Decoupling China and Russia from the West: the effects on trade

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SUMMARY

Geopolitical tensions between Russia, China and the West have been rising over recent years. Events like the Russian invasion of Ukraine, the 2018-2020 tariff war between the US and China, the US-enacted CHIPS act, and speculations about a potential invasion of Taiwan by China have prompted discussion among researchers and policymakers about the potential emergence of new geopolitical blocs, as well as the feasibility, design, and impact of potential structural changes in the trading relationships between these blocs.

In this study, we simulate the effect of a decoupling of trade relationships between the West (i.e. the US, the EU, and their allies) and China and Russia (RCH). The main decoupling scenario, called 'broad decoupling' scenario, simulates the imposition of substantial trade barriers on all direct trade flows between the two blocs. We find a large negative impact on trade flows (both gross and in value added terms) between the two blocs. We also decompose the changes in production volumes across industries in the different bloc into four channels: direct loss, indirect loss, trade diversion, and other general equilibrium effects. We find that the different blocs incur different losses. For instance, the neutral 'rest of world' does not incur direct losses, but do lose indirectly.

China and Russia stand to incur greater losses from decoupling from the West than vice versa. We find that the imposition of tariffs on all trade flows in the broad decoupling scenario leads to a substantial decrease in international trade between the two blocs. While trade decoupling always leads to less trade and lower real incomes for the directly affected countries, this effect is stronger for some countries than for others. We find that in terms of real income, Russia and China stand to lose relatively more than the West. This can be explained intuitively by the relative economic size. Western countries collectively make up a larger share of the world economy than Russia and China. This implies that in a broad decoupling scenario, Russia and China would "lose access" to a larger share of the world economy than vice versa.

Countries outside of the two blocs are expected to increase their exports and GDP due to trade diversion, although they cannot easily replace China's role in global trade. Neutral countries that maintain normal trade relationships with both blocs, are likely to see gains in trade due to trade diversion. Our analysis further shows that countries outside of the two blocs are best off if they remain neutral. Both the West, as well as Russia and China, will lose less GDP if third countries join their respective trading blocs, rather than maintaining neutrality.

The model captures some long-run forces, such as lowest-cost sourcing and the allocation of resources across industries. This is reflected in the elasticities we are using. Aggregate changes to welfare are therefore likely smaller than reallocations across sectors, which is also found by Caliendo and Parro (2023). Other long-run forces, such as trade-induced technological progress,

remain outside of the model. The results of the model should be interpreted as showing the economy once it has reached its new long-run equilibrium after the shock. Furthermore, the level of aggregation of our data (two-digit industries), limits our ability to make strong statements about the role of critical resources and goods that may be difficult or even impossible to source elsewhere. Relatedly, the model does not include costs of necessary shifts in the economic structure of a country, such as investments in infrastructure, education, and production facilities. Finally, we assume no dynamic effects, via economic growth or innovation. If the rate of innovation in Western economies were negatively impacted by decoupling, e.g. via reduced knowledge spillovers across blocs, or smaller market sizes, this could amplify the costs.

1 INTRODUCTION

Geoeconomics is back! Geoeconomics is the "application of power politics by economic means" (WEF, 2024). While it was never really gone, it has definitely received a lot of attention in recent years. High-profile examples of geoeconomic actions include the US-China trade war of circa 2018-2020, economic and financial sanctions following the Russian attack on Ukraine in 2022, as well as the US-enacted CHIPS and Science Act. These instances underscore the interconnected nature of economic and political forces, and have put geoeconomics high on the agenda of policy makers and researchers.

In this paper we study several scenarios that explore the effects of geoeconomic actions on international trade flows and incomes. These scenarios are intended as exploratory exercises, rather than predictions of likely future developments. They help us to think through relative effect sizes, and to uncover the mechanisms behind potential policies. By examining stark scenarios, we gain deeper insights into potential outcomes.

There are several political rationales and debates behind recent geoeconomic policies. In some cases, countries aim to secure access to vital resources, such as food, medicine, or critical inputs needed for domestic production (such as energy, semiconductors, and rare metals). In the case of sanctions, economic pressure is exerted with the aim of making a political actor change their actions (e.g. to cease military actions). In other cases, countries may adopt geoeconomic policies to safeguard critical infrastructure and sensitive technologies, or gain dominance over certain technologies and industries. Policy measures that are implemented range from levying tariffs on trade flows, to investment screening policies, trade and financial sanctions, and domestic subsidies. Countries may either collaborate for economic integration or compete for advantageous positions, resulting in economic fragmentation.

The different scenarios in this study reflect some of the different goals and policies behind ongoing geoeconomic debates. The first scenario simulates the impact of a "broad decoupling" between several advanced, mostly Western economies on the one hand, and Russia and China on the other hand. This scenario reflects an extreme development, where high geopolitical tensions lead the respective blocs to cease virtually all direct economic trade interactions. The second scenario of "strategic decoupling" aims to reflect a more partial and targeted decoupling; reflecting discussions related to open strategic autonomy, and critical inputs. The third scenario analyses the potential impact of the Global Sustainable Arrangement on steel and aluminium (GSA), that has recently been negotiated between the US and the EU. Under the GSA, high tariffs would be imposed on steel and aluminium trade with countries outside of the USA-EU bloc. The fourth, and final scenario simulates the potential impact of further trade integration. The EU and India, as well as the EU and Indonesia are currently negotiating about adopting free-trade agreements (FTA), which we simulate in this scenario.

1.1 RELATED LITERATURE

In light of recent global developments, policymakers and academics have shown increased interest in understanding the potential effects of geoeconomic actions. A rapidly growing body of research studies the consequences of sanctions and global fragmentation. These studies vary in terms of their assumptions and methods, and in terms of the questions and mechanisms that they focus on. In this section, we give an overview of this literature.

The closest studies to ours are Javorcik et al. (2022) and Baqaee et al. (2023). Both studies use quantitative general equilibrium trade models (based on Baqaee & Farhi (2019)), and examine the effects of scenarios similar to our first scenario. Like in our study, their primary focus is modelling the impact of trade fragmentation between geopolitical blocs on trade flows and incomes in general equilibrium.

Javorcik et al. (2022) study the economic costs of friend-shoring. They explore scenarios in which international trade fragments into three blocs: the USA and its allies, China and its allies, and neutral countries. They define these blocs using countries' voting behaviour in a UN vote condemning the aggression against Ukraine (support, against, neutral). The authors assume a 20% increase in non-tariff barriers, and alternatively a 20% increase in tariffs between the opposing blocs in several different scenarios. Subsequently, they quantify the costs of this scenario in terms of real GDP; they find that all countries lose, with losses ranging from 0.1 to 4.6% of GDP. The study also assesses the impacts of China's zero-COVID policy by introducing trade costs between China and bloc 1 (led by USA) countries. In contrast to the two-polar world scenario, the findings indicate that certain countries with potential to replace China as a trade partner could benefit.

