

A Three-Bloc Structure of the World Economy: Evidence of Geoeconomic Fragmentation in International Trade, Financial and Military Data

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Geoeconomic fragmentation has received much attention by scholars in recent years. The hypothesis that such fragmentation is taking place carries the assumption that distinct geopolitical blocs exist. Many studies include presumptions on the number and exact composition of these blocs, which vary largely in the literature. Taking stock of the different approaches reveals a considerable lack of effort to define blocs on an empirical basis. To narrow this gap, we aim to check the existence of different country groups in a data-driven manner. We apply hierarchical clustering to a broad set of geopolitically relevant data. Our results reveal a sensible three-bloc structure of the world economy, with these blocs centred around major geopolitical powers: the United States, the European Union, and a China-Russia conglomerate, respectively. While our results corroborate the commonly applied East-West divide, the finding that the two major Western geopolitical actors form separate blocs challenges the existing consensus.

Journal of Economic Literature (JEL) codes: F02, F12, F50

Keywords: geoeconomic fragmentation, geopolitical blocs, hierarchical clustering

1. Introduction

The global economy has been undergoing significant shifts throughout the past years. One of these reconfigurations can be described by the term geoeconomic fragmentation, which (although definitions vary) most commonly refers to a “policy-driven reversal of global economic integration often guided by strategic considerations” (IMF 2023a: p. 91). A body of research (see i.a. Norring 2024a; Kaarevirta et al. 2023) considers the formation of distinct geopolitical blocs to be a prerequisite for geoeconomic fragmentation. Nevertheless, the existence of such geopolitical blocs and the question of their composition are not empirically settled,

* The papers in this issue contain the views of the authors which are not necessarily the same as the official views of the Magyar Nemzeti Bank.

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The first version of the English manuscript was received on 27 August 2025.

DOI: <https://doi.org/10.33893/FER.25.2.65>

and previous research correspondingly exhibits substantial variation. Both two-bloc and three-bloc models are commonly used. Poles are usually coined as East and West (alternatively, US- and China-leaning blocs), while three bloc models typically add a third, neutral grouping. Literature classifies respective countries into these blocs either arbitrarily or based on United Nations (UN) voting behaviour patterns (for a detailed comparison refer to *Section 2.3*). Thus, we have identified a significant niche in the literature addressing the phenomenon of geoeconomic fragmentation: to the best of our knowledge, the existence (as well as the number and the composition) of such economic blocs has not been researched in any systematic manner. In order to narrow this gap, our aim was to identify geoeconomic blocs (if any) empirically, i.e. based on linkages which might exist between different countries in terms of various geoeconomic data such as trade, investments, finance and military links. Applying a widely used clustering technique (hierarchical clustering) to a broad set of data, our results support the idea that certain country groupings exist and have a meaningful impact on the structure of the international economy. Nevertheless, our results offer a different bloc structure of the global economy than those in the existing literature. We identify three blocs centred around the United States, the European Union, and the China-Russia conglomerate, respectively. While the East-West divide remains, the finding that the United States and the EU belong to different blocs largely differs from what has been assumed in previous research.

This paper is structured as follows. *Section 2* provides an overview of the literature (including a definitional framework and a review of the effects of geoeconomic fragmentation, as well as an extensive discussion of how the various studies divide the world economy into geopolitical blocs). *Section 3* describes the methodology and empirical approach we used to identify blocs. In *Section 4*, we present the results, while *Section 5* elaborates on our conclusions.

2. Literature review

2.1. Geoeconomic fragmentation: a definitional framework

The recent shifts in the global economy cover a broad range of economic activities and cross-border flows, and are caused by a multitude of reasons, including the emerging systemic rivalry between the United States and China, the COVID-19 pandemic, supply chain and energy crises as well as the ever-intensifying military conflicts of the 2020s (see e.g. *Halmai 2023; Altman et al. 2024 and Halmai 2025b*; for an in-depth historical review, see i.a. *Halmai 2025a*). Many concepts have emerged in the literature describing these reconfigurations (e.g. deglobalisation, decoupling, nearshoring, friendshoring, etc. with fragmentation being the most common of them). Due to the novel need to describe the shifts of the global economy, definitions often vary and overlap. In this section we provide a brief overview of concepts related to the current reshaping of the global economy in order to facilitate a deeper discussion of the analysis of geoeconomic fragmentation.

The most common term capturing this reconfiguration of the global economy is geoeconomic fragmentation. Its most widely accepted definition stems from the *IMF (2023a)*, which describe geoeconomic fragmentation as “a policy-driven reversal of global economic integration often guided by strategic considerations” (p. 91; this definition is also used by *Aiyar – Ilyina 2023; Bolhuis et al. 2023* as well as *Mohr – Trebesch 2025* amongst other). The IMF’s definition is complemented by that of *Gopinath et al. (2024)*, who emphasise that these policy-induced changes apply for “the sources and destinations of cross-border flows” (p. 1) and are “often guided by strategic considerations, such as national and economic security, sovereignty, autonomy” (*ibid.*; this definition is also referred to by i.a. *Altman et al. 2024* and *Ginter 2025*).

Separating the concepts of geoeconomic fragmentation is no easy task, not only due to their novelty but also due to several similar (or even overlapping) concepts having emerged in the past years. In her review, *Norring (2024a)* provides a conceptual framework by classifying the concepts of (de)globalisation and (geo)economic fragmentation. *Norring* defines globalisation as an “increasing of links of economic activity between countries” (*ibid.* p. 8) and conversely deglobalisation describes a dissolution of such linkages “driven by e.g. changes in technology, preferences, regulation, or economic conditions” (*ibid.*). *Norring* distinguishes fragmentation from deglobalisation by a special characteristic of the former, namely, the emergence of “concentration of economic activity within blocs” (*ibid.*).¹ Blocs (a term referring to a group of countries based on a certain kind of proximity) can be formed on a regional basis (i.e. between countries close to each other in a geographical sense) or based on policy proximity. Should fragmentation occur due to geopolitical motives and strategic rivalry, one speaks of geoeconomic fragmentation (see also *Norring 2024b* and *Airaudo et al. 2025*).

