (roughly -5%), electronics, cars, aircraft, and chemicals (all around -1%). Among individual euro area economies Germany would be the most affected.[49]

US tariffs on China lead to trade diversion, yet euro area output does not benefit (Table B.E.1). Under the baseline scenario 2, in which the US imposes tariffs on China only, the euro area experiences very limited output effects. At the same time, there is substantial trade diversion. When the US imposes tariffs on China, euro area production becomes relatively more competitive in the US vis-à-vis US firms facing higher input costs as well as vis-à-vis Chinese firms facing higher tariffs. Yet, the strong tailwind from additional exports to the US is offset by higher euro area imports from China and weaker global demand.[50] As China faces lower demand from the US, prices for Chinese goods decline, providing a competitive advantage for Chinese exporters in the euro area.

For the US as the tariff-imposing country, import tariffs translate into higher consumer-price inflation, while generating a decline in output. In both baseline scenarios, US import tariffs trigger a marked drop in US imports from tariffed countries (Table B.E.1). US inflation rises as higher import costs are passed through to consumer prices. Tariffs fail to raise US real output, underscoring the efficiency costs that stem from the limited substitutability of imports with non-tariffed trading-partner imports and domestic production amid complementarities in consumption and production as well as real and/or nominal rigidities. Except for the Baqaee-Farhi, in all models this translates into US output declines. Interestingly, when the US imposes tariffs on the euro area, the negative output effects are of similar size across country blocks. Only in the Baqaee-Farhi model—due to a strong role of terms of trade shifts and the rebate of tariff revenue—the US exhibits substantial output gains compared to the euro area.[51]

[49] Results at a granular level should be interpreted with caution as the model abstracts from several practically relevant channels, such as pricing-to-market strategies and foreign-owned production. Moreover, a high share of euro area pharmaceutical exports to the US originates from US-owned firms operating in Ireland, mainly reflecting the relocation of US value added for tax purposes rather than actual production in the euro area, implying that tariffs would affect US corporate profits more than output (Emter et al., 2025).

[50] In the Aguilar García et al. (2026) model baseline simulation, trade diversion plays a small role for the euro area as the US can hardly replace inputs from China with euro area inputs. Trade diversion would be stronger in case of a higher trade elasticity with more positive effects on euro area output. Euro area output improves even though global activity weakens, because substitution dominates demand-loss effects. More generally and across models, the strength of trade diversion hinges critically on the assumptions on substitution elasticities.

[51] The Baqaee-Farhi model can generate positive GDP effects for the tariff-imposing country through a "factoral" terms-of-trade channel: by improving the relative price of domestic factors (e.g. wages) vis-à-vis foreign ones, tariffs can increase domestic output. However, as noted in Baqaee and Farhi (2024), this mechanism represents a theoretical upper bound that relies on the model assumptions of flexible prices and mobility of production factors across sectors. Moreover, as household saving behavior is not explicitly modelled, the lump-sum tariff rebate is implicitly assumed to be fully consumed, reinforcing the boost to output. When nominal rigidities like

Tracing how import tariffs propagate through production networks highlights euro area vulnerabilities. The position of a sector within the input-output structure—whether upstream or downstream—governs the extent to which shocks are amplified. In the tariff-imposing economy, import tariffs on goods in upstream industries (such as, e.g., metals) cascade through several stages of production, while negative effects from tariffs in downstream sectors (such as, e.g. car manufacturing) are more contained. On the contrary, for the euro area as the tariff-targeted economy, foreign tariffs imposed on downstream sectors are more harmful due to a large share of these goods in total exports, and as there may be negative demand spillovers to euro area upstream sectors, even if upstream sectors are not directly affected by tariffs.

Table B.E.2: Alternative scenarios: Targeted US tariffs on euro area exports

50 pp US import tariff on EA metals vs. automotive exports (Baqaee-Farhi model)

	Automotive	Metals
EA manufacturing output (real, %)	-0.50	-0.03
EA exports to US (vol., %)	-4.43	-0.45
EA total output (real, %)	-0.14	-0.01
EA GDP (real, %)	-0.08	-0.01

Revenue-equivalent US import tariffs on EU* final goods vs. intermediate goods exports (Gnocato et al. DSGE model)

	Final goods	Interm. goods
EU manufacturing value added (real, %)	-0.72	-0.04
Total EU exports (vol., %)	-2.00	-0.14
EU GDP (real, %)	-0.16	-0.01

*Notes: Averages over a three-year horizon. Top panel: Simulations based on the Baquee-Farhi model. The column "Automotive" assumes US import tariffs of 50 pp. on products (incl. parts) in the automotive sectors for all trading partners; the column "metals" assumes US import tariffs of 50 pp. on products from the metals (steel, aluminium, copper) sector for all trading partners. Lower panel: Simulations based on the Gnocato et al. model with US import tariffs targeting either only final goods or only intermediate goods. The shock is scaled up according the steady-state share of final or intermediate goods in overall EU exports—i.e., in a way that the steady-state revenue is the same as under the baseline scenario (i.e. a 10 pp increase in US import tariffs on all EU goods). *The Gnocato et al. DSGE model is calibrated for the EU, consequently the results refer to the entire EU.*

US tariffs targeting only key euro area final goods exports can harm the euro area economy. We first use the Baqaee-Farhi model to run a scenario of US tariffs targeting upstream sectors (50 pp import

sticky wages, incomplete pass-through, or constraints on factor mobility are incorporated, the output effect vanishes or becomes negative.

tariffs across trading partners on metals only, namely on steel, aluminium, and copper[52]) complemented by a scenario of US tariffs on downstream industries (50 pp. tariffs only on goods classified as "transport equipment: cars and aircraft"). The simulations suggest that for US output tariffs on metals are less beneficial than tariffs on cars.[53] In the euro area, sectoral tariffs on the transport equipment industry cause larger aggregate output losses than tariffs on metals. This reflects the relatively higher exposure of this sector to the US market due to a large US share in the sector's exports as well as strong sectoral value-chain linkages with the US. This is reflected also in the larger fall of euro area exports to the US (Table B.E.2, upper panel). In a second analysis, we use the framework of Gnocato et al. (2025) and build two alternative scenarios: (a) the US imposing tariffs on all final goods imports but not on intermediate goods, and, alternatively, (b) the US targeting only all intermediate goods.[54] When the US targets final goods, euro area exports and manufacturing output are substantially more affected and output losses are larger (Table B.E.2, bottom panel). The effects reflect that in this model final goods are easier to substitute than intermediate goods.

E.4. Other channels related to tariffs

Retaliation is not necessarily the optimal response to import tariffs. Governments of tariff-targeted economies may desire to limit the adverse effects for domestic firms that export tariffs cause. The most natural option are *quid-pro-quo* tariffs which counteract some of the terms-of-trade externalities and exploit tariff revenues, thereby cushioning part of the original effects. Yet, retaliation is not necessarily optimal. This can be seen in Table E.1, which builds on Box E.1 by comparing a scenario in which the tariff-targeted economy (i.e. the EU) retaliates to a scenario in which it does not.

If rounds of retaliation spiralled into an all-encompassing trade war, GDP losses could multiply. Even a single proportionate EU retaliation equalling the baseline 10 pp US import tariff (as considered in Table E.1) increases GDP losses by up to one half for either country. Retaliation is particularly harmful in models with intermediate inputs in production, which, as discussed before, imply cost-push type effects of retaliatory tariffs.[55] Rotunno and Ruta (2025) compare different policy options in response to US import tariffs, including retaliation by imposing counter tariffs, domestic industrial policy (e.g. subsidies), or increased trade integration with other countries. They find that, while retaliation and

[52] This scenario imposes import tariffs on goods in sectors under the classifications "steel", "aluminum" and "copper". It does not extend to other sectors that contain these metals as inputs.

[53] As metals are key intermediate inputs, their higher costs propagate through downstream manufacturing. For instance, production in US automotive declines drastically (-1.2%) and also other manufacturing production is markedly hit. These results suggest that tariffs on upstream, hard-to-replace inputs impose the greatest efficiency losses on the tariff-imposing country.

[54] Both cases assume shocks of similar size to the baseline scenario, see footnote of Table B.E.2.