Baqaee et al. (2023) examine the consequences of decoupling from China, specifically on the German economy. Their scenario is very similar to the broad decoupling scenario considered in our study and in Javorcik et al. (2022), with the difference that Baqaee et al. consider a complete cessation of trade relations, rather than the imposition of trade barriers. The authors focus on the difference between short-term and long-term impacts of trade fragmentation. They find that the German economy would initially experience a 5% decline in Gross National Expenditure (GNE). However, over the medium and long term, the costs would diminish to a sustained loss in the range of 1-2%. Compared to this study, our study focuses only on the long-term impacts.

Bolhuis et al. (2023) analyse the effects of a hypothetical trade fragmentation on economic output, while explicitly accounting for international trade in commodities. They highlight that the impact of fragmentation on a nation's actual GDP can be broken down into three components: (i) the direct influence of import prices on final goods, (ii) amplification due to linkages in the input-output structure, and (iii) the effect on commodity prices. They calculate that the estimated global output losses range between 0.3% and 2.3% in the long run, depending on the fragmentation scenario. They observe that advanced economies and emerging market economies (EMEs) are particularly vulnerable to shocks in energy and high-tech manufacturing trade, while low-income countries experience the most significant decline in output in the case of disruptions in the trade of agricultural goods.

Various recent studies examine trade diversion: the redirection or replacement of trade flows to third countries. This is a potential side effect of any trade policy. Freund et al. (2023) and Dang et al. (2023) study disaggregated trade flows in the context of the US-China "trade war" of 2018-2020. They find that after the imposition of trade tariffs between the US and China, countries with a revealed comparative advantage in a sanctioned product were able attract to trade flows and replace China's exports to the US. The research further finds that large developing countries, bordering China, countries with stronger trade links with China, and countries with greater capital abundance were more likely to benefit from the trade diversion effects. These results show that tariffs on Chinese products alone may be insufficient to substantially decrease the overall reliance on Chinese inputs. Chupilkin et al. (2023) study trade diversion following the trade sanctions imposed on Russia after its attack on Ukraine in 2022. The authors report that some of the EU's exports to Russia are being replaced with countries neighbouring Russia, consistent with the

argument of rerouting of Russia's import via neighbouring economies being used to increase access to sanctioned imports. Rademakers et al. (2024) demonstrate that Dutch exporters of technological products, initially affected by the sanctions on Russia, have significantly redirected their exports from Russia to third countries. They also show that this reorientation has led to a significant increase in Dutch microchip exports to Turkey and former Soviet republics, raising suspicions that these destinations serve as transit channels for the eventual transfer of the chips to Russia.

Besides the effect of geopolitical tensions on trade, the literature also studies the effects on foreign direct investment (FDI). It finds some early signs of fragmentation of FDI flows (changes in bilateral FDI trade flow destinations), although the evidence is mixed. IMF (2023) show that the post-pandemic period decline in global FDI flows has been uneven across regions. The decrease in US FDI into China was greater than the average global decline. At the same time, US FDI to other areas, especially emerging Europe, demonstrated a greater degree of stability. One might expect to observe the recent increase in Asian export is accompanied by relatively stronger Chinese FDI in those countries. However, IMF (2023) shows that China decreased its FDI to all regions but the decline in Chinese FDI to other Asian countries is surprisingly more severe. On the contrary, Denis (Denis, 2023) show that the FDI from China to ASEAN countries is ramping up and the existing investment figures have significant potential to underestimate the scale of Chinese investments in ASEAN countries as some of these are channelled through offshore structures in Hong Kong or the British Virgin Islands. Considering the tightening in screening of Chinese investments by other countries to "keep China down" (McCalman et al., 2022) it is also possible that Chinese investors may prefer to investment in other regions in other investment forms rather than FDI such as loans, credit lines, export credit, mergers and acquisitions or through indirect investment routes.

In addition to the channels of import prices, commodity prices, tariff revenues and trade diversion, the disintegration of global trade may affect trade flows and incomes through other channels. These include labour market dynamics, access to technology and labour, productivity, capital flows through financial fragmentation, and constrained international collaboration in essential fields like climate change and pandemic response. See Aiyar et al. (2023) for a discussion of the literature on these other channels.

It should be noted that no single study is capable of comprehensively addressing all these aspects without encountering certain limitations. The studies on the quantitative costs of the fragmentation have certain limitations since researchers are required to make simplifying assumptions. While the calculated economic losses provide an idea about the magnitude of the economic effects, there are certain mechanisms and channels that the studies, including ours, cannot encompass. Although existing studies commonly conclude that economic costs escalate with increasing fragmentation severity[1], the yet-to-be-explored channels and their interplay have the potential to substantially multiply economic losses. For instance, studies addressing limited knowledge sharing across countries indicate that the direct impact of the trade channel worsens with technological decoupling (Cerdeiro et al., 2021; Góes & Bekkers, 2022). Another study emphasizes that foreign direct investment (FDI) fragmentation arising from geopolitical blocs can cause large output losses (up to 2% of global GDP) in the long term (IMF, 2023). Therefore, in our study, instead of magnitudes of impacts on economic variables such as trade, income, and

[1] For a detailed survey of the existing studies, see Baba et al. (2023).

production costs, we focus on the relative positions of countries and industries in a trade fragmentation scenario.

2 METHOD AND DATA

The main model we use in this study is the CPB trade model. This model is based on the canonical Caliendo & Parro trade model (Caliendo & Parro, 2015), FIGARO data on international trade and production for the year 2019, and estimates of the trade elasticities; for more details on the model, see Boeters et al. (2023). The model is a multi-country, multi-industry, general equilibrium model that accounts for cross-border trade in intermediate inputs. For a given change in trade frictions between countries, the model calculates a consistent counterfactual set of world trade flows, wages, prices, and incomes. This allows us to compare the world economy under counterfactual trade frictions with the world economy we observe in the data under current trade frictions. The main ingredients of the model are standard, and common to other models used in the related literature. Compared to the Baqaee & Farhi (2023) trade model, the Caliendo & Parro (2015) model does not account for non-linearities, as well as price rigidities equally well.