Other interlinked concepts include those of friendshoring (“a preference for sourcing inputs from economies that share similar values”; *Javorcik et al. 2023: p. 2*), nearshoring (the shortening and regionalisation of global value chains caused by the risks stemming from distance; *Plummer 2023*), reshoring (bringing back production to certain countries and thus protecting the domestic economy; *Altman et al. 2024* and *Plummer 2023*) as well as decoupling (“the process of weakening interdependence between two nations or blocs of nations”; *Witt et al. 2023: p. 1*). Other authors (e.g. *Kaaresvirta et al. 2023*) use the term decoupling for the “economic distancing of China and the United States” (p. 4) and use fragmentation as nations “either taking sides in US-China competition or forming alternative trading blocs” (*ibid.*).

As demonstrated above, concepts related to (geoeconomic) fragmentation are not only intertwined, but often used interchangeably. In this paper, we rely on

¹ In this paper, we use the term *blocs* in the broader sense outlined above, i.e. to denote groupings in which multiple dimensions of economic activity are concentrated. These dimensions include not only trade, but also other forms of cross-border economic flows.

the definition of the *IMF* (2023a) (i.e. we consider fragmentation as a policy-driven reversal of global economic integration, p. 91) as well as *Norring's* (2024a) prerequisite for the formation and concentration of economic activity within blocs. By such blocs (and in similar vein as e.g. *Aiyar et al.* 2023), we mean groups of countries that exhibit tighter economic integration within the group and reduced engagement with countries outside the group. In the following parts of the literature review, we consider studies that deal with geoeconomic fragmentation based on the above definitions, even if the respective authors use the term differently. In the following sections, we summarise certain characteristics and effects of geoeconomic fragmentation as well as the understanding of blocs serving as a prerequisite for geoeconomic fragmentation.

2.2. Geoeconomic fragmentation: channels and effects

In order to gain deeper understanding of the phenomenon, in this section we present the channels through which geoeconomic fragmentation is transmitted, as well as its effects on global welfare. *Aiyar – Ilyina* (2023) identify three main channels through which the effects of fragmentation are transmitted: (1) international trade, (2) cross-border migration, and (3) cross-border capital flows (and foreign direct investments, in particular). Earlier, these channels used to be the main contributors to global economic integration (supported by the diffusion of technology), and conversely the diminished use of these channels reinforces fragmentation trends. *Fernández-Villaverde et al.* (2024) identify a similar structure of variables along which they quantify geopolitical fragmentation. The authors identify 16 variables as proxies, grouped in a four-factor structure; the four factors include (1) trade fragmentation (comprising trade openness as well as different types of trade restrictions); (2) financial fragmentation (comprising FDI and financial flows as well as capital controls); (3) mobility fragmentation (including migration-related variables as well as patent flows); and (4) political fragmentation (including geopolitical risk, UN voting patterns, energy uncertainty as well as the number of armed conflicts and sanctions).

The estimated effects of geoeconomic fragmentation vary to a large degree (*Farkas et al.* 2023). Two different approaches persist in the literature when it comes to calculating these estimates. The first approach uses different modelling strategies to estimate the economic costs of fragmentation; these papers emphasise the costly nature of fragmentation-related policies. *Javorcik et al.* (2023) use a quantitative, two-bloc model incorporating inter-country inter-industry linkages and find that fragmentation² may result in losses of up to 4.7 per cent of GDP in certain economies. *Campos et al.* (2023) also model the welfare effects of trade fragmentation in a supposed three-bloc setup (West, East and Neutral). They estimate that in case

² While *Javorcik et al.* (2023) use the term “friendshoring”, their paper clearly focuses on fragmentation effects (as it analyses scenarios of trade between and within two distinct geopolitical blocs). This also reflects the need for a clear terminology on these interlinked concepts.

of three-bloc fragmentation, global trade flows would diminish by up to 57 per cent, resulting in welfare losses up to 3.7 per cent (these losses would be higher in the Eastern bloc). Similarly, *Felbermayr et al. (2023)* modelled the effects of decoupling by major economies and country groups (the EU, the US, Russia and China) from one another. The most severe scenario (with the US and the EU decoupling from the BRICS economies³) would result in welfare losses up to 3.9 per cent.

The second approach uses retrospective analyses of available data (on trade, FDI, etc.), trying to prove or disprove of the existence of geoeconomic fragmentation. In these studies, the results are more nuanced. *Altman et al. (2024)* challenge the deglobalisation narrative drawing on a multitude of variables proxying cross-border transactions. They find that “international flows have not decreased relative to domestic activity, there is not an ongoing shift from global to regional business, and geopolitically driven shifts in international flows still primarily involve countries at the centre of present conflicts” (p. 416). While certain signs of US-China decoupling persist (as well as Western countries successfully decoupling from Russia), the global economy does not seem to have rearranged itself into geopolitical blocs distinct from each other. *Kaarevirta et al. (2023)* come to a similar conclusion when comparing trade and investment trends before and after the start of the US-China trade war (using this need for decoupling as a demarcation). They find that while US-Chinese linkages contracted after the start of the trade war, no other signs of the formation of distinct blocs had emerged by their cut-off point in 2021. *Aiyar – Ohnsorge (2024)* contradict the above findings, stating that between 2016 and 2023 fragmentation increased in trade, bank and FDI liabilities. Similarly, *IMF (2023a)* find that FDI flows have become increasingly common between geopolitically aligned countries, and especially in strategic sectors.