[55] While this channel that discourages retaliation is active in the baseline version of the Baqaee and Farhi (2024) model, it is outweighed by the benefits of retaliation, namely improving the terms-of-trade and raising fiscal revenues. In a related scenario study, Darracq Pariès et al. (2026) find that in a US-Chinese trade war that extends to euro area goods, higher euro area tariffs could be welfare improving.

subsidies may partially offset welfare losses for some of those partners, deepening integration with third countries raises welfare the most.

Table E.1: The role of tariff retaliation in a suite of ECB models

GDP effects of a 10 pp US import tariff on EU goods (with and without equal EU retaliation)

GDP effects (real, %)		ECB-Global	ECB-Base	Aguilar et al. DSGE	Gnocato et al. DSGE	Baqaee-Farhi
without EU retaliation	**EA***	-0.11	-0.07	-0.06	-0.08	-0.18
	US	-0.06	.	-0.03	.	0.05
with EU retaliation	**EA***	-0.15	-0.05	-0.08	-0.24	-0.14
	US	-0.12	.	-0.05	.	-0.01

*Notes: Based on scenario analysis in Box E.1. Reported figures constitute the geometric mean over a three-year horizon. Tariffs are imposed on all goods except mining. *All models feature the euro area as a separate region, except the Gnocato et al. DSGE model that is calibrated for the EU, consequently the euro area results for the Gnocato et al. model are approximated by results for the entire EU.*

Tariff uncertainty entails negative effects on trade, output and investment. A crucial feature of trade policy—especially in the US Trump administrations—is tariff uncertainty. In presence of tedious negotiations and disagreements with trading partners, predicting the direction of future policy is particularly hard. Alessandria et al. (2025b) embed time-varying tariff risk and firm-level heterogeneity in an open-economy model and show that heightened policy uncertainty and expectations of recurring trade wars reduce aggregate trade.[56] Both the intensive and extensive margins matter, as uncertainty over future tariff rates discourages entry into new export markets (Crowley et al., 2018). In a similar vein, WTO (2025) uses its Global Trade Model to simulate the combined effects of the tariff measures announced in February 2025 and the rising trade policy uncertainty. In that model, uncertainty is reflected in a mechanism in which firms anticipate possible future tariff increases relative to applied and MFN rates, which effectively raises trade costs and discourages investment in export markets.

The effects of tariff and trade-policy uncertainty are similar to those of an adverse macroeconomic shock that lowers global investment and output. Focusing on macroeconomic effects, Caldara et al. (2020) and Boer and Rieth (2024) find that trade policy uncertainty depresses business investment and activity, with effects transmitting internationally through trade and financial channels. For countries that issue safe-haven currencies, trade policy uncertainty induces an appreciation (Khalil and Strobel, 2024). For the US, in particular, this effect might counteract its attempts to improve competitiveness by raising tariffs.

[56] Simulations on the 2018-19 US-China trade tensions extended to 2050 suggest that even after tariffs normalise lingering expectations of future trade conflicts keep US output and trade below their initial trajectories, implying a lasting drag on global economic integration.

E.5. Macroeconomic effects of sanctions, de-risking, and other trade barriers.

New trade barriers beyond tariffs arise in many forms. To achieve geopolitical goals, governments may use several trade policy measures apart from tariffs, most prominently sanctions, trade restrictions and regulations. Households and firms incorporate geoeconomic dependencies and risks into their decision-making, which creates additional obstacles to international trade (ECB, 2024).

For the imposing country most new trade barriers are more harmful than tariffs as they do not generate fiscal revenues. While such barriers create distortions to international trade flows just like tariffs, they do not generate fiscal revenue on either side of the transaction. But they still change the terms of trade because of the shifts in demand or supply, which complicates the analysis of relative gains and losses across trading partners. The relative cost of such trade barriers for the imposing and the target countries mirrors their relative geoeconomic power within the affected sectors. Such trade-based measures of relative power thus complement the power indices of Section D.2, which capture only one dimension of such power. Recent literature has attempted to shed light on the macroeconomic transmission of such trade barriers, especially for sanctions.

While trade sanctions may come with large costs for the target economy, they are also costly for the imposing economy. Ghironi et al. (2025) model sanctions in a two-country setting, in which the home country ("Home") specialises in downstream consumption goods (e.g. the EU in cars) and the foreign country ("Foreign") in upstream production (e.g. Russia in energy). When Home imposes import restrictions on Foreign-produced consumption goods excluding commodities, both consumption and output in Foreign fall considerably, yet Home welfare declines even more than Foreign welfare. In case of a total ban on commodity trade (i.e. upstream production goods), welfare is depressed more substantially in Foreign. Home also suffers losses, for instance via higher costs of inputs, although in this case typically less than Foreign. Interestingly, the largest welfare cost for Foreign stems from Home *export* restrictions on consumption goods, i.e. on goods in which Foreign has a comparative disadvantage. Intuitively, if Home has a comparative advantage in the production of consumption goods, it is harder for Foreign to substitute to domestic alternatives.[57]

International coordination increases the effectiveness of sanctions in terms of reducing the welfare of the target economy considerably but is hard to achieve. This mirrors the cost of coalition building described in Sections C.3 and D.2. Ghironi et al. (2024, 2025) develop a three-region model that distinguishes sanctioning economies (e.g. the EU, UK, and US), a target economy (e.g. Russia), and third countries (e.g. China, India, and Turkey). Their results highlight the pivotal role of third countries: if they refrain from joining the sanctions, target economies suffer considerably smaller welfare losses,

[57] Ghironi et al. (2025) discuss the key role of real exchange-rate adjustment: trade sanctions on consumption goods tend to depreciate Home's real exchange rate (as Home's export prices rise and Foreign's import demand shifts), while energy-trade sanctions tend to appreciate Home's real exchange rate (due to reallocation and relative price effects of inputs). Lewis and Puangjit (2025) assess the role of sanctions in addition to geopolitical risk in a small open economy matching observed dynamics for Russia, including inflationary pressure, output contraction, and rising interest rates

while the sanctioning economies face larger welfare contractions. At the same time, third countries gain from diverted trade and investment flows, making cooperation on sanctions hard to achieve.

Sanctions influence nominal exchange rates via distinct currency demand and supply channels. Itskhoki and Mukhin (2025) show that import sanctions tend to appreciate the domestic currency (by reducing demand for foreign currency), while export sanctions depreciate it (by curbing supply of foreign currency), even when both yield identical effects on welfare and fiscal revenue.[58] Beyond that, rising precautionary demand in the target economy for foreign currency in the face of uncertainty further depreciates its exchange rate unless offset by its central bank selling reserves or financial repression of foreign-currency saving.[59]

Supply-chain reorientation due to de-risking may act like an import tariff without generating revenues. In Clancy et al. (2024), a relocation or localisation shock is implemented as a gradual, permanent shift away from imported intermediate inputs (used in export production) toward domestically produced (reshoring) or "trusted-partner" (friend-shoring) inputs, mimicking non-tariff measures like local-content rules. This reorientation initially raises production costs, pushing up inflation and causing a real effective exchange rate appreciation that erodes external competitiveness. In this model, resources move from tradable to non-tradable sectors and aggregate output falls during the transition.

Fragmentation shocks reduce trade and output but have ambiguous effects on inflation. New trade barriers might arise as the world fragments into blocs along geopolitical lines, which results in lower trade and output for the affected economies (ECB, 2024). Cuba-Borda et al. (2025) show that such new trade frictions increase costs of intermediate inputs and feed into headline inflation with notable lags. Consequently, new trade barriers can lead to sustained domestic inflation pressures. In line with this evidence, Ambrosino et al. (2025) show that higher import prices due to fragmentation shocks can transmit inflationary pressures via higher costs in the tradable sector. However, this requires that the trade barriers arise unexpectedly. If import prices increase only gradually, there might even be disinflation at lower frequencies as forward-looking agents reduce consumption and save in anticipation of future income losses.