The basic assumptions of the model are standard in the economic trade literature: consumers maximize utility over composite goods, consisting of domestically produced and imported varieties. Firms choose their suppliers based on the lowest price, akin to Ricardian trade. Production involves labour and intermediate inputs. Changes in bilateral trade shares are determined by changes in relative cost, which in turn are driven by (country and industry specific) production cost and trade cost. The size of the adjustment in trade shares is in line with trade elasticities from gravity equation estimations. Income equals expenditure for each country, except for trade imbalances, which are kept at their initial level.

A crucial input into the model are bilateral trade frictions between countries. These include factors like physical distance, common membership in a free-trade agreement, tariffs, and non-tariff barriers. Using estimates of how each of these bilateral factors affect trade flows, we simulate counterfactual policy scenarios by varying these bilateral trade frictions. The model is solved iteratively. In a first step, the effect of a shock in the bilateral friction on trade shares is calculated with fixed wages. In the second step, these trade shares are used to determine the corresponding incomes, expenditures and trade imbalances. Country-specific wages are then adjusted in the direction that the initial trade balances are restored. These two steps are iterated until the full model converges to a new equilibrium.

When interpreting the results of trade models like the one used in this study, it is important to keep in mind the critical assumptions and potential shortcomings of the method. Perhaps most importantly in our context, we make the assumption (like much of the recent literature in international trade), that the same good from different suppliers is perfectly substitutable. Put differently, the model assumes that goods in a given industry differ only by price, and not by quality. This implies that Dutch firms, for example, can replace the import of a certain good from China with an import from Great Britain by simply paying a higher price. This assumption, however, limits our ability to account for dependencies on "critical inputs" that are only available from one or a few suppliers (at least within a certain timeframe). Such inputs do exist in the real world, and can range from certain rare earths to high end manufactured goods like specific machines or microchips. Including such dependencies could significantly magnify the effects produced by the model.

In addition, our model operates under the assumption of a transition from one equilibrium to another without factoring in specific frictions and transitional costs. Such frictions include, for example, costly adjustments on labour markets (Artuç et al., 2010), as workers might need to transition from one industry to another, or from one region of the country to another. An example of transitional costs could be related to production capacities that may take a time to build and are costly: e.g. investments into new machinery, new infrastructure, and human capital. Adding such frictions and transition costs would amplify the costs of our decoupling scenarios.

2.1 Decomposition of results in broad decoupling scenario

The changes in production volumes across industries in a country under the broad decoupling scenario can be decomposed into four channels: direct loss, indirect loss, trade diversion, and other general equilibrium effects. Table 3 below contains the results of the decomposition.

The decomposition relies on a simple idea: using the trade shock and trade elasticities from the CPB trade model, we can get a reasonably accurate estimate of the new import shares. This approximation of the new import shares can be calculated as the solution of a system of equations in prices, $\hat{p}_j^s$, and costs, $\hat{c}_i^s$:

$$\hat{p}_j^s = \left(\sum_i \bar{\pi}_{ij}^s \left(\hat{k}_{ij}^s \hat{c}_i^s \right)^{-\eta_s} \right)^{-\frac{1}{\eta_s}}$$

$$\hat{c}_i^s = \hat{w}_i^{\gamma_i^{Ls}} \prod_r (\hat{p}_i^r)^{\gamma_i^{rs}}$$

Prices (by country and industry) are a CES aggregate of the prices of all country-specific varieties and production cost (by country and industry) are a Cobb-Douglas aggregate of all input prices (with input shares as weights). This system of equations is only in prices and cost and therefore much smaller than a full equilibrium model. In the equations, index *i* denotes the exporting country, *j* the importing country, and *s*, *r* the industries. $\bar{\pi}_{ij}^s$ is the initial import share, $\hat{k}_{ij}^s$ trade cost relative to initial trade cost (here the trade conflict shock is applied), η_s trade elasticity (estimated), $\hat{w}_i$ wage (relative to initial value), γ_i^{rs} input coefficient.

If we assume that wages do not change ($\hat{w}_i = 1$), this gives an approximation of the new import shares, π_{ij}^s, assuming that the shock in trade cost has propagated consistently into all prices and cost, but leaving wage adjustments and general-equilibrium income effects out of the picture:

$$\pi_{ij}^s = \bar{\pi}_{ij}^s \left(\frac{\hat{k}_{ij}^s \hat{c}_i^s}{\hat{p}_j} \right)^{-\eta_s} \quad (1)$$

The most direct effect of decoupling on Dutch production is then that Dutch exports to Russia and China are reduced by $\left(\pi_{NLDj}^s - \bar{\pi}_{NLDj}^s\right) E_j^s$ $(j = RUS, CHN)$, where E_j^s are total exports of industry s. This direct effect is shown in column "DL" (direct loss) of Table 3. Formally, "DL" is defined as

$$\text{DL} = \frac{X_{NLD}^s - \left(\pi_{NLDj}^s - \bar{\pi}_{NLDj}^s\right) E_j^s}{X_{NLD}^s} (j = RUS, CHN)$$

Domestic production is affected not only by reduced direct exports to Russia and China, but also by indirect value chain effects. These are intermediate deliveries of domestic firms to other firms, domestic or foreign, whose production is reduced because they sell less to Russia and China. In

order to separate these effects, we set up a modified input-output calculation in the spirit of the "hypothetical extraction" method (Dietzenbacher et al., 2019). In this exercise, all trade flows between trade partners in conflict are reduced according to the approximated new trade shares from (1) – without compensation for the time being This applies both to final demand and to intermediate inputs We assume that both final and intermediate demand for the products of the trade conflict adversaries are reduced by the difference between ex-ante and ex-post trade shares, without any compensation.

Formally this means that we start from the standard input-output relationship

$$\mathrm{x} = (\mathrm{I} - \mathrm{A})^{-1}\mathrm{f}$$

where f is the vector of final demand, A is the matrix of input coefficients, $(\mathrm{I} - \mathrm{A})^{-1}$ is the Leontief inverse and x is the vector of production levels. We adjust the final demand vector and the matrix of intermediate input coefficients to become $\tilde{\mathrm{f}}$ and $\widetilde{\mathrm{A}}$, respectively, and we calculate the adjusted necessary production levels as:

$$\mathrm{x} = \left(\mathrm{I} - \widetilde{\mathrm{A}}\right)^{-1}\tilde{\mathrm{f}} \tag{2}$$

The elements of initial final demand are

$$f_i^s = \sum_j \bar{\pi}_{ij}^s \, \alpha_j^s \bar{I}_j$$

where the $\bar{I}_j$ are incomes (assumed to be unchanged) and α_j^s are consumption shares. These elements are updated to become

$$\tilde{f}_i^s = \sum_j \pi_{ij}^s \, \alpha_j^s \bar{I}_j \tag{3}$$

if and only if *i* and *j* denote countries that are in trade conflict with one another Trade diversion is thus neglected for the time being The same holds for the elements of A. They change from

$$a_{is}^{jt} = \bar{\pi}_{ij}^s \gamma_{js}^t$$

to

$$\tilde{a}_{is}^{jt} = \pi_{ij}^s \gamma_{js}^t \tag{4}$$

where index *t* denotes the receiving industry and the γ_{js}^t are intermediate input shares.