2.3. Geoeconomic fragmentation and blocs

As referred to by *Norring (2024a)*, one prerequisite for (geoeconomic) fragmentation is the formation of distinct blocs. Specifically considering geoeconomic fragmentation, these blocs are formed on the basis of particular geopolitical strategic alliances. While a thorough definition of such blocs is necessary to capture geoeconomic fragmentation, the literature is divided on what categorisations should be used to describe the respective blocs. In the following, we review fourteen different studies focusing on fragmentation-related topics, all of which include geoeconomic blocs. The body of literature reviewed is not only divided on the number of blocs, but also their composition and what this composition is based upon. We summarise these variations below; the results of the review are also presented in a structured way in *Table 1*.

First, the number of blocs is not uniform across the literature: studies either use two- or three-bloc models (examples for the former include *Alvarez et al. 2023*; *IMF*

³ Brazil, Russia, India, China and South Africa.

2023b; Bekkers – Góes 2023; Maskus 2023; while for the latter Campos et al. 2023; Gopinath et al. 2024; Aiyar – Ohnsorge 2024; Bolhuis et al. 2023; Fernández-Villaverde et al. 2024; Conteduca et al. 2025; Baur et al. 2023; Baur et al. 2025; Kirsamer – Riha 2025 as well as Gopinath 2023) or both (Javorcik et al. 2023; Abeliansky et al. 2024).

Second, categorisations also vary, however, to a lesser extent. Most categorisations include an East-West divide, often framed as a US-centred bloc and a China-centred bloc (Aiyar – Ohnsorge 2024; Gopinath et al. 2024; Bekkers – Góes 2023; Abeliansky et al. 2024; Conteduca et al. 2025; Baur et al. 2023), respectively. Others (IMF 2023b; Bolhuis et al. 2023; Fernández-Villaverde et al. 2024 and Kirsamer – Riha 2025) specify the Western bloc as the conglomerate of the US and the European Union, while the Eastern counterpart is Russia and China. There are also some other regional specifications (Javorcik et al. 2023; Abeliansky et al. 2024; Gopinath 2023), which are presented in detail in Table 1. Three-bloc models (see above) also include a neutral or non-aligned bloc, the members of which are neither Western nor Eastern allies. In certain cases, the latter bloc is used as the set of “connector countries” (see Baur et al. 2025, as well as Aiyar – Ohnsorge 2024), characterised by “their unique position in maintaining substantial economic ties with both Western and Eastern blocs” (Baur et al. 2025: Section 1., para. 2). However, non-aligned countries are often treated as members of a third bloc (aligned to neither of the two world powers).⁴ Nevertheless, the available body of research on connector countries is limited so far and which countries behave as connectors varies across the literature. Thus, in our paper we do not address this issue explicitly; however, we encourage future research in doing so. Third, it varies to a high extent upon what the respective authors base the composition of the respective geopolitical blocs. The majority of the studies reviewed uses countries’ voting behaviour at the United Nations General Assembly (UNGA). Certain authors either compose their blocs based on the voting behaviour for one specific resolution: the resolution on the aggression against Ukraine (Javorcik et al. 2023; Alvarez et al. 2023; IMF 2023b) or the resolution concerning the suspension of the rights of membership of the Russian Federation in the Human Rights Council (Campos et al. 2023). A more sophisticated approach to countries’ categorisations into geopolitical blocs based on voting behaviour at the UNGA includes the usage of aggregate voting behaviour (ideal points and clustering: Javorcik et al. 2023 and Kirsamer – Riha 2025;⁵ the Foreign Policy Similarity Database based on UNGA voting: Bekkers – Góes 2023; or affinity of voting with China or the US: Maskus 2023; Gopinath et al. 2024; Abeliansky et al. 2024; Aiyar – Ohnsorge 2024). Several other authors (Bolhuis et al. 2023; Fernández-Villaverde et al. 2024; Conteduca et al. 2025) use an arbitrary East-West (or alternatively EU-US and Russia-China) categorisation of blocs instead. In addition, Gopinath (2023) uses a historical categorisation from the Cold War era.

⁴ The paper of Baur et al. (2025) includes three simulations, in two of which connector countries are assigned to either of the two blocs concentrated around the US and China.

⁵ The latter includes further diplomatic and political variables: the Level of Representation index and the Voice and Accountability index.

Table 1
Number and the composition of geopolitical blocs in the literature reviewed

Author(s)	Number of blocs	Name and composition of blocs	Methodological basis of the composition of blocs
<i>Javorcik et al. (2023)</i>	2	Bloc 1: countries voting in favour of the UN General Assembly resolution on “Aggression against Ukraine” Bloc 2: countries voting against or abstaining	Voting behaviour at the UN General Assembly (on the resolution on “Aggression against Ukraine”)
		Bloc 1: North America and Europe Bloc 2: Southeast Asia, Russia, Latin America	Voting behaviour at the UN General Assembly (ideal points based on voting between 2014 and 2021)
	3	Friends, non-friends and non-aligned	Voting behaviour at the UN General Assembly (clustering based on heat maps of bilateral vote similarity)
<i>Alvarez et al. (2023)</i>	2	Bloc 1: countries voting in favour of the UN General Assembly resolution on “Aggression against Ukraine” Bloc 2: countries voting against or abstaining	Voting behaviour on the UN General Assembly resolution on “Aggression against Ukraine”
<i>IMF (2023b)</i>	2	Bloc 1: US-Europe+ Bloc 2: China-Russia+	Voting behaviour on the UN General Assembly resolution on “Aggression against Ukraine”
<i>Campos et al. (2023)</i>	3	Bloc 1: West Bloc 2: East Bloc 3: Neutral	Countries allocated to a bloc according to UN vote “on the resolution concerning the suspension of the rights of membership of the Russian Federation in the Human Rights Council. Countries are part of a Western, Eastern, or a Neutral bloc, depending on whether they voted with Russia, against Russia, or abstained” (p. 2)
<i>Gopinath et al. (2024)</i>	3	Bloc 1: US leaning bloc Bloc 2: China leaning bloc Bloc 3: Non-aligned	Political proximity based on voting patterns at the UN General Assembly; top quartile of voting with the US or China results in being classified into Bloc 1 or 2, otherwise a country is considered non-aligned
<i>Bekkers – Góes (2023)</i>	2	Bloc 1: West (US-centred bloc) Bloc 2: East (China-centred bloc)	Foreign Policy Similarity Database based on UN General Assembly voting
<i>Maskus (2023)</i>	2	Bloc 1: higher-productivity West (EU and US centred) Bloc 2: lower-productivity East (China-centred bloc)	Affinity of voting with China and the US at the United Nations