F. Europe's geoeconomic position and options

The US-China rivalry entails difficult choices for the EU and many middle-powers. For middle-power economies, the strategic choices are the hardest: They are large enough to be worth coercing, yet without the power to shape the international order on their own terms. While the EU is larger than

[58] Eichengreen et al. (2024) present empirical evidence consistent with these predictions.
[59] In a simulation of their calibrated model Itskhoki and Mukhin (2025) decompose the ruble's 2022 dynamics and find a sharp initial depreciation driven by capital flight and precautionary demand, followed by an appreciation driven by import restrictions and strong export revenues from surging energy prices, and finally a gradual depreciation back to pre-war levels as export revenues fall.

these middle powers, it faces similar challenges as it cannot easily deploy the geoeconomic power implied by its size due to the presence of strategic vulnerabilities (Section D). In this section we first examine how the EU accumulated these geoeconomic vulnerabilities over time, then assess its untapped power potential, and finally derive policy recommendations.

F.1. How Europe became geoeconomically vulnerable

For decades Western Europe benefitted geoeconomically from a historical coincidence. The Cold War fault line ran through Central Europe, giving the US strong incentives to guarantee national security in Western Europe and sustain a rule-based international order. The European Communities sat directly at the line separating the liberal market economies centred around the US and the autocratic, planned economies centred around the Soviet Union. As noted in Section D.3, the US maximised its welfare by allowing Western Europe to thrive within a rule-based international order rather than wielding its geoeconomic power coercively (Clayton et al., 2025a).

With the "end of history" (Fukuyama, 1992) after the dissolution of the Soviet Union, geopolitics was perceived a thing of the past. The world transitioned from bipolarity to unipolarity, as the US became the uncontested global hegemon. EU enlargements integrated Western with Eastern Europe. Once countries integrated major geopolitical—let alone armed inter-state—conflict within Europe became inconceivable. As a result, EU defence spending declined from 2.3% to 1.3% of GDP from 1990 to 2015 (Mejino-López and Wolff, 2024) and trade integration among former geopolitical rivals deepened. After decades of peace and prosperity, political systems in many EU countries seemed to take this favourable regime for granted.

But geopolitics is well and alive – merely the main global fault line have shifted from Europe into East Asia. Consequently, the historical coincidence under which US and EU geoeconomic interests happened to be aligned has disappeared. The geoeconomic strategy that maximises US welfare may now no longer be one in which the EU can rely on the US to defend its interests.

While the EU benefited from the US-guaranteed rule-based international order, its geoeconomic dependencies were accumulating. Vis-à-vis the US, EU dependencies became concentrated in technology and services, where network externalities entail lock-in effects that are very costly to overcome (see Section D.2). Moreover, the US remains the key guarantor of EU national security through its critical contribution to NATO military capabilities and military goods supply (Burilkov et al., 2025; Mejino-López and Wolff, 2025).[60] Vis-à-vis China, dependencies emerged on two fronts: China became a key supplier of intermediate inputs and key export market for EU manufacturing. Meanwhile, the widespread expectation that China's economy and political system would gradually liberalise discouraged the EU from adequately addressing the geoeconomic concerns implied by these dependencies.

In this period, the EU failed to properly account for geoeconomic considerations in its strategic policy choices. Fragmented defence and industrial policies raise the costs of precaution that are a

[60] Most existentially, except for France, the US is the sole guarantor of nuclear deterrence for the EU.

prerequisite for the EU to ensure its national security on its own. The lack of a systematic common foreign policy undermines the EU's credibility vis-à-vis and its geoeconomic power over other countries. The incomplete Banking and Capital Markets Union, persistent non-tariff barriers within the Single Market, and Brexit inhibit deeper European integration and, thereby, sustained economic growth. A delayed and uncoordinated green transition entails critical dependencies on energy and commodity imports from geopolitically risky regions. Taken together this results in a continent that lacks the institutional and economic infrastructure that wielding geoeconomic power—or at least resisting being coerced—requires.

Collective action problems and ideology explain the EU's failure to account for geoeconomic considerations into policymaking. First, even where policymakers recognised strategic dependencies, the EU struggled to coordinate appropriate responses both across and within member states. The main reason is the uneven distribution of costs associated with reducing dependencies. Member states differ substantially, e.g., in sectoral specialisation, reliance on China as an export market, and dependence on Russia as an energy supplier. While the EU as a whole would benefit from reducing these vulnerabilities, the short-term costs fall disproportionately on particular member states and sectors, undermining collective action. Second, Europe's colonial past and experience of several devastating wars make overtly geopolitical approaches to economic and foreign policy politically suspect to large parts of the electorate.

F.2. The EU's geoeconomic power potential

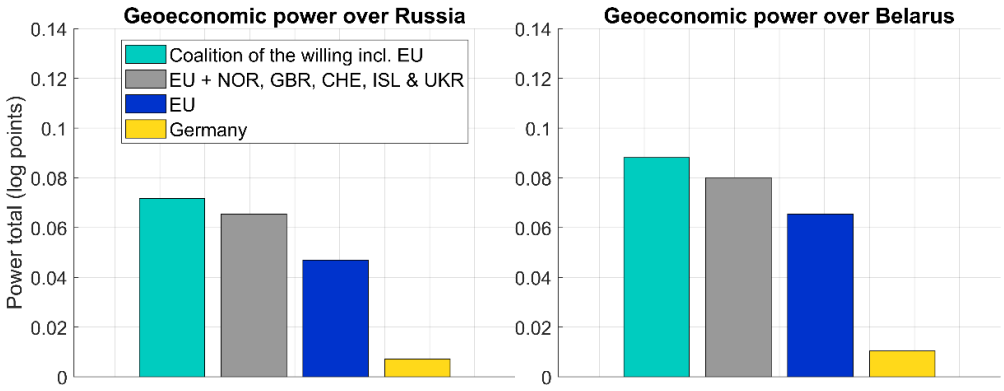
While the EU lacks the military power of the US and the critical input dominance of China, its major role in global trade gives it substantial geoeconomic leverage. With nearly 450 million relatively wealthy consumers, the EU's Single Market is an attractive export destination.[61] It is this demand power that makes EU trade agreements valuable, that gives EU regulations global reach, and that incentivises third countries to align geopolitically with the EU. The "Brussels effect"—the tendency of firms worldwide to comply with EU regulations to maintain market access—is one of the clearest illustrations of the effectiveness of this demand power. Moreover, the EU is not only an attractive export market but also a key supplier. Many economies rely on EU intermediates, technology, and capital goods that cannot be easily substituted.[62]

The EU could be an anchor for a coalition of countries committed to a rule-based international order, providing an alternative to choosing sides between the US—at least under the Trump administration--and China. Especially for small countries and middle powers alignment with the EU is attractive. On their own, these countries are more vulnerable to geoeconomic coercion. Together with other middle powers, the EU could act as a geoeconomic safe-haven in which a rule-based international order prevails (see also Carney, 2026). Already a European coalition including the UK,

[61] See the discussion on "threats not to buy" in Section D.2.
[62] See the discussion on "threats not to sell" in Section D.2.

Norway, and Switzerland would have considerably more geoeconomic power over Russia, China, and the US than the EU or any of the other countries alone (Figures 14 and 15).[63]

Figure 14: Geoeconomic power of EU and EU-led coalitions over Russia and Belarus arising from "threats not to sell"



Notes: The figure shows the geoeconomic power arising from "threats not to sell" of Germany, the EU and EU-led coalitions on Russia (left) and Belarus (right) for the year 2022. We use data from OECD ICIO for the year 2022. See Box D.1. for details on the construction. The European coalition includes the EU plus Iceland, Norway, Switzerland, Ukraine, and the United Kingdom. The "coalition of the willing" includes—besides the EU27—Australia, Canada, New Zealand, Norway, Iceland, Japan, Switzerland, Turkey, Ukraine, and the United Kingdom.

While the EU has substantial geoeconomic power through trade, it lacks the credibility to deploy this clout systematically because of internal political frictions and national security vulnerabilities. Geoeconomic threats are only effective if they are credible (see Section C). At the current juncture, the EU suffers from internal political frictions resulting from collective action problems and unanimity decision-rule constraints in foreign, security, and defence policy. In the presence of preference heterogeneity these make it difficult to speak with one voice externally. Moreover, acute and possibly existential military dependencies on the US in the face of belligerent neighbours imply that its national security is too vulnerable to allow the EU to deploy its geoeconomic power based on its role in global trade.