The production levels resulting from (2) contain (relative to the initial situation) both direct and indirect losses from missing exports to RCH. If we subtract the direct losses in "DL", we get the indirect losses ("IL") in Table 3. As the direct losses, they are necessarily negative. The relative size of direct and indirect losses differs substantially across industries.

3 THE IMPACT OF DECOUPLING ON INTERNATIONAL TRADE

In this section we present our analysis of the impact of a broad decoupling of international trade. In the broad decoupling scenario, we assume that the West and a bloc consisting of Russia and China respectively increase their trade barriers towards each other, while the rest of the world stays neutral. We begin the analysis by examining the raw data in Section 3.1, before showing the

main results in Section 3.2. Section 3.3 shows results for the *strategic decoupling scenario*, in which only certain strategic industries will be affected by higher NTBs. Section 3.4 and 3.5 presents the results of two more specific decoupling scenario, the Global Sustainable Arrangement on steel and aluminium (GSA*)* scenario, in which the US and the EU set up an alliance on green steel production, and further trade integration scenarios, in which we have the EU and India, as well as the EU and Indonesia FTAs.

3.1 DESCRIPTIVE STATISTICS

We begin our analysis by examining the raw data on international trade. This will help us gain a sense of the magnitudes that are involved when talking about decoupling between blocs WEST and Russia and China (RCH). Table 2 shows the total value of gross economic transactions within and between the three blocs in 2019. Columns 1-3 show gross amounts (in trillion Euros). For example, the first amount from the top-left, 38.0, tells us that in 2019, RCH collectively produced 38 trillion Euros worth of goods and services that were consumed in RCH. Similarly, we can see that the bloc rest of the world (ROW) produced 2.8 trillion Euros of goods and services that were consumed in WEST. Column 'Total Production' and row 'Total Consumption' contain the sum across rows, and columns, respectively.

There is an imbalance in trade dependency between two blocs, RCH and WEST. Table 1 reveals several interesting facts about the relative size of trade flows, as well as economies. When we compare the absolute trade volumes between blocs RCH and WEST, we find that they are roughly equivalent in both directions: 1.3 trillion Euros. However, an imbalance becomes evident when we compare this with total production volume. Whereas 1.6% of WEST's total production is consumed in RCH, 3.2% of RCH's total production is consumed in WEST. In other words, a larger share of RCH's revenue depends on demand in WEST than the other way around. We see a similar picture emerge when we compare shares in consumption: 1.6% of WEST's consumption is sourced from RCH, whereas 3.2% of RCH's consumption is sourced from WEST.[2] These figures provide a first indication that RCH is more dependent on trade with WEST, than vice versa.

Three structural factors shape the patterns: first, relative economic size plays an important role. Table 2 shows that total gross output of WEST is roughly twice the total gross output of RCH in 2019. In a scenario where blocs would lose access to each other's markets, the WEST bloc would lose access to a smaller share of the world's economic production than the RCH bloc. In terms of value added (see Table 1) WEST's economy is three times larger, than RCH's, and 2.5 times that of ROW. Within RCH, China is the dominant economy in terms of value added. Within the WEST bloc, the US accounts for 43% and the EU for 30% of total value added. Russia's contribution to global value added is around 1.9%.

[2] Consumption shares can be calculated by dividing a given flow by the sum of its column, i.e. the total consumption of a given bloc.

Table 1 Value Added and Trade of Blocs and Selected Countries, trillion Euros or %, 2019

	Value added		Exports	Imports	Trade as % Value Added	Domestic use
	€	%	€	€	%	%
World	75.4	100.0	18.4	18.4	24.4	88.1
RCH	14.2	18.9	2.7	2.5	18.4	93.3
China	12.8	17.0	2.3	2.2	17.6	93.8
Russia	1.4	1.9	0.4	0.3	25.7	85.8
West	43.7	57.9	10.8	10.8	24.7	86.9
EU	12.9	17.1	5.5	5.1	40.9	79.1
USA	18.7	24.8	2.2	2.7	12.9	93.4
Row	17.6	23.3	4.9	5.1	28.6	84.7
Mexico	1.1	1.4	0.4	0.4	40.5	76.9
India	2.4	3.2	0.5	0.5	20.5	90.9

Source: FIGARO Release 2022
Note: trade as %. Total Value Added (TVA) = 0.5*100*(Exp+Imp)/VA

A second important factor is openness to trade, measured as trade as a share of GDP. For two countries that are otherwise equal, we would expect the country with higher openness to trade to be more impacted (in either direction) by what happens in the rest of the world. Economists expect that a country with a relatively high openness to trade stands to experience greater losses if it loses access to all foreign markets.

Larger economies tend to have a smaller share of trade relative to their GDP than smaller countries. For example, large countries like the US and China, show a trade openness (defined as the sum of imports and exports divided by GDP) of 13% and 18%, respectively, which is relatively low compared to the global average of 24%. The Netherlands and Mexico, on the other hand, exhibit higher proportions of trade, as detailed in Table 1. This implies that smaller, open economies will experience a higher variance of outcomes in our trade intervention scenarios.

Third, specific trade patterns play a role. Table 2 shows gross transactions across and within blocks. When we compare the destinations of goods produced in RCH (row 1), and in WEST (row 2), a noticeable disparity emerges: about half of the combined extra-bloc exports from the RCH are destined for WEST, whereas only about a third of the combined extra-bloc exports of WEST are destined for RCH.