Table 1 Number and the composition of geopolitical blocs in the literature reviewed			
Author(s)	Number of blocs	Name and composition of blocs	Methodological basis of the composition of blocs
Abeliansky et al. (2024)	2	Bloc 1: US bloc (North America, Europe, Japan, South Korea, Australia, New Zealand) Bloc 2: China bloc (Asia, Africa, Latin America, Caribbean)	Geopolitical distance to China and the US based on voting behaviour at the UN General Assembly
	3	Bloc 1: US bloc (North America, Europe, Japan, South Korea, Australia, New Zealand) Bloc 2: China bloc (most of Central Asia and North Africa, parts of Southeast Asia) Bloc 3: Non-aligned (Russia, India, Middle East, Latin America, Caribbean)	Geopolitical distance to China and the US based on voting behaviour at the UN General Assembly; countries that are not in the closest quartile of the US or China are considered nonaligned
Aiyar – Ohnsorge (2024)	2	Bloc 1: US bloc Bloc 2: China bloc	Geopolitical distance to China and the US based on voting behaviour at the UN General Assembly
Bolhuis et al. (2023)	2	Bloc 1: EU and US Bloc 2: Russia and China	Arbitrary
Fernández-Villaverde et al. (2024)	3	Bloc 1: EU and US Bloc 2: Russia and China Bloc 3: others	Arbitrary
Conteduca et al. (2025)	3	Bloc 1: West (US-centric bloc) Bloc 2: East (China-centric) Bloc 3: non-aligned	Arbitrary
Baur et al. (2023)	3	Bloc 1: West (led by the US) Bloc 2: East (led by China) Bloc 3: non-aligned (i.a. India, Brazil, South-Africa)	Arbitrary; alternative scenarios include non-aligned joining either Bloc 1 or Bloc 2
Baur et al. (2025)	3	Bloc 1: West (led by the US) Bloc 2: East (led by China) Bloc 3: nonaligned (i.a. India, Brazil, South-Africa)	Voting behaviour in the UN vote on the suspension of Russia's membership in the Human Rights Council
Kirsamer – Riha (2025)	3	Bloc 1: EU and US Bloc 2: Russia and China Bloc 3: New bloc	The new bloc (which could not be identified with 2002 data) includes i.a. Latin American, South African countries as well as India.
Gopinath (2023)	3	Bloc 1: West (US, Europe, Canada, Australia and New Zealand) Bloc 2: East (Belarus, China, Mali, Nicaragua, Russia, and Syria) Bloc 3: Non-Aligned (rest of the world)	Based on Gokmen's (2017) categorisation referring to the Cold War period
Source: based on the body of literature listed			

2.4. Research questions

Our literature review clearly shows that the phenomenon of geoeconomic fragmentation has gained much importance in the past decade. Nevertheless, one conceptual question remains unanswered: what exactly are the blocs between which economic activity is diminishing and causing geoeconomic fragmentation by doing so? As shown in *Section 2.3*, there is no consensus on the number and composition of these blocs. Furthermore, so far the literature lacks any solid methodology for dividing the global economy into different blocs. A number of authors did so in an arbitrary fashion, while others used voting behaviour at the UNGA for doing so. As noted in *Section 2.1*, geoeconomic fragmentation is a complex phenomenon, comprising economic, security and foreign policy factors. Thus, the usage of voting behaviour only allows for a partial understanding of fragmentation and excludes a number of economic and geopolitical variables. (Some, but not all of relevant variables were collected by *Fernández-Villaverde et al. (2024)*; however, they also constructed the bloc structure in an arbitrary manner.) Thus, we have identified a niche in the literature focusing on geoeconomic fragmentation: to the best of our knowledge, no attempt has been made to empirically identify the blocs upon which geoeconomic fragmentation is based. We thus design our research to address the following questions:

1. Is there an identifiable structure of blocs in the global economy?
2. If such a structure exists, is it one consisting of two, three or more blocs?
3. If such a structure exists, does it align with the supposed East-West divide described in the literature?
4. If such a structure is available, which countries of the world economy can be categorised in the respective blocs?

3. Methodology

As described, we found a significant gap in the literature, i.e. a lack of empirical approaches to identify groups of countries (“clusters”) based on relevant data, which reveal basic splits (if any) on the global level in terms of trade, investment and other kinds of relations. To fill this gap, we apply a widely used clustering technique (hierarchical clustering) to a broad set of data which we deem relevant based on the literature of geoeconomic fragmentation, as well as practical considerations (data availability, quality, etc.).⁶ As usual in econometrics, the method of clustering

⁶ Clustering is a widely used methodological approach in international economic research. Some of the studies cited in *Section 2.3* use different clustering approaches (*Javorcik et al. 2023* and *Kirsamer – Riha 2025*) for researching certain (narrower or specific) aspects of geoeconomic fragmentation. Nonetheless, clustering is more typical for researching other aspects of international economics. Notable examples include the clustering of countries based on their Human Development Index (see e.g. *Altas – Arikian 2017*) or international (e.g. trade) flows (see e.g. *Jiménez-Almazán et al. 2020*).

is sensitive to different choices regarding (inter alia) the sample, the variables and certain features of the technique itself. Our choices are explained in more detail in *Sections 3.1* and *3.2*, respectively. The final results are based on several rounds of iterations where we applied clustering to various sets of countries and variables. In the following, we present our data and considerations which resulted in the final “sample” underlying the main output of this paper.