F.3. Policy recommendations

Establishing credibility is the central challenge for the EU. The policy recommendations that follow are designed to address these and to further increase its geoeconomic power through trade.

[63] The EU's attractiveness as a partner is testified by its trade agreement record: it has 59 regional trade agreements in force, compared to 14 for the US and 24 for China (WTO, 2026).

Recognise the role of geopolitics in international interactions

While the EU has long relied on an international rule-based order, an environment characterised by rising global geopolitical tensions requires readiness to use geoeconomic power. Fending off increasingly frequent attempts of coercion requires credible threats of retaliation. In this spirit, the EU's Anti-Coercion Instrument introduced in 2023 (European Parliament, 2023) aims at protecting the EU from coercion by third countries. To be sure, the goal of retaliation threats is to deter coercion by making protectionist policies too costly to pursue, so that retaliation does not have to be carried out in practice (Becko and O'Connor, 2025). In other words, the EU should wield geoeconomic power only defensively.

Geoeconomic power can only be used effectively when underpinned by credibility. Even if geoeconomic power through trade is large, "threats not to sell" or "threats not to buy" are ineffective if they are not credible. For example, the benefits and costs of following through with a certain trade policy threat may be distributed unequally across EU member countries. In the absence of appropriate mechanisms for burden-sharing, consensus across member countries might be difficult to achieve even if the EU would benefit as a whole. Dependencies beyond trade—particularly in of the context of national security—further undermine the credibility of trade policy threats (Burilkov et al., 2025).

Speak with one voice

For the EU to issue credible trade-policy threats, it needs to build internal political consensus more effectively. Speaking reliably with one voice requires a fair balancing of interests within the EU to reduce susceptibility to external divide-and-rule attempts or coercion. Deepening EU integration would help spread geoeconomic risk exposures and the costs of reducing dependencies more evenly and thereby facilitate coordination.

Compared to the EU, member countries have very little geoeconomic power on their own. Figure 14 illustrates this by comparing the small geoeconomic power of Germany (in orange) based on "threats not to sell" with the geoeconomic power of the EU as a whole (in blue). Both vis-à-vis Russia (left panel) and Belarus (right panel) Germany's geoeconomic power is less than one-sixth of the EU's.[64] The EU's geoeconomic power derives from its common trade policy. Without an EU responsibility for trade policy, coordination across individual member countries would be difficult and undermine the credibility of trade policy threats.[65]

Many areas remain in which the EU is perceived as a geoeconomically weak actor due to distributional externalities and heterogeneous preferences across member states. In the context of irregular migration, for example, such externalities generate divergent incentives between member states with and without external EU borders, as well as between countries of transit and countries of preferred final destination. These differences in incentives undermine the EU's ability to speak with

[64] Notably, based on this measure the contribution of Germany to the EU's geoeconomic power is smaller than Germany's economic weight in the EU in terms of GDP. This reflects the relatively smaller contribution to the EU's provision of critical services.

[65] Another success story is euro area monetary policy, which has resolved the debate about the desirability of monetary policy coordination among member countries.

one voice externally, thereby weakening its bargaining power vis-à-vis neighbouring countries. A similar pattern can be observed in foreign policy, where member states often adopt divergent positions towards third countries, limiting the coherence of EU external action.

Treat growth as a strategic priority

The foundation of geoeconomic power is economic size. Economic growth increases the attractiveness of the EU as a trading partner, thereby strengthening incentives for other countries to align geoeconomically. Furthermore, it provides the fiscal capacity necessary to bear the costs of building and maintaining geoeconomic power, including defence spending and foreign aid.

Policy initiatives that foster EU long-term economic growth also improve its geoeconomic position. The "Next Generation EU" (NGEU) and its core facility, the "Recovery and Resilience Facility" (RRF), aim to channel more investment into digitalisation, green transition, and structural reforms in member states.[66] More generally, policies that foster innovation and entrepreneurship, reduce inefficiencies in public spending and streamline public administration and bureaucracy can further enhance productivity growth and the EU's long-term economic dynamism. By improving allocative efficiency and accelerating technological diffusion, such reforms strengthen the EU's capacity to sustain its economic weight and thus its geoeconomic influence over time.

Geoeconomic power considerations should be central to the design of EU industrial policy. The goal should be a coherent and targeted industrial strategy focused on strategic sectors, alongside a redesign of state aid rules to enable scaling in strategic technologies. For example, the Green Deal Industrial Plan and the Net-Zero Industry Act aim to strengthen domestic manufacturing capacity in strategic sectors, while the European Chips Act targets technological sovereignty. However, such industrial policy needs to be designed carefully to avoid mission creep, windfall gains for existing projects, and capture by interest groups seeking to protect inefficient sectors and firms.

Reduce asymmetric dependencies

Chokepoints should be identified and underlying dependencies reduced, with explicit cost-benefit trade-offs against the gains from specialisation. The goal should not be to aim for autarky; despite the role of geopolitics, trade still entails significant benefits (Section B). However, the costs arising from dependencies should be more systematically internalised in an environment of heightened geopolitical tensions, especially when they are asymmetric and therefore create potential for coercion by trading partners. State intervention may be necessary to internalise the social costs associated with the EU's exposure through specific sectors or firms. This has parallels with the debate on optimal policy responses to global supply chain disruptions during the COVID-19 pandemic, where governments considered promoting resilience by subsidising alternative sources of supply in multiple countries and domestically (Grossman et al., 2023).

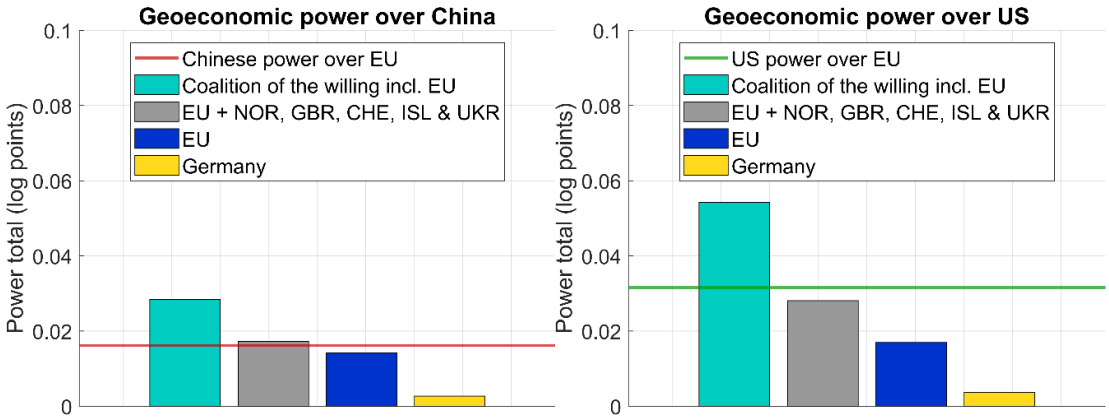
[66] Ongoing debates around reforming EU fiscal rules, deepening the Capital Markets Union, and advancing a competitiveness agenda—echoed in proposals linked to a European Sovereignty Fund—further underscore a broad policy consensus: sustaining high, investment-driven growth is indispensable to enhancing the EU's economic size and thereby its geoeconomic power.

Prominent EU policy reports reflect awareness of geoeconomic exposures arising from asymmetric dependencies. The Draghi Report (2024) on the future of European competitiveness calls for reducing strategic dependencies. To ensure a stable supply of critical materials, it proposes diversifying sourcing countries and pursuing trade agreements with resource-rich partners. More broadly, analyses in the context of the EU's Open Strategic Autonomy agenda (European Commission, 2020, p.13; European Council, 2022) identify specific areas of EU dependency (ECB, 2023; Kroll, 2024) and draw implications for EU trade policy design (European Commission, 2021).

Form coalitions

Forming coalitions could boost the EU's geoeconomic power. The EU's geoeconomic power would increase if it could coordinate trade-policy threats with other countries (see Figure 14, Section C.3 and Clayton et al., 2025a). For the EU, a key potential coalition partner is the UK. Given the UK's strong position in financial services, coordinating policy within a broader European coalition would enhance leverage in critical service sectors such as finance, information technology, and telecommunications.