Table 2 Gross transactions across and within blocs, trillion Euros, 2019

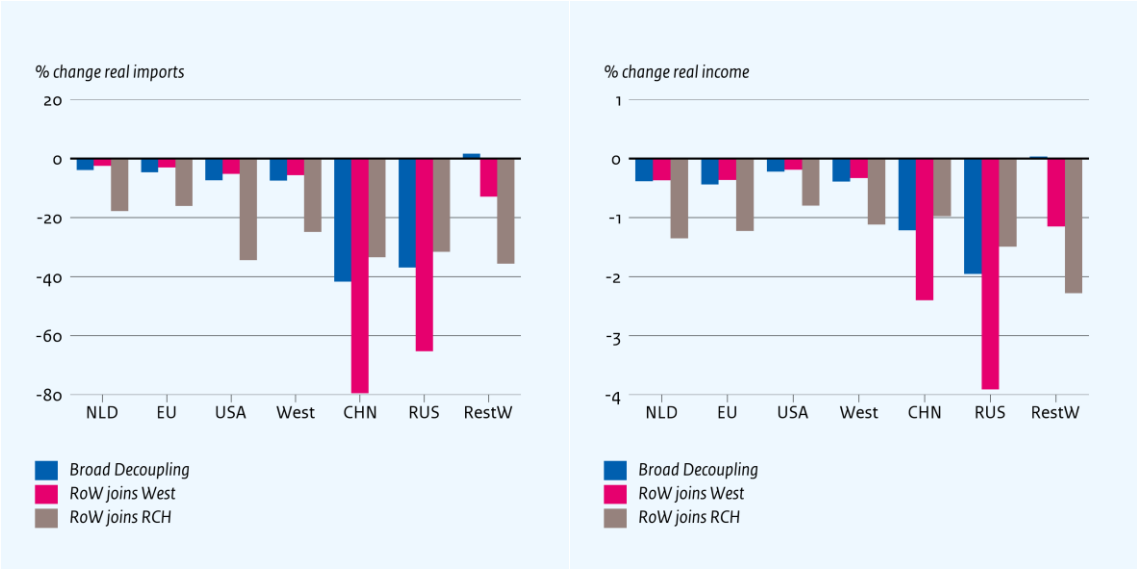
	RCH	WEST	ROW	TOTAL OUTPUT
RCH	38.0	1.3	1.3	40.6
WEST	1.3	78.3	2.7	82.3
ROW	1.1	2.8	28.4	32.3
TOTAL DEMAND	40.4	82.4	32.4	155.2

3.2 BROAD DECOUPLING

The *broad decoupling* scenario models the effect of a structural, and permanent decoupling of trade relations between two geopolitical blocs: WEST and RCH. WEST includes the member countries of the European Union (EU), the United States of America (USA), and 7 other countries. RCH includes the Russian Federation and China.[3] In this scenario, we assume a counterfactual 25% increase in non-tariff barriers (NTBs) on all trade flows between WEST and RCH. We make this assumption in order to model a scenario where the WEST and RCH blocs establish substantial trade barriers across all industries of the economy. We model this scenario via the imposition of NTBs, rather than tariffs, since we want to abstract from the revenue effects that the imposition of tariffs would entail in the model. Tariffs and NTBs have otherwise identical effects on the incentives to trade. Furthermore, we see the scenario as being motivated by a potential further escalation of geopolitical tensions, rather than a trade war-like situation.

This scenario serves to clearly demonstrate the mechanisms and magnitudes involved in such a situation, providing a depiction of 'what would be at stake' in a case of extreme confrontation. As will be shown in the results section, the imposition of these NTBs leads to a very substantial decrease in the amount of trade between the directly affected blocs. All countries that are not part of blocs WEST or RCH are jointly referred to as Rest of World (ROW), including countries like India, Indonesia, Mexico, and Turkey. In the baseline scenario, we assume that ROW is not directly affected by the changes in NTBs (although all countries are indirectly affected via general equilibrium effects which are in our model). In additional variants of the scenario, reported in Figure 1, we assume that ROW joins either WEST or RCH, and would thus also be directly impacted by changes in the NTBs.

Figure 1 Broad Decoupling Scenario – ROW joins WEST (left), ROW joins RCH (right)



Note: This Figure shows changes in real imports (left panel) and changes in real incomes (right panel) for a selection of countries and country groups under the three shown scenario. The changes are shown as % changes relative to the ex-ante situation.

[3] Appendix 6 contains a list of all countries covered in the data, as well as the definition of the geopolitical blocs.

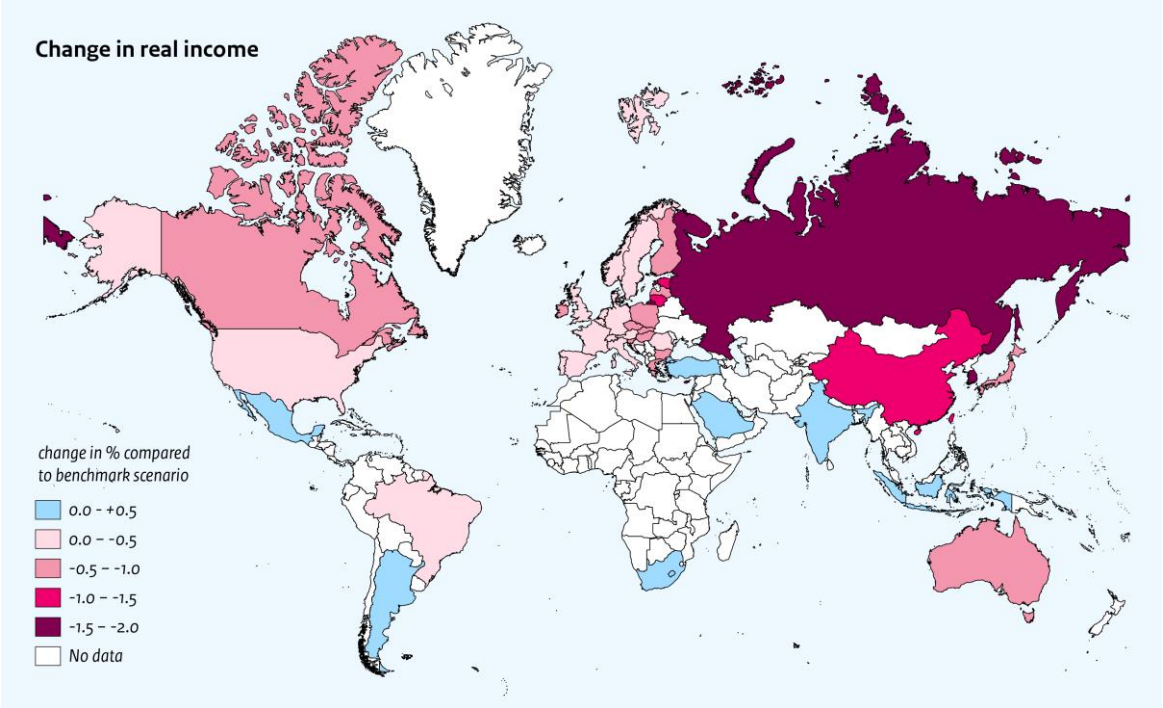
The broad decoupling scenario reduces imports by RCH by about 40%, while imports by Western countries decrease by less than 10%. Figure 1 shows that the reduction in imports is more substantial for the US than for the EU. This indicates a stronger connection between the US and the RCH bloc. This disparity in impact, particularly for European countries can mostly be explained by the relative strength of initial trade connections to the other bloc. The ROW countries see slight increases in their imports, as both WEST and RCH increase their trade with ROW.