3.1. Variables and data

The starting point of our empirical work is the identification of variables which could be decisive in determining the “geoeconomic proximity” of different countries. For the purposes of this paper, the concept of “geoeconomic proximity” is operationalised to capture the strength of the relationship of country *i* with a small set of “great powers” of our age. Countries are then compared based on these relationships and included in clusters characterised by the presence or lack of these “great powers”. It is undoubted that the United States (US) and the People’s Republic of China (PRC, hereinafter “China” or CN) need to be regarded as such powers, as they are at the heart of the fragmentation issue nowadays. Besides them, the European Union (EU) and Russia (RU) are among the major players mastering a web of geoeconomic relations spanning beyond their closest neighbours. Thus, we select these four actors as “points of reference” when creating measures of economic and geopolitical links.

With regard to these links, we identify five broad topics relevant for fragmentation, based on our literature review:

- (1) Trade,
- (2) Foreign direct investments,
- (3) International financial support (development finance),
- (4) Military links (arms sales),
- (5) Public opinion (about “great powers”).

These broad categories cover the most important aspects of geoeconomic fragmentation discussed in a broad set of papers focusing on the topic (*Section 2*). Furthermore, this list already reflects practical considerations such as data availability. Variables and metrics related to these topics can be best interpreted as proxies signalling the overall stance or orientation of different countries vis-à-vis the four “great powers” mentioned above.

This approach yields the variables included in *Table 2*.

Table 2
Full set of variables considered in the empirical analysis

Topic	Variable	Description and notes	Unit of measure	Source	Variable names
(1)	Trade share of “great power” j in total foreign trade of goods of country i in 2022	j = US; CN; EU; RU Total foreign trade (goods): exports + imports	%	IMF	TRADE_SHARE_US TRADE_SHARE_CN TRADE_SHARE_EU TRADE_SHARE_RU
(2)	Net FDI stock of “great power” j in country i in 2023	Liabilities less assets	Million USD	IMF	FDI_US FDI_CN FDI_EU FDI_RU
(3a)	Approved financing amounts by AIIB to country i between 2016 and July 2025 (Asian Infrastructure Investment Bank)	Proxy of closer links to China Sum of nominal values (sovereign and non-sovereign finance extended to/in country i)	Million USD	AIIB	FIN_AIIB
(3b)	IBRD loans, total disbursed amount to country i as of 30 June 2025 (International Bank for Reconstruction and Development, World Bank)	Possible proxy of closer links to the West Data provided by IBRD as sum of nominal values	Million USD	IBRD	LOAN_IBRD
(4)	Ratio of arms purchases by country i from source k, for items purchased between 2016–2024	k = NATO and APAC allies; CN; RU Ratio calculated from sum of purchase volumes (number of items)	%	SIPRI	ARMS_NATO ARMS_CN ARMS_RU
(5)	Net favourability of China in country i, 2024 or latest data available since 2020	Aggregated worldwide polling data, share of positive minus negative responses No wide-scale data available for US, EU, RU	ppt	ASPI	FAV_CN
<i>Note: Topic (2) was omitted in final output due to data availability issues (several cases of missing data).</i> <i>Unit of measure: Standardised variables are used for clustering.</i> <i>APAC allies: Closest US allies in the Asia-Pacific region, i.e. South Korea, Japan, Australia, Philippines, Taiwan (Republic of China, ROC). The distinction between the ROC and the PRC is merely practical and does not represent any statement on the related territorial issues.</i> <i>For details of data sources, see Appendix Table 4.</i>					

3.2. List of countries and clustering method

Initially, we considered the full list of countries; however, due to missing data, countries with a population of less than one million were removed. In a narrower list of 156 countries, lack of data and potential distortions still posed a challenge, especially when FDI data was included as initially planned. To handle this issue, FDI variables had to be removed, just as Latin American and Sub-Saharan countries. Our final (standardised) data set thus contains 89 countries ($N = 89$) and 10 variables (those described in the last column of *Table 2*, except for Topic (2)). Clusters were identified by hierarchical clustering using the Ward criterion.^{7, 8}

4. Results

Based on the dendrogram (*Appendix Figure 2*), three clusters can be identified. *Figure 1* and *Table 3* provide an overview of them. For the list of members in each cluster, see *Appendix Table 5*. Significance tests show that all of the 10 variables included in the analysis have a significant relationship with cluster membership ($\alpha = 10\%$). (Except for `TRADE_SHARE_CN` and `FAV_CN`, all the other variables have an empirical significance level less than 5%.)

⁷ Our basic distance metric was the Euclidean distance which is a conventional and very common interpretation of distance in a multidimensional space of data points. The Ward approach starts with unique data points (i.e. their Euclidean distance) and creates groups based on the objective to minimise the increase in total within-cluster variance (within-cluster sum of squares, WSS). This process can be best illustrated with dendrograms. Instead of this agglomerative approach, it is possible to randomly set a certain number (k) of cluster centres and assign the closest data points to them (usually using their Euclidean distance). This is called k-means clustering, where the subsequent iterations change the cluster centres step by step to minimise the WSS (until no further improvement is possible). As a counterfactual to our main output, we also resorted to k-means clustering. (Missing data were handled by MICE imputation, i.e. multiple imputations by chained equations.) In the cases of $k = 3$ and $k = 4$, the result was disproportionate in terms of the size of the resulting clusters. (Most of the countries, i.e. 72 and 67 of them, respectively, formed one single cluster, while the remaining clusters were very small.) This highlights the fact that our results are sensitive to different clustering techniques as it was only the Ward criterion which resulted in meaningful outcomes. However, we believe that our case study adds to the empirical analysis of geoeconomic fragmentation, considering the significant barriers in data availability and quality, as well as the high complexity of the global geoeconomic landscape.