Figure 15: Geoeconomic power of the EU and hypothetical coalitions over China and the US based on "threats not to sell"



Notes: The figure shows the geoeconomic power arising from "threats not to sell" of Germany, the EU and EU-led coalitions on China (left) and the USA (right) for the year 2022. We use data from OECD ICIO for the year 2022. See Box D.1. for details on the construction. The European coalition includes the EU plus Iceland, Norway, Switzerland, Ukraine, and the United Kingdom. The "coalition of the willing" includes, besides the EU, Australia, Canada, New Zealand, Norway, Iceland, Japan, Switzerland, Turkey, Ukraine, and the United Kingdom.

Coalitions with other countries would further increase overall geoeconomic power, especially vis-à-vis China and the US. While the EU's geoeconomic power (based on "threats not to sell") is broadly matched by China's corresponding leverage over the EU (Figure 15, left panel), the EU alone is in a weaker position vis-à-vis the US (right panel, blue bar). Only a coalition between the EU and other European countries (right panel, grey bar) would be sufficient to counterbalance US geoeconomic power. A broader global coalition comprising the EU, other European countries, and selected non-

European partners would likely yield a significant geoeconomic advantage over both China and the US (see also Carney, 2026).

In practice, such coalitions could take the form of new trade and other multilateral agreements. Deepening and expanding the EU's network of free trade agreements—through upgrading existing treaties and concluding new accords with key economies—would help diversify supply chains, secure market access, and extend the global reach of EU regulatory standards.

A layered array of coalitions might expand the set of coalition partners. The EU can leverage plurilateral and so-called "minilateral" cooperation formats to advance regulatory coordination even in the absence of full consensus among major countries. Institutions such as the International Monetary Fund, the G7, G20 can serve as starting points for flexible coalitions of willing partners to coordinate on financial stability, debt sustainability, and climate-related regulation, and to advance standards in areas such as digital governance, supply chain security, and export controls. Beyond these forums, the EU could further institutionalise cooperation through sector-specific alliances on critical raw materials, clean technologies, or semiconductor supply chains to reduce strategic dependencies. Taken together, such layered coalitions enhance the EU's capacity to project economic influence, manage external shocks, and shape the rules of the global economy.[67]

F.4. The role of the ECB

The aggregate effect of standard protectionism on inflation and output tends to be moderate, especially in absence of retaliation. The macroeconomic models discussed in Section E show only small effects of foreign protectionism on EU inflation and growth, effects that can well be handled by existing monetary policy tools. Monetary policy therefore has played only a limited role in the trade conflict with the US since 2025.

Global trade tensions can impair financial stability. US import tariffs may lead to, for example, lower equity valuations and higher debt spreads for EU non-financial corporations (Deutsche Bundesbank, 2025). As long as the trade dispute remains regionally contained the entailed risk is not imminent (Dizioli and van Roye, 2018b). But over medium horizons a revision of growth expectations can increase financial vulnerabilities paired with worse funding conditions for banks. A sudden increase in the cost of risk could thereby impair bank profitability and lending (Avril et al., 2025).

A large geoeconomic conflict, however, can have considerably larger effects on output, inflation and financial stability than in standard tariff-shock scenarios. Widespread supply chain disruptions would limit the ability of firms to substitute between sources and products, ultimately hampering production. If trade tensions intensify and countries retaliate this can lead to temporary spikes in inflation and trigger a repricing in global asset markets, including a massive increase in the financing cost of European firms (Deutsche Bundesbank, 2025). Overall, such a scenario threatens global financial stability (Dizioli and van Roye, 2018a, 2018b). This can cause harmful feedback loops with the

[67] Independently from the implications of coalitions for geoeconomic power configurations, Bonadio et al. (2026) show that a US withdrawal from free trade does not raise optimal tariffs and does not undermine the sustainability of cooperative trade policy for the remaining countries.

macroeconomy. Central banks can prepare themselves for such disruptive events by incorporating risks and uncertainties into their toolkit (ECB 2025a, ECB 2025b).

The geoeconomic dimension of the current wave of protectionism complicates the picture. Of primary concern for a central bank in this context are sovereign debt sustainability and distributional effects. The large public investment required to close gaps in Europe's strategic capabilities might increase euro area inflation and threaten sovereign debt sustainability. Distributional effects of foreign trade policy across households and countries (due to, e.g., the differences between EU countries in their exposure to exports) might destabilise the euro area.

The ECB is exposed itself to potential foreign geoeconomic action. Foreign geoeconomic threats might, for example, target the payment systems used in Europe (e.g. by access restrictions), undermine European monetary sovereignty (e.g. by promoting stablecoins backed by a foreign currency), or European financial stability (e.g. by restricting access to foreign assets).

A prudent way to obliterate foreign threats is to reduce the ECB's exposure. This includes, for example, ensuring the independent operability of EU payment systems.

In addition, the ECB can contribute to Europe's geoeconomic power by making Europe's financial infrastructure attractive for third countries to align with. This starts with buttressing the international role of euro by reliable monetary policy, which in the international context includes not only inflation, but also convertibility and swap lines. Within its mandate the ECB can also build geoeconomic levers, such as supporting EU-based payment systems and financial services and regulate them in a way that they can conveniently be used outside of the EU.

F.5. Conclusion

As the geopolitical imprint on the international trading system is here to stay, Europe is likely to face more foreign coercion attempts via both economic and non-economic threats in the future. As only geoeconomic power shields against coercion, Europe needs to invest in its ability to issue credible geoeconomic promises and threats. If Europe rises to the challenge, it can provide a valuable public good to the world: a rule-based and fair international order open to all countries that share these values.

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H. Appendix

H.1. The effects of openness

The hyperglobalisation era (Rodrik, 2011, pp. 200-201) redefined global production and reshaped domestic economies in profound ways. While openness boosted productivity and growth, it also exposed firms and workers to stronger import competition, dividing economies into winners and losers. This appendix explores these contrasting effects and their implications for political attitudes toward trade.

Productivity and growth

Trade fosters economic growth primarily through increases in productivity. A robust finding in the empirical literature is that lower trade costs raise industry-level productivity. Much of the empirical literature focuses on trade policy liberalisation to exploit clean sources of identifying variation. However, the underlying mechanisms are general and apply to any reduction in trade costs, whether driven by policy reform, technological progress, or improvements in infrastructure. Several mechanisms drive this result.

First, openness reallocates market shares toward more productive firms, increasing aggregate efficiency. This mechanism, formalised in the seminal model by Melitz (2003), arises because exposure to foreign competition forces less productive firms to exit while allowing more productive firms to expand. In the aftermath of Chile's trade liberalisation, Pavcnik (2002) finds that roughly two thirds of a 19% increase in industry productivity can be attributed to such reallocation from less to more efficient producers.

Second, firms themselves become more efficient following integration, generating within-firm productivity gains. These improvements can arise through several channels: firms may benefit from scale effects as they expand into foreign markets (e.g., Eaton et al. 2025) or gain access to cheaper and higher-quality imported inputs (Amiti and Konings, 2007; Goldberg et al. 2009). Firms may also respond endogenously to new export opportunities by upgrading technology and innovating. Bustos (2011) shows that Argentine firms exposed to new export markets through Mercosur were more likely to adopt advanced technologies. In her model, trade liberalisation raises export revenues and induces a set of previously non-exporting but relatively productive firms to enter export markets. Because the benefits of adopting advanced technologies are proportional to firm revenue while adoption costs are fixed, these new exporters now find it profitable to upgrade. A bilateral tariff reduction thus expands the group of firms that both export and invest in better technology, linking trade integration directly to technological upgrading and higher productivity. Cross-country evidence points in the same direction. Coelli et al. (2022) find that tariff cuts during the 1990s generated sizable increases in innovation across firms in 65 countries without reducing patent quality. Coelli (2025) confirms these effects for China and shows that falling trade costs stimulate innovation along both intensive and extensive margins, including the entry of new patenting firms and expansions into new technological fields, with higher-quality innovations responding more gradually than lower-quality ones.