Gross trade flows and trade in value added (TVA) change in broadly similar ways, although they represent different aspects of trade dynamics. Gross trade flows refer to the tangible imports and exports recorded in data, and analysed in our model. Conversely, TVA provides a different perspective, emphasizing the role of intermediate goods that countries import. These imported components contribute to the final products' value. For example, when German car manufacturers import intermediate inputs like engines or tires, these components make up a substantial share of the value of the final product. TVA recognizes and captures this aspect of global trade, shedding light on the interconnected nature of value creation across borders. We find that the change in TVA goes into the same direction as the change in gross trade flows, but is only partial.

These findings on observed changes in gross and TVA flows have several implications. First, the large drop in gross trade flows between WEST and RCH shows that firms and customers on both sides find alternative sources for the goods they buy and consume. The large change in TVA shows that this change is not merely a rerouting of existing TVA relations; after the decoupling, it is not the case that e.g. Western households consume the same value created in China as before the decoupling, but just wrapped in, for example, Vietnamese exports. Rather, Western households consume substantially less value added produced in China than before the decoupling. However, both the drop in gross trade flows, as well as the drop in TVA are less than 100%. This illustrates a larger point: While it may be relatively easy to replace certain goods from the other bloc, there are some trade relations that have very high value to consumers and firms. Even in the stark decoupling scenario, a non-trivial amount of gross trade, and an even larger amount of TVA remains. For certain goods and varieties, it may be very costly or hard to find a good source outside of the other bloc.

Countries that remain neutral in the decoupling scenario experience increases in trade and incomes. This is due to the trade diversion effect (further elaborated on in the decomposition exercise in Section 3.2.1). This can be seen in Figure 1 and Figure 2. As trade between the directly affected blocs (WEST and RCH) becomes more costly, consumers and firms in those countries choose firms in neutral countries to replace some of their products. Among the countries that experience larger imports are Mexico, India, and Turkey. Each of these countries is relatively well-connected to some of the directly affected countries, and therefore pick up some of the business that falls away between the blocs.

Figure 2 Changes in real incomes



Note: This Figure shows changes in real incomes by country under the broad decoupling scenario. The changes are shown as % changes relative to the ex-ante situation.

This result illustrates a more general point: third countries play an important role in mitigating the impact of any change in trade relations between two countries. In our model, we see that countries that do not join either of the blocs see an increase in trade. While it would be tempting to call these countries “neutral”, this may be misleading. In the economic sense, these countries are integrated with both blocs. They thereby call into question the definition of a bloc. They also highlight a basic aspect of discriminatory trade policies, such as e.g. sanctions or tariffs: there will always be incentives to circumvent them, and third countries will often play an important role in enabling or preventing this from happening.

When ROW joins either the WEST or RHC bloc, its imports will invariably be reduced. This is shown in Figure 1. However, the impact on imports is less severe when ROW joins WEST as this is the larger trading bloc. For the rest of WEST, the reduction in imports is lower when ROW joins WEST. This is because the enlargement of the WEST bloc leads to increased intra-bloc trade. Consequently, the ROW countries are able to compensate some of their trade losses with RCH by trading more with WEST countries. In the scenario where ROW joins WEST, the reduction in imports is large for RCH: almost 80%. Conversely, when ROW joins RCH, the countries in WEST face greater reductions in imports, as ROW now aligns its trade more closely with RCH, shifting the balance of global trade.

Changes in real incomes mirror those in imports. As can be seen in Figure 1 and Figure 2, trade restrictions invariably lead to a reduction in real incomes for the affected countries. This reduction occurs because maintaining production and consumption becomes costlier when certain trading partners, who previously had a comparative advantage in producing specific goods, are no longer available. Incomes experience the most significant reduction when trade restrictions encompass a broader range of countries and goods. When the ROW aligns with RCH, it exacerbates the decline in incomes for WEST.

Reductions in incomes vary significantly by exposure to the other bloc. In Figure 2, we show how the reduction in income varies by country, highlighting the heterogenous effect of such a trade shock for different countries. It is also evident that Eastern European countries are more affected than Western European countries, stemming from their stronger trade connection with Russia.

3.2.1 Direct and indirect effects

All the effects so far stem from demand loss due to the trade conflict. On the other hand, there are trade diversion effects. Trade volume is not simply lost, but may shift to other trading partners. For instance, if a European machine producer loses access to a supplier of intermediate products in Russia, it might shift to a different supplier in, say, the US. This effect can be calculated in the input-output setting from above (2) by adjusting the respective demand shares not only downwards (as in the calculations for "DL" and "IL"), but also upwards for the country-industry pairs benefitting from not being in conflict with each other. The adjustments in $\tilde{f}$ and $\tilde{A}$ from (3) and (4) are not only performed for the country pairs *i*, *j* that are in conflict with one another (as for the calculation of "DL" and "IL"), but for all countries, so that trade diversion enters the picture as well. The results are shown in column Trade Diversion in Table 3, which is the difference between (2) and the sum of Direct Losses and Indirect Losses. Again, the effects differ between the blocs, see Table 3.

The neutral Rest of World does not incur direct losses, but will be affected by indirect losses, albeit lightly. The China and Russa bloc suffer the highest direct losses, which can be explained by the fact they lose access to a large market (the West). However, the gain through trade diversion is also larger, which follows from the fact they need to find alternative trading partners. For the EU the direct losses are somewhat larger than the West bloc as a whole.

Table 3 Decomposition per bloc, highlighting the EU

	DIRECT LOSSES	INDIRECT LOSSES	TRADE DIVERSION	GENERAL EQUIL.	TOTAL
WEST	-1.3	-0.3	1.1	0.1	-0.5
EU	-1.5	-0.4	1.1	0.2	-0.6
RCH	-2.7	-1.0	2.2	-0.2	-1.6
ROW	0.0	-0.2	1.1	-0.7	0.2

Note: all given as % changes relative to pre-shock situation and adding up (except for rounding) to Total.

The full trade model adds further general equilibrium effects to what we get from the input-output calculation alone (column "Tot" in Table 3). These are (1) tariff revenue effects: If trade volumes change, tariff revenue changes as well, and this generates demand changes. And (2) trade balance effects: the wages in the different countries must adjust in a way that restores the initial trade balances. "General Equilibrium" in Table 3 reports the difference between the total model outcome and the earlier identified effects ("DL", "IL" and "TD").