⁸ As FDI was excluded from our final cluster analysis, we deem that the remaining variables grasp conceptionally different dimensions of international linkages (i.e. trade; military links; financial links; public opinion). Any relationships among these variables can eventually be traced back to a latent variable, namely a general orientation of a country towards one of the great powers/geopolitical blocs, which is the major topic of our paper. Therefore, excluding any of our variables due to its potential relationship to the others could result in limiting our interpretation of “geopolitical proximity”, and would be rather arbitrary.

Figure 1
Our clusters on the world map

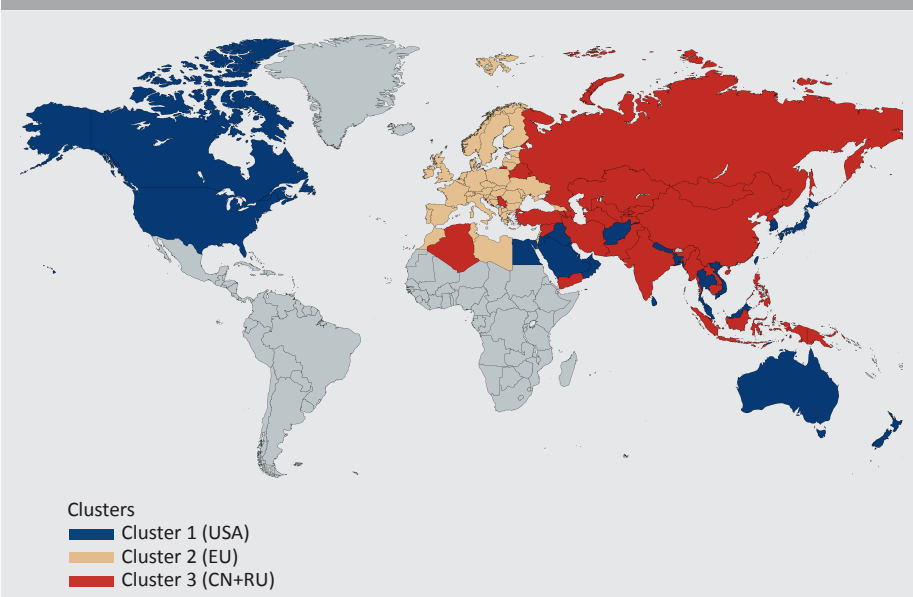


Table 3
Overview of the clusters

Cluster	“Great power” in the cluster	Examples of other countries	n	Cluster averages										FAV CN
				Trade share (%)				Finance (Million USD)		Arms purchases (%)				
				US	CN	EU	RU	AIIB	IBRD	NAT	CN	RU		
(1)	US	Australia, Canada, Gulf States, Japan, South Korea, Taiwan	25	10	19	10	1	420	2,598	85	4	4	7	
(2)	EU	Georgia, Israel, Ukraine, United Kingdom	38	5	6	60	3	28	2,974	90	1	0	−19	
(3)	CN, RU	Armenia, Azerbaijan, India, Iran, Kazakhstan, Serbia, Türkiye	26	4	26	17	11	1,565	10,787	20	16	42	31	

Note: Higher values (percentage points) of FAV_CN mean a more positive image of China. Averages are unweighted.

Based on this cluster structure, the between-cluster sum of squares (BSS) was calculated and compared to the total sum of squares (TSS). Calculating BSS/TSS, i.e. eta-squared yielded 0.102. This can be interpreted as meaning that 10 per cent of the variance in the dataset is explained by our cluster structure. This effect size is a major limitation of our paper. However, considering the difficulties in capturing the underlying phenomenon (i.e. fragmentation), as well as data availability issues, it can be concluded that our classification still carries a considerable amount of relevant information. This is supported by the fact that each variable proved to be significant in the respective ANOVA tests as explained above.

Boxplot is an easy-to-use tool to illustrate the distributions of the variables in each cluster. Our boxplots are included in *Appendix Figure 3*. We rely on them and the cluster averages (*Table 3*) to characterise the three country groups.

Cluster 1 includes the United States and many of its closest allies. It is remarkable that this group of countries stretches from North America to the Persian (Arabian) Gulf and the Asia-Pacific region (APAC) where it “encircles” China. Anglo-Saxon countries (Australia, Canada, New Zealand) are part of this cluster, except for the United Kingdom which proved to be “closer” to the European Union in this setting. All of the seven Arab states bordering the Persian Gulf (Bahrain, Iraq, Kuwait, Oman, Qatar, Saudi Arabia and the United Arab Emirates) belong to this cluster. From APAC, the cluster includes close US allies such as Japan, South Korea and Taiwan, as well as some countries with historical links to the West (Singapore, Malaysia, Thailand).⁹ The boxplots on trade share in *Figure 3* show that Cluster 1 countries tend to have the highest shares of trade with the US and the lowest with Russia. In addition, half of them purchased more than 87 per cent of their arms from the NATO and NATO allies.

Cluster 2 includes the members of the European Union and several of their neighbours. The boxplots tell a great deal about why these countries form a separate cluster (i.e. why they are not linked to the US). First of all, they trade far more with (other) EU members than anyone else. (The average share of trade with the EU is 60 per cent in this cluster.) Consequently, they trade less with the US and China than Cluster 1 countries on average. In addition, they have the lowest amounts of AIIB loans (if any at all) and the most unfavourable views of China. (Average FAV_CN indicates a relatively strong negative perception in this group, while the other clusters tend to be more positive about the East Asian giant.) In terms of arms purchases, NATO and NATO allies dominate this cluster.

⁹ Regarding the South China Sea disputes with China, three of the major claimants happen to be in this cluster, notably Vietnam, Malaysia and Taiwan. Interestingly, another major claimant, the Philippines was classified into the “China + Russia” cluster, which must be due to its relatively lower share of trade with the US and its higher amount of AIIB loans.