Lastly, trade integration exerts pro-competitive effects. Evidence from liberalisation episodes in the 1980s and 1990s shows that markups declined as import competition intensified, forcing domestic firms to operate more efficiently (Harrison 1994; Levinsohn 1993). These findings indicate that openness enhances productivity not only through reallocation and technology adoption, but also by strengthening market discipline and reducing firms' ability to maintain excess markups.

A large empirical literature also documents systematic differences between exporting and non-exporting firms. Exporters are, on average, larger, more productive, more capital- and skill-intensive, and pay higher wages (e.g., Bernard et al. 2007). These patterns are consistent with the Melitz (2003) framework, in which only the most productive firms can profitably overcome the fixed costs of serving foreign markets. The exporter premium thus reflects both self-selection into exporting and learning-by-exporting effects, whereby firms improve their performance once they enter foreign markets.

Exporting is highly concentrated among a small number of dominant "superstar" firms. Globalisation has amplified this pattern, as the most productive firms exploit scale economies, advanced technology, and superior market access to capture a disproportionate share of world trade. In the US, the top 10% of exporters account for 96% of total export value (Bernard et al., 2007). Similarly, across 32 developing countries, the leading firm alone represents about 14% of national (non-oil) exports, while the top five firms account for roughly 30% (Freund and Pierola, 2015).

Distributional and labour-market effects

Economic theory has long recognised that while trade raises overall welfare, it does so through reallocation, benefiting some firms and workers while leaving others worse off. During the first decades of globalisation, most trade took place among advanced economies with similar income levels and production structures. As a result, trade primarily induced adjustment within industries, shifting market shares toward more productive firms while allowing workers to move relatively easily into expanding ones. Adjustment costs were therefore limited, and many workers benefited from employment in growing, higher-paying firms

Since the 1990s, the integration of large emerging economies, most notably China, into global production networks has fundamentally changed the nature of trade exposure. Competition increasingly shifted from within industries to across sectors. In high-income countries, import pressure fell disproportionately on low-skill, labour-intensive manufacturing, while high-skill and capital-intensive activities expanded. Because adjustment now required workers to change sectors, acquire new skills, or relocate, reallocation became far more costly and slower. The result was persistent employment and wage losses in regions most exposed to import competition (Autor et al., 2013; Acemoglu et al., 2016; Dix-Carneiro and Kovak, 2017; Pierce and Schott, 2016). Recent work underscores that these effects extend beyond the labour market: Pierce and Schott (2020) document substantial increases in "deaths of despair," particularly fatal drug overdoses among white workers in trade-exposed regions.

The political economy of trade policy helps explain why some sectors remained protected even as global barriers fell. In the classic "protection for sale" model (Grossman and Helpman, 1994), politically organised industries "buy" protection through campaign contributions, and the government sets

tariffs by weighing these contributions against the economic costs of protection. Empirical work supports the model's core mechanisms: using data for the US, Goldberg and Maggi (1999) show that politically organised industries receive systematically higher protection, and Bombardini (2008) documents that only large firms in the US find it profitable to lobby, making sectoral influence depend on the firm-size distribution. Recent evidence for the US shows that globally engaged firms increasingly lobby for liberalisation: Blanga-Gubbay et al. (2025), for example, find that the strongest support for free trade agreements (FTAs) comes from large, internationally integrated firms in the US that gain from reciprocal market access and cheaper inputs. Information asymmetries further reinforce these lobbying dynamics. Ponzetto et al. (2020) show that producers, who gain from protection, are far better informed and more politically vocal than consumers, who bear its diffuse costs. As a result, politicians tend to overweight producer interests and supply excessive protection. For other countries, comparable evidence is scarce because few jurisdictions require firms to disclose lobbying expenditures. This is why almost all empirical political-economy studies of trade policy focus on the US, where lobbying and campaign-finance laws provide detailed public data linking contributions to policy outcomes.

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H.2. The effects of trade policy: a literature overview

This appendix provides an overview of different aspects of trade policy and their effects as discussed in the academic literature. It is a non-comprehensive summary and is meant to serve as a starting point for the interested reader. Broad surveys of empirical trade policy provide the backdrop for the thematic blocks that follow: Bown and Crowley (2016) on the empirical landscape of trade policy, Goldberg and Pavcnik (2016) on the effects of trade policy, and Harrison and Rodríguez-Clare (2010) on trade and industrial policy in developing countries.

The 2018/2019 US trade war

This subsection surveys literature that treats the 2018–2019 US tariffs and partner retaliation (alongside the Section 201, 232, and 301 actions) as a natural experiment for the incidence, trade, and political effects of a return to protectionism. The recurring finding is near-complete pass-through of US tariffs to domestic prices, with sizeable losses for US importers, consumers, and exporters through supply-chain and retaliation channels, and politically targeted retaliation. For a synthesis see Fajgelbaum and Khandelwal (2022).

Paper	**What the paper does and finds**
Amiti, Redding and Weinstein (2019), JEP	Regress monthly changes in HTS10 import prices and quantities on applied-tariff changes for 2018. Find near-complete pass-through to US prices, with tariffs costing US consumers and importers about $3.2bn per month and a deadweight loss near $1.4bn per month by late 2018.
Amiti, Redding and Weinstein (2020), AEA P&P	Extend the analysis of Amiti et al. (2019) through October 2019. Pass-through stays close to complete for most sectors, though foreign steel exporters absorb roughly half the tariff; the import-volume response to tariffs about doubles over time as trade is redirected.
Blanchard, Bown and Chor (2024), JIE	Map county-level exposure to US and retaliatory tariffs and regress 2018 Republican House vote-share changes on it. Republicans lost support where retaliation bit but gained

Paper	What the paper does and finds
	nothing where protection landed; absent the trade war they would have lost ten fewer seats.
Cavallo, Gopinath, Neiman and Tang (2021), AER: Insights	Compare border (ex-tariff) and retail prices using BLS micro-data. Tariffs pass through almost fully at the border, so incidence falls on US firms, while retail prices barely move, implying compressed retail margins; US exporters cut prices under retaliation.
Chor and Li (2024), JIE	Use high-frequency night lights across about 97,000 Chinese grid cells with grid-level tariff exposure. A one-point rise in US-tariff exposure cuts luminosity by 0.59%, and the most-exposed 2.5% of the population lose about 2.5% of per-capita income; China's retaliation shows no effect.
Fajgelbaum, Goldberg, Kennedy and Khandelwal (2020), QJE	Event-study on monthly HS10 trade for 2018. Find complete pass-through and large declines in imports and exports; losses to US consumers and importers of about $51bn (0.27% of GDP), falling to a $7.2bn aggregate real-income loss (0.04% of GDP) net of revenue and producer gains, with protection skewed toward politically competitive counties.
Fajgelbaum, Goldberg, Kennedy, Khandelwal and Taglioni (2024), AER: Insights	Difference-in-differences on HS6 trade to ask how bystander countries fared. The war created net export opportunities, not just diversion; cross-country heterogeneity is driven mostly (about 76%) by country-specific tariff elasticities rather than pre-war specialisation.
Fajgelbaum and Khandelwal (2025), QJE (r&r)	Use shipment-level data and bunching at the $800 Section 321 de minimis threshold. De minimis imports concentrate in lower-income zip codes, so the exemption is progressive; eliminating it would lower welfare by roughly $11–13bn.
Fetzer and Schwarz (2021), Economic Journal	Test whether China, EU, Canadian, and Mexican retaliation targeted Trump's base, using county vote shares and simulated counterfactual tariff lists. Retaliation was politically targeted toward 2016 Trump-swing areas; the EU achieved targeting while minimising harm to its own economy.