3.3 STRATEGIC DECOUPLING SCENARIO

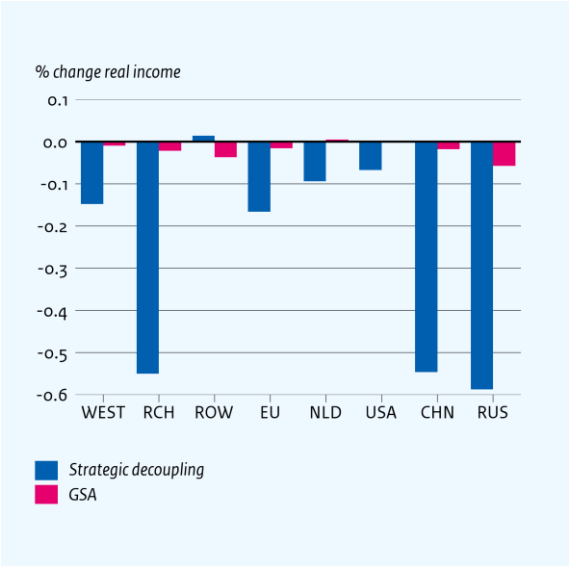
The Strategic Decoupling scenario captures the effects of decoupling trade relations only in goods of "strategic importance". This scenario is designed to capture the impact of policies aimed at reducing the risks of cross-bloc dependencies on critical inputs: think, for example, of computer chips, rare earths, or specialized chemicals. This scenario is motivated by the Open Strategic Autonomy agenda of the EU, in which it aims to "increase the EU's capacity to pursue its interests

and enforce its rights, including autonomously where needed" (EU, 2021). In this scenario, we define strategic goods as those in the mining industry, the chemicals industry, and high technology industries (FIGARO industries: B, C20, C26, C27, C28). We implement the scenario by assuming an increase of NTBs by 25% on trade of goods in these industries between blocs WEST and RCH.

Data constraints make it difficult to accurately model the potential effects of a decoupling of specific goods. The FIGARO dataset that we are basing our analysis on reports trade flows aggregated at the industry level. For instance, industry code C26 (Manufacture of computer, electronic and optical products) contains products ranging from computers, to computer keyboards, digital cameras, microscopes, semiconductors, electronic components like capacitors and resistors, display panels, and medical and dental instruments. Whereas some of these goods are presumably fairly commoditized, other goods likely require highly specialized knowledge and production processes. In the model and data, all of these products are described by the same trade flows, and are subject to the same elasticities of substitution. It is therefore very difficult to use this model and data to make specific statements about questions such as the existence of critical dependencies in the sourcing of semiconductors, or the role of individual companies. While such critical dependencies and bottlenecks may very well exist in the real world, we think that they are particularly relevant in the short run. In contrast, the CPB trade model is designed with long run relationships and adjustments in mind.

The consequences of a strategic decoupling scenario are qualitatively similar to those of the broad decoupling scenario, but smaller in absolute terms. This is the case because the measures of the strategic decoupling scenario are fully contained within the broad decoupling scenario. Figure 3shows the effects of a strategic decoupling scenario on real incomes across countries. We see that, similar to the broad decoupling scenario, Russia and China are more strongly affected than the West, and that the rest of the world sees an increase in real incomes.

Figure 3 Changes in Real Incomes – Strategic Decoupling and GSA Scenarios



Note: This Figure shows changes in real incomes for the affected countries and under the two scenarios. The changes are shown as % changes relative to the ex-ante situation.

3.4 GSA SCENARIO

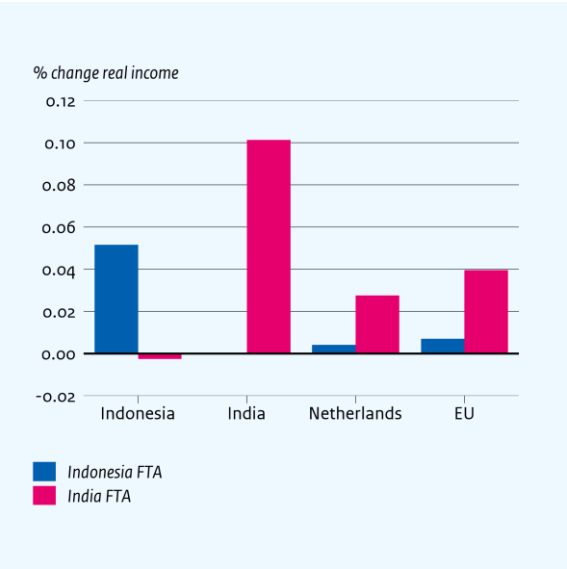
The Global Sustainable Arrangement on steel and aluminium (GSA) scenario simulates the implementation of additional tariffs on steel & aluminium by the US and the EU. We explore the case of additional tariffs imposed by the USA and EU on imports of steel products (C24 and C25) from all other countries. This scenario relates to recent negotiations about the GSA between the EU and the US. Implementation of such a policy would entail tariffs of 25% on steel, and 10% on aluminium on imports from countries outside of the agreement (i.e. outside of the EU and the USA). The idea of this policy is similar to that of a carbon club (which underlies the EU CBAM), i.e. a club of countries that imposes stricter carbon regulation and then tries to protect the competitiveness of its domestic producers with an import tariff on carbon-intensive goods.

Figure 3 shows changes in real incomes under the GSA scenario. The green steel alliance is modelled as a one-sided increase in import barriers, which means that the effect on real incomes can even become positive for countries whose domestic industry is now protected from foreign competition. According to our model, this would be the case for the Netherlands. For the West as a whole, the GSA scenario would still reduce real incomes, since most countries now need to switch to more expensive suppliers of metals.

3.5 TRADE INTEGRATION WITH INDIA AND INDONESIA

In this integration scenario, we explore the potential outcomes of two separate free-trade agreements (FTAs). The first agreement is between the European Union (EU) and India, and the second is between the EU and Indonesia. In both cases, we assume that all tariff barriers between the affected countries are completely eliminated as part of the agreements. This scenario is motivated by the ongoing negotiations regarding free-trade agreements between the EU, and India and Indonesia, respectively. The scenario provides insight into the economic dynamics that could emerge from such integrations.[4]

Figure 4 Changes in real incomes - FTAs with India and Indonesia



[4] See the European Commission's Negotiations and Agreements: https://policy.trade.ec.europa.eu/eu-trade-relationships-country-and-region/negotiations-and-agreements_en

Note: This Figure shows changes in real incomes for the affected countries and under the two scenarios. The changes are shown as % changes relative to the ex-ante situation.