Note that Cluster 2 includes Israel and some other countries located in the Mediterranean (e.g. Lebanon, Morocco, Tunisia), as well as Ukraine and the United Kingdom. This reflects the impact of geographical proximity on trade, but it can also be indicative in terms of geopolitical orientation, especially in the case of Ukraine. The high share of trade with the EU and NATO arms supplies were decisive in classifying Ukraine into Cluster 2.

Having a separate “EU” cluster is one of the most remarkable results of our study; nevertheless, the composition of Cluster 3 is equally interesting. China and Russia belong in the same group, together with India, Iran, Türkiye, North Korea, Pakistan and a large part of the post-Soviet region. Southeast Asia is split between Cluster 1 and 3, reflecting its role as a “buffer zone”. It is worth mentioning that Serbia, a candidate country for EU membership, was classified into this group which is in line with its traditional relationship with Russia, as well as its more recent orientation towards China.

The boxplots show that higher shares of trade with China and Russia are typical for Cluster 3 countries, and they are also the main recipients of finance from the AIIB and IBRD. Let us note here that although IBRD loans proved to be significant in terms of the cluster structure, the reason for this is likely different from our original assumption. LOAN_IBRD was included as a possible proxy of Western influence (closer links to the West). Nonetheless, *Figure 3* (Boxplot on loans from IBRD) suggests that it may only indicate a “developing country” status and tells little about geopolitical orientation. By contrast, finance from the AIIB is a much clearer sign of closer links to China (see boxplot on AIIB financing in *Figure 3*).

As for arms purchases, Cluster 3 countries do not really buy weapons from NATO and its allies. Instead, Russia has a clear edge in this group. China also seems to be a relatively important arms supplier, and the image of China is apparently the most favourable in this cluster.

5. Discussion

The results of the hierarchical clustering thus show that the world economy is arranged into three blocs. These three blocs are centred around the United States, the European Union as well as the conglomerate of the two major non-Western powers (i.e. China and Russia), respectively. Our results are in line with previous research suggesting a three-bloc structure in the global economy (*Campos et al. 2023; Gopinath et al. 2024; Aiyar – Ohnsorge 2024; Bolhuis et al. 2023; Fernández-Villaverde et al. 2024; Conteduca et al. 2025; Baur et al. 2023* as well as *Gopinath 2023*), and similarly to previous papers, our results also reveal blocs centred around major global geopolitical powers.

However, the composition of the respective blocs differs from any of those reviewed in *Section 2*. Previous research on geoeconomic fragmentation emphasised the divide between East and West as well as the dichotomic systemic rivalry between the United States (often accompanied by i.a. the European Union, Japan, South Korea and Australia) and China (often accompanied by i.a. Russia, Central Asia and North Africa); others complement this structure with a neutral bloc. Our results, however, show a different structure. According to our findings, the United States and the European Union belong to separate blocs, while China, Russia and certain aligned states form the third one. (The latter, i.e. Russia and China jointly forming the cornerstone of a predominantly Eastern bloc however corroborates a vast array of literature reviewed in *Section 2.3*.) The fact that the United States and the European Union belong to different geoeconomic blocs challenges previous consensus in the fragmentation literature and suggests that the *a priori* linking of the US and the EU (as seen in many pieces of literature) may need reconsideration.

This result of ours has also implications on a broader scale: the public discourse on fragmentation also tends to classify the United States and the European Union into one geoeconomic bloc, which, however, is not justified by our data. The finding that these two Western actors belong to distinct clusters obviously does not weaken existing diplomatic and economic ties between them. Nevertheless, this measured geopolitical distance between the United States and the European Union should be taken into account in the overall fragmentation discourse. With our findings, we hope to have contributed to the literature on geoeconomic fragmentation. By answering the research questions and presenting a three-bloc structure of the world economy, we offer a new narrative for the fragmentation discourse where – despite all presuppositions – the Western bloc turns out to be two blocs instead of one.

While supplementing the fragmentation literature with novel findings, our paper also has certain limitations. First, our results represent a snapshot of the global economy – while geoeconomic fragmentation (along with deglobalisation, decoupling, etc.) is rather of a processual nature. Thus, longitudinal analysis may prove valuable if one aims to capture changes in how the global economy is structured (and thus add to our description of its present characteristics). Such a longitudinal analysis would also allow for a deeper understanding of the respective state actors' motives for pursuing fragmentation-enhancing policies. While relevant from our perspective, the cross-sectional nature of our research did not allow for the examination of such motives – future research delving deeper into this question would be of great value.

Second, due to the unavailability and inaccuracy of data in the case of certain variables, in our analysis, we had to exclude certain countries (Latin America and the majority of Africa, in particular). The exclusion of these countries from our analysis necessarily leads to an incompleteness of the results: the countries excluded are

typically considered as part of the neutral bloc. In addition, we were not able to use FDI data due to many missing values in the breakdown of FDI stocks. The need to omit certain variables and regions may have distorted the results to a certain extent. Furthermore, an analysis comprising all countries of the globe would also allow for identifying connector countries in the sample, as well as a deeper understanding of their function. (Pertinent studies listed in *Section 2.3* indicate that i.a. Latin American countries may fall under this definition – these were, however, excluded from our analysis due to data gaps.) Moreover, examining connector countries separately – by analytically distinguishing them from the main sample comprising the respective blocs – would make it possible to map their roles in mediating between-bloc interactions. However, conducting such an analysis (and especially the exploratory identification of connector countries) would have exceeded the scope of the present study. We encourage future research to pursue investigations in this direction as well.

Third, it is a general challenge to identify a broad set of variables capturing geoeconomic fragmentation while also avoiding excessive multicollinearity. Clustering does not involve estimating coefficients or predicting dependent variables, so in this sense, correlation between our variables does not violate any assumptions. Nevertheless, as the Ward criterion relies on calculating Euclidean distances, similar variables might carry the risk of overemphasising certain features. In our analysis, data on trade and arms purchases could thus play a more pronounced role in driving the classification of countries into clusters. If higher data quality and availability could be reached (especially in the case of FDI or attitude surveys), the set of variables could be further developed and refined, for example by using principal component analysis. It would be desirable for future quantitative research to address the above-mentioned matters.