Paper	What the paper does and finds
Flaaen, Hortacsu and Tintelnot (2020), AER	Study washing-machine antidumping and safeguard tariffs (2012–2018) with retailer-model price data. Production relocation shapes incidence: safeguards prompted relocation to the US and a 12% price rise, complement (dryer) prices rose in step, and domestic producers matched importer increases.
Flaaen, Hortacsu, Tintelnot, Urdaneta and Xu (2025), AER (r&r)	Trace pass-through of the 2019–2021 EU-wine tariffs along the chain with transaction and retail data. Border pass-through is incomplete (producers cut prices 5.2%), but domestic markups push retail prices up 6.9%, so consumer costs exceed the tariff revenue collected.
Flaaen and Pierce (2024), ReStat	Separate import-protection, input-cost, and retaliation exposure for US manufacturing (NAICS4, 2018–2019). Higher input costs and retaliation outweigh the small employment gains from protection, lowering relative employment and raising producer prices.
Handley, Kamal and Monarch (2025), AEJ: Applied Economics	Use firm-linked trade data to estimate supply-chain spillovers of US import tariffs onto US exports. More import-tariff-exposed products exported less in 2019, equivalent to a 2% tariff on US exports and accounting for over half of the otherwise-unexplained export weakness.

Antidumping and safeguards

This subsection surveys literature that studies the trade, price, employment, and supply-chain effects of contingent protection (antidumping and safeguard duties), typically exploiting policy adoptions as quasi-experiments. The findings consistently show large import contractions and substantial downstream costs that often outlast the temporary measures. For a survey see Blonigen and Prusa (2016).

Paper	What the paper does and finds
Bown, Conconi, Erbahar and Trimarchi (2026), AEJ: Economic Policy (cond. accepted)	Shift-share IV using swing-state variation to trace US temporary trade barriers against China along supply chains (1993–2016). Protection raises employment in shielded industries but lowers it downstream, for an estimated net loss of about 177,000 manufacturing jobs.

Paper	What the paper does and finds
Cox (2025), AER (r&r)	Local-projection estimates of the 2002 Bush steel tariffs on downstream industries, using a novel steel-specific input-output table built from tariff-exclusion requests during the US trade war 2018–19. A one-percent larger input-cost shock cut downstream exports about 3% and global market share about 0.3pp, with effects persisting long after removal (hysteresis).
Felbermayr and Sandkamp (2020), European Economic Review	Firm-level gravity on Chinese exporters facing antidumping duties (2000–2009). Duties sharply cut export values and induce firm exit with full pass-through to importers (no producer-price change); smaller firms are hit harder, and firms deflect to third markets.
Lake and Liu (2025), AEJ: Economic Policy	Generalised difference-in-differences across US commuting zones for the 2002 Bush steel tariffs. Tariffs did not raise local steel-producing employment but persistently depressed steel-consuming employment, with lasting establishment exit.
Sandkamp (2020), JIE	Difference-in-differences using the 2004 EU enlargement as a natural experiment of being exposed to protection through antidumping tariffs (CN8). Duties raise import prices about 25% and cut quantities about 74%; price increases come only from market-economy exporters, while non-market-economy quantity responses are larger.

Export promotion

This subsection surveys literature that evaluates whether export-promotion programs and export access causally raise firm export performance, relying on RCTs, IV, and matching designs in developing-country settings. The evidence points to real gains that work mainly through the extensive margin and quality upgrading rather than through prices and affect especially smaller firms pointing towards that export promotion can successfully lower the fixed cost of exporting.

Paper	What the paper does and finds
Atkin, Khandelwal and Osman (2017), QJE	RCT giving Egyptian rug producers access to a foreign buyer. Exporting raises profits 16–26% through quality upgrading,

Paper	What the paper does and finds
	providing causal evidence of learning-by-exporting rather than movement along the production frontier.
Buus, Munch, Rodrigue and Schaur (2025), ReStat	IV (random caseworker outreach) for Danish export-support take-up that are meant to reduce nontariff barriers to trade. Support raises firm export values about 9–10% per year for two years and lifts profitability, with no effect on prices, quality, markups, or marginal costs.
Volpe Martincus and Carballo (2008), JIE	Matching difference-in-differences on Peru's promotion agency (universe of exporters). Assistance raises exports mainly on the extensive margin (more products and destinations), with export growth about 17pp higher and no evidence for intensive-margin effects.
Volpe Martincus and Carballo (2010), JDE	Quantile-treatment-effect estimates for Chile's promotion programs. Effects are heterogeneous and strongest for smaller firms, concentrated in the lower tail of export growth and across the distribution of products and destinations.

Trade-policy uncertainty

This subsection surveys literature that measures how trade-policy uncertainty shapes firms' entry, investment, and trade, using accessions, agreement renegotiations, and the Brexit referendum as sources of variation in the risk of future protection. Reducing uncertainty is found to expand entry and trade well beyond what actually applied-tariff changes alone would imply.

Paper	What the paper does and finds
Breinlich, Leromain, Novy and Sampson (2020), European Economic Review	Synthetic-control estimates of the Brexit vote on UK–EU27 FDI. After the Leave vote, UK outward transactions to the EU27 rose 17% as firms secured market access, while EU27 investment into the UK fell 9%.
Crowley, Meng and Song (2018), JIE	Linear-probability model linking foreign antidumping actions ('tariff scares') to Chinese firms' market entry and exit (2000–2009). Higher uncertainty deters entry and raises exit, with cumulative trade losses around $25bn (discouraged entry) and $19bn (added exit).

Paper	What the paper does and finds
Crowley, Exton and Han (2020), AEA P&P	Exploit the Brexit vote and product-level WTO threat tariffs for UK exporters. The threat of future tariff hikes deterred new product entry into the EU, leaving about 4,700 missing firm-product entrants by end-2016.
Graziano, Handley and Limão (2021), Economic Journal	Use prediction-market Brexit probabilities interacted with MFN tail risk on monthly HS6 trade. A higher Brexit probability cut UK–EU export values, by an estimated 11–20% after the referendum, concentrated in high-MFN-risk products.
Handley and Limão (2015), AEJ: Economic Policy	Structural uncertainty model estimated on Portugal's EC accession. Removing uncertainty explains about 61% of firm-entry growth and about 87% of export-value growth, even though applied tariffs were already low.
Handley and Limão (2017), AER	Uncertainty-augmented gravity on China's 2001 WTO accession and US imports. Lower uncertainty explains over a third of Chinese export growth to the US and raised US welfare equivalent to a 13pp permanent tariff cut, concentrated in high-sunk-cost industries.
Pierce and Schott (2016), AER	Difference-in-differences using the cross-industry variation in exposure to a change in US trade policy that eliminated potential tariff increases on Chinese imports. Lower tariff uncertainty, is associated with significantly lower US manufacturing employment and rising imports from China.

Trade facilitation

This subsection quantifies how border processing, customs delays, and transit systems act as trade costs, using transaction-level customs data with instruments based on inspection and congestion. Faster processing yields large export gains, affecting new exporters more negatively.

Study	What the paper does and finds
Carballo, Graziano, Schaur and Volpe Martincus (2024), ReStat	Route- and firm-level evidence on a transit system upgrading that streamlines border processing in developing countries from El Salvador. The better transit system raised route-level exports 44% with a benefit-cost ratio of 3 to 1.

Study	What the paper does and finds
Carballo, Graziano, Schaur and Volpe Martincus (2025), JIE	IV estimates of Peruvian seaport processing times on imports. A one percent longer processing time cuts import value 0.24%, a tariff-equivalent of about 18% at the median delay and roughly double that for new importers.
Volpe Martincus, Carballo and Graziano (2015), JIE	IV (random physical-inspection allocation) for Uruguayan customs delays. A 10% longer delay cuts exports 3.8%, mainly through fewer shipments and buyers; effects are larger for new relationships, time-sensitive goods, and distant markets.

Quotas and bans

This subsection surveys literature that studies discretionary quantitative restrictions, import licensing, and export controls, and what their removal reveals about market power and misallocation. Restrictions raise prices and distort allocation, while liberalization uncovers large efficiency gains.

Study	What the paper does and finds
Atkin, Blaum, Fajgelbaum and Ospital (2024), NBER WP, AER (r&r)	Transaction-level study of Argentina's discretionary import licensing (2012–2015) with a classifier-Lasso for market power. Restrictions raised prices 4% and cut quantities 31%; foreign exporters hold market power in about 48% of pairs, which determines whether restrictions raise or lower prices.
Garred (2018), JIE	Year-by-year cross-industry regressions of China's export restrictions (export taxes and processing-trade export bans) on its pre-WTO import tariffs, 1997–2012. Post-accession export restrictions increasingly mirror the inverse of the pre-WTO tariff schedule, partly restoring prior protection; export-tax revenue reaches about 34–40% of counterfactual 1999 tariff revenue.
Khandelwal, Schott and Wei (2013), AER	Difference-in-differences on the 2005 removal of Chinese textile export quotas (Multifiber Agreement). Removal reveals large misallocation: net entry by productive private firms drives most quality-adjusted price declines, and about 71% of productivity gains come from ending the inefficient licensing system, not the quota itself.