Trade integration increases real incomes for the countries involved. Figure 4 shows changes in real incomes. Enhanced trade integration facilitates further specialization, and better utilization of comparative advantages. This results in cheaper inputs and higher real consumption. Since India's economy is larger than Indonesia's, the income effects for the Netherlands are larger when trade with India is opened. Real incomes increase even more when trade is increased with both. Additionally, because the EU is a larger market than either India or Indonesia, these countries benefit relatively more from integration than the EU itself.

4 CONCLUSIONS

Geo-economic tensions often overlap with geopolitical interests, as countries seek to enhance their global influence, secure strategic advantages, and promote national security alongside economic growth. These tensions can impact international relations, global markets, and the overall stability of the international economic system.

Our paper highlights that geo-economic aims are costly, and will involve shifts in trade and production patterns. The broad decoupling scenario, which involves imposing substantial trade barriers between the two blocs (West, and Russia and China), would significantly reduce trade flows, harming both sides but with varying degrees of impact.

When we break down the effects into four categories: direct losses, indirect losses, trade diversion, and other general equilibrium effects, we find that China and Russia would suffer greater economic damages compared to the West due to the decoupling. This is attributed to the relative economic size of the Western countries, which collectively form a larger portion of the world economy compared to Russia and China.

Countries outside of the two main blocs could benefit from trade diversion, potentially seeing an increase in exports and GDP. However, these countries cannot fully compensate for China's significant role in global trade. The study suggests that remaining neutral and maintaining trade relations with both blocs is the most beneficial stance for these countries.

The analysis incorporates long-term factors like lowest-cost sourcing and resource allocation across industries. Yet, there are also other costs to contend with such as the exclusion of trade-induced technological progress and the costs related to necessary economic structural shifts (e.g., in infrastructure, education, and production facilities). The model does not account for dynamic effects like economic growth or innovation, which could further amplify the costs of decoupling, especially if it leads to reduced knowledge spillovers and smaller market sizes affecting innovation in Western economies.

The findings imply that geopolitical tensions and the ensuing trade decoupling have complex and significant economic repercussions. Policymakers are encouraged to consider these implications when discussing the potential formation of new geopolitical blocs and the redesign of global trading relationships.

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6 APPENDIX: DATA DESCRIPTION

Table 4 List of Countries by bloc, FIGARO data

WEST	*RCH*	*ROW*
AT Austria	CN China	AR Argentina
BE Belgium	RU Russia	BR Brazil
CY Cyprus		ID Indonesia
DE Germany		IN India
EE Estonia		MX Mexico
ES Spain		SA Saudi Arabia
FI Finland		TR Turkey
FR France		ZA South Africa
EL Greece		WRL_REST All Remaining Countries
IE Ireland		
IT Italy		
LT Lithuania		
LU Luxembourg		
LV Latvia		
MT Malta		
NL The Netherlands		
PT Portugal		
SI Slovenia		
SK Slovakia		
BG Bulgaria		
CZ Czech Republic		
DK Denmark		
HR Croatia		
HU Hungary		
PL Poland		
RO Romania		
SE Sweden		
UK United Kingdom		
US United States		
AU Australia		
CA Canada		
CH Switzerland		
JP Japan		
KR South Korea		
NO Norway		

Table 5 Industry Classification (64) of FIGARO (June 2022 release)

A01	Crop and animal production, hunting and related service activities
A02	Forestry and logging
A03	Fishing and aquaculture
B	Mining and quarrying

C10T12	Manufacture of food products; beverages and tobacco products
C13T15	Manufacture of textiles, wearing apparel, leather and related products
C16	Manufacture of wood and of products of wood and cork, except furniture; manufacture of articles of straw and plaiting materials
C17	Manufacture of paper and paper products
C18	Printing and reproduction of recorded media
C19	Manufacture of coke and refined petroleum products
C20	Manufacture of chemicals and chemical products
C21	Manufacture of basic pharmaceutical products and pharmaceutical preparations
C22	Manufacture of rubber and plastic products
C23	Manufacture of other non-metallic mineral products
C24	Manufacture of basic metals
C25	Manufacture of fabricated metal products, except machinery and equipment
C26	Manufacture of computer, electronic and optical products
C27	Manufacture of electrical equipment
C28	Manufacture of machinery and equipment nec
C29	Manufacture of motor vehicles, trailers and semi-trailers
C30	Manufacture of other transport equipment
C31_32	Manufacture of furniture; other manufacturing
C33	Repair and installation of machinery and equipment
D35	Electricity, gas, steam and air conditioning supply
E36	Water collection, treatment and supply
E37T39	Sewerage, waste management, remediation activities
F	Construction
G45	Wholesale and retail trade and repair of motor vehicles and motorcycles
G46	Wholesale trade, except of motor vehicles and motorcycles
G47	Retail trade, except of motor vehicles and motorcycles
H49	Land transport and transport via pipelines
H50	Water transport
H51	Air transport
H52	Warehousing and support activities for transportation
H53	Postal and courier activities
I	Accommodation and food service activities
J58	Publishing activities
J59_60	Motion picture, video, television programme production; programming and broadcasting activities
J61	Telecommunications
J62_63	Computer programming, consultancy, and information service activities
K64	Financial service activities, except insurance and pension funding
K65	Insurance, reinsurance and pension funding, except compulsory social security
K66	Activities auxiliary to financial services and insurance activities
L	Real estate activities
M69_70	Legal and accounting activities; activities of head offices; management consultancy activities
M71	Architectural and engineering activities; technical testing and analysis
M72	Scientific research and development
M73	Advertising and market research
M74_75	Other professional, scientific and technical activities; veterinary activities
N77	Rental and leasing activities
N78	Employment activities
N79	Travel agency, tour operator reservation service and related activities
N80T82	Security and investigation, service and landscape, office administrative and support activities
O84	Public administration and defence; compulsory social security
P85	Education
Q86	Human health activities
Q87_88	Residential care activities and social work activities without accommodation
R90T92	Creative, arts and entertainment activities; libraries, archives, museums and other cultural activities; gambling and betting activities
R93	Sports activities and amusement and recreation activities
S94	Activities of membership organisations
S95	Repair of computers and personal and household goods
S96	Other personal service activities
T	Activities of households as employers; undifferentiated goods- and services-producing activities of households for own use

U	Activities of extraterritorial organisations and bodies

Table 6 Input substitution elasticities by industry

Industry	*Elasticity*
A	4.07
B	6.784
C10T12	3.243
C13T15	4.79
C16	3.167
C17	3.167
C18	3.167
C19	7.003
C20	7.178
C21	7.178
C22	6.026
C23	5.358
C24	5.913
C25	5.913
C26	12.073
C27	12.073
C28	13.238
C29	8.119
C30	8.119
C31_32	12.094
C33	12.094
All others	10.6