Standards and regulatory measures

This subsection surveys literature that covers nontariff measures, product and environmental standards, and their dual role as legitimate regulation and disguised protection, using gravity and reduced-form designs. Nontariff measures add substantially to measured restrictiveness, can shift comparative advantage and pollution across borders, and are sometimes enforced counter-cyclically as hidden protection. For surveys see Ederington and Ruta (2016) and, on the environment, Copeland, Shapiro, and Taylor (2021).

Study	What the paper does and finds
Abman, Lundberg, McLaren and Ruta (2023), NBER WP	Triple-difference on child-labour provisions in regional trade agreements across 101 developing countries. Agreements without such clauses reduce child labour and raise enrolment, whereas agreements with child-labour bans unexpectedly increase child labour and lower enrolment due to substitution within households (reduction in labour of those under 14 but increases in those over 14).
Abman, Lundberg and Ruta (2024), JEEA	Triple-difference on environmental provisions in regional trade agreements using satellite forest-loss data. Agreements without provisions raise forest loss about 23%; forest and biodiversity provisions almost fully offset this, with the strongest effects in tropical, high-biodiversity countries.
Broner, Bustos and Carvalho (2012), NBER WP	Cross-country, cross-industry IV using meteorological dispersion to test the pollution-haven effect. Laxer environmental regulation raises a country's US import share in pollution-intensive industries, evidence that regulation shapes comparative advantage.
Calí, Graciano, Ghose, Montfaucon and Ruta (2026), JDE	Triple interaction (yuan depreciation, China competition, and NTM exposure) on Indonesian firm exports. Firms facing more input non-tariff measures are less resilient to Chinese currency shocks; input tariffs show little effect, and the result is driven by trade-distorting NTMs.
Grundke and Moser (2019), JIE	Gravity on US FDA import refusals as enforcement of product standards. Stricter refusals increasingly depress imports from developing countries and intensify in downturns, consistent with counter-cyclical hidden protection.

Study	What the paper does and finds
Kee, Neagu and Nicita (2013), ReStat	Compare overall trade restrictiveness across 2008–2009 to assess crisis-era protectionism. Find no broad rise in protection; only a few countries raised tariffs, while the US and EU leaned on antidumping.
Kee and Nicita (2022), JIE	Linking discrepancies between import and export flows, which is a proxy for fraud, to non-tariff measures. NTMs raise discrepancies (a 10pp rise in the ad valorem equivalent implies about 15% more discrepancy, versus 8% for tariffs), consistent with fraud to evade restrictive measures.
Kee, Nicita and Olarreaga (2009), Economic Journal	Estimate theory-based ad valorem equivalents of non-tariff barriers and trade-restrictiveness indices, by products (HS6). Non-tariff barriers add about 87% on average to tariff-only restrictiveness, and poor countries both impose and face higher barriers.
Shapiro (2021), QJE	Regress tariffs and non-tariff barriers on industry CO2 intensity (IV via input-output tables). Dirty, upstream industries face lower barriers, an implicit subsidy of about $85–120 per ton of CO2; harmonising policy would cut global CO2 about 3.6% while raising real income.

Rules of origin

This subsection surveys literature that studies how rules of origin and cumulation in preferential agreements reshape input sourcing, with both protectionist and supply-chain-integrating effects. Relaxing rules of origin raises intermediate sourcing from cumulation partners, while strict rules divert intermediate trade away from non-members.

Study	What the paper does and finds
Bombarda and Gambaroni (2013), International Economic Review	Heterogeneous-firm model with probit and NLS evidence on relaxing rules of origin. Relaxation drives the least productive exporters out, and diagonal cumulation (PECS) turns the negative effect of strict rules on intermediate trade positive.
Bombarda, Gambaroni and Iodice (2025), ReStat	Triple-difference using the PECS cumulation system and 2004 EU enlargement with a novel EU rules-of-origin restrictiveness index. Relaxing rules of origin raises intermediate imports from newly cumulable partners (a one

Study	What the paper does and finds
	percent higher prior value requirement implies 0.4–0.7% more imports), more so when preference margins are larger.
Conconi, Garcia-Santana, Puccio and Venturini (2018), AER	Triple-difference on NAFTA rules of origin and Mexican intermediate imports (1991 versus 2003). Rules of origin cut the growth of Mexican intermediate imports from third countries by about 48 log points relative to NAFTA partners, a protectionist effect on inputs.
Felbermayr, Teti and Yarcin (2019), JIE	Compute the profitability of trade deflection to ask whether rules of origin are needed. Deflection is unprofitable for 86% of FTA product pairs (98% for unilateral preferences), so the pervasive use of rules of origin is hard to rationalise.

Buy-national procurement

This subsection surveys literature that evaluates 'Buy American'-style domestic-content and procurement rules, combining quasi-experimental price evidence with quantitative trade models. The policies function largely as costly employment measures, with a high welfare cost per job and most incidence borne by consumers.

Study	What the paper does and finds
Allcott, Kane, Maydanchik, Shapiro and Tintelnot (2024), NBER WP	Event-study price evidence plus a nested-logit equilibrium model of the IRA electric-vehicle credits. Consumers bear most of the credit, the leasing loophole doubled EV lease shares, and credits cost $23–32k per added EV with 23–33% additionality, mainly benefiting domestic producers.
Bombardini, Gonzalez-Lira, Li and Motta (2024), NBER WP, AER (r&r)	Eaton-Kortum model with government procurement calibrated to US contract micro-data, plus a shift-share design. Buy American created 50,000–100,000 manufacturing jobs at $111–138k each, and tightening content rules raises the cost to $154–238k per job.

Subsidies and industrial policy

This subsection surveys literature that measures the use and effects of subsidies and industrial policy, spanning new text-based measurement of policy activity and causal evaluations of targeted protection. Industrial policy is found to be widespread and increasingly geopolitically motivated, and well-designed

targeting can produce lasting gains in targeted sectors. For a survey see Juhász, Lane, and Rodrik (2024).

Study	What the paper does and finds
Centorrino, Diakantoni, Keck, Ruta, Sztajerowska and Wei (2025), IMF WP	Build a Trade-Policy Activity Index and nowcast it using data on trade policy from the WTO's Trade Monitoring Database (TMDB) and the Global Trade Alert (GTA). They we document a structural shift around 2019 with a substantial expansion in the use of trade policies.
Juhász (2018), AER	Difference-in-differences using the Napoleonic Blockade as exogenous protection for French cotton regions. Greater protection raised mechanised-spinning adoption and persistent industrial localisation, with higher value added per capita through 1860.
Juhász, Lane, Oehlsen and Perez (2022), STEG WP	Supervised text classification of more than 28,000 Global Trade Alert descriptions to measure industrial policy. Achieves about 93% accuracy and shows industrial policy is common, rising, granular, concentrated in rich countries, and targeted toward high-comparative-advantage sectors.
Lane (2025), QJE	Difference-in-differences on South Korea's 1973–79 heavy and chemical industry drive with plant-level panel-data. Targeted industries saw lasting gains in output, employment, productivity, and exports, with evidence of learning-by-doing.

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Georgios Georgiadis
European Central Bank, Frankfurt am Main, Germany: email: georgios.georgiadis@ecb.europa.eu

Makram Khalil
Deutsche Bundesbank, Frankfurt am Main, Germany; email: makram.khalil@bundesbank.de

Georg Strasser
European Central Bank, Frankfurt am Main, Germany: email: georg.strasser@ecb.europa.eu

Feodora Teti
Ludwig-Maximilians-Universität (LMU), Munich, Germany; ifo Institute, Munich, Germany; email: teti@ifo.de

Postal address 60640 Frankfurt am Main, Germany
Telephone +49 69 1344 0
Website www.ecb.europa.eu

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