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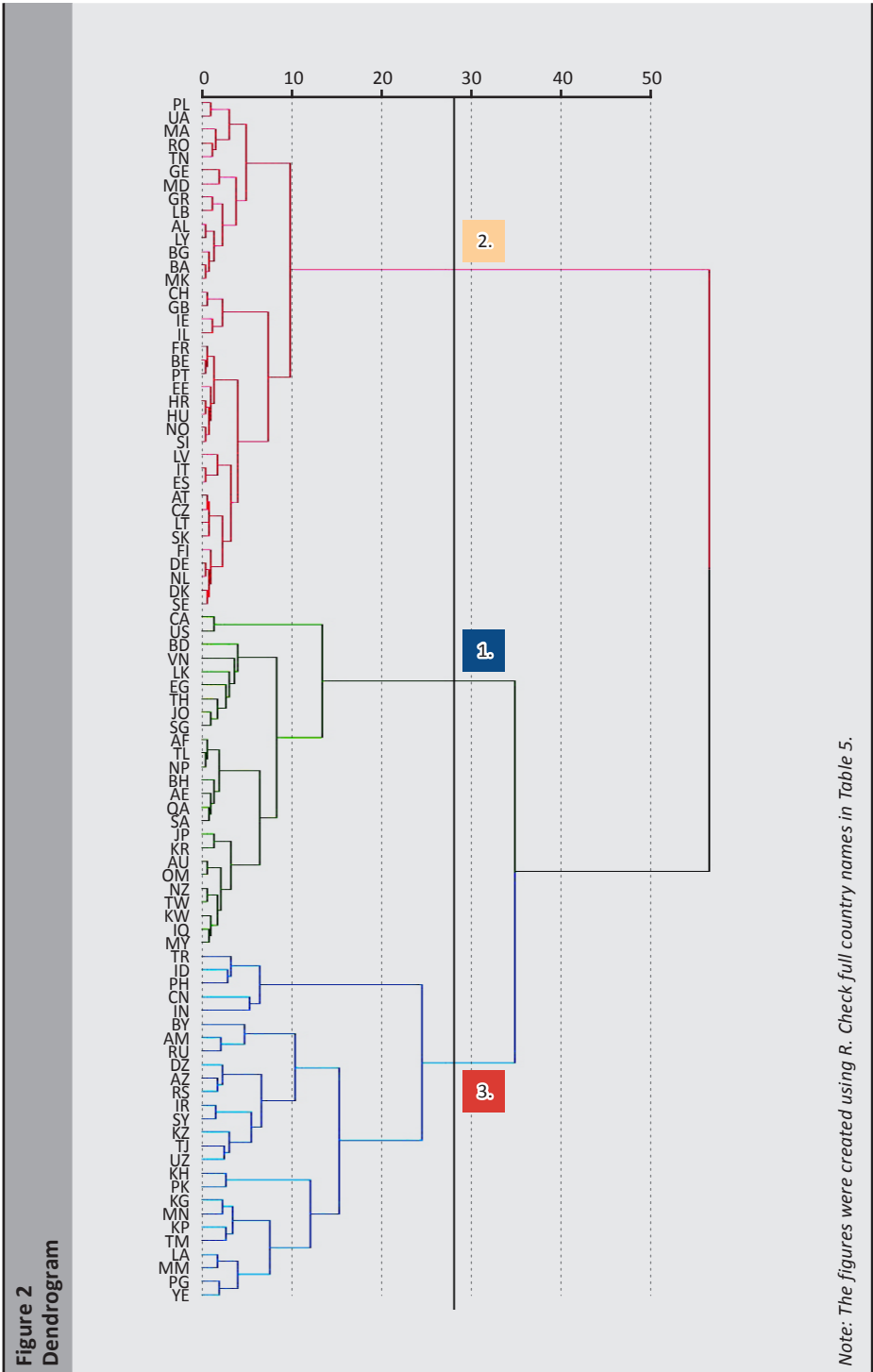
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Appendix

Table 4 Data sources		
Variable	Variable names	Source
Trade share of “great power” j in total foreign trade of goods of country i in 2022	TRADE_SHARE_US TRADE_SHARE_CN TRADE_SHARE_EU TRADE_SHARE_RU	IMF International Trade in Goods (by partner country): https://data360.worldbank.org/en/dataset/IMF_DOT
Net FDI stock of “great power” j in country i in 2023	FDI_US FDI_CN FDI_EU FDI_RU	IMF Direct Investment Positions by Counterpart Economy: https://data360.worldbank.org/en/dataset/IMF_CDIS
Approved financing amounts by AIIB to country i between 2016 and July 2025	FIN_AIIB	AIIB Approved Financing Amounts: https://www.aiib.org/en/projects/list/year/2025/member/All/sector/All/financing_type/All/status/All
IBRD loans, total disbursed amount to country i as of 30 June 2025	LOAN_IBRD	IBRD Loans Disbursed Amount: https://financesone.worldbank.org/ibrd-country-economy-wise-loan-summary/DS01538
Ratio of arms purchases by country i from source k , for items purchased between 2016-2024	ARMS_NATO ARMS_CN ARMS_RU	SIPRI Arms Transfers Database, Transfers of Major Conventional Arms: https://armstransfers.sipri.org/ArmsTransfer/TransferData
Net favourability of China in country i , 2024 or latest data available since 2020	FAV_CN	Asia Society Policy Institute’s Global Public Opinion on China: https://asiasociety.org/policy-institute/global-public-opinion-china
<i>Note: FDI was omitted in final output due to data availability issues (several cases of missing data).</i>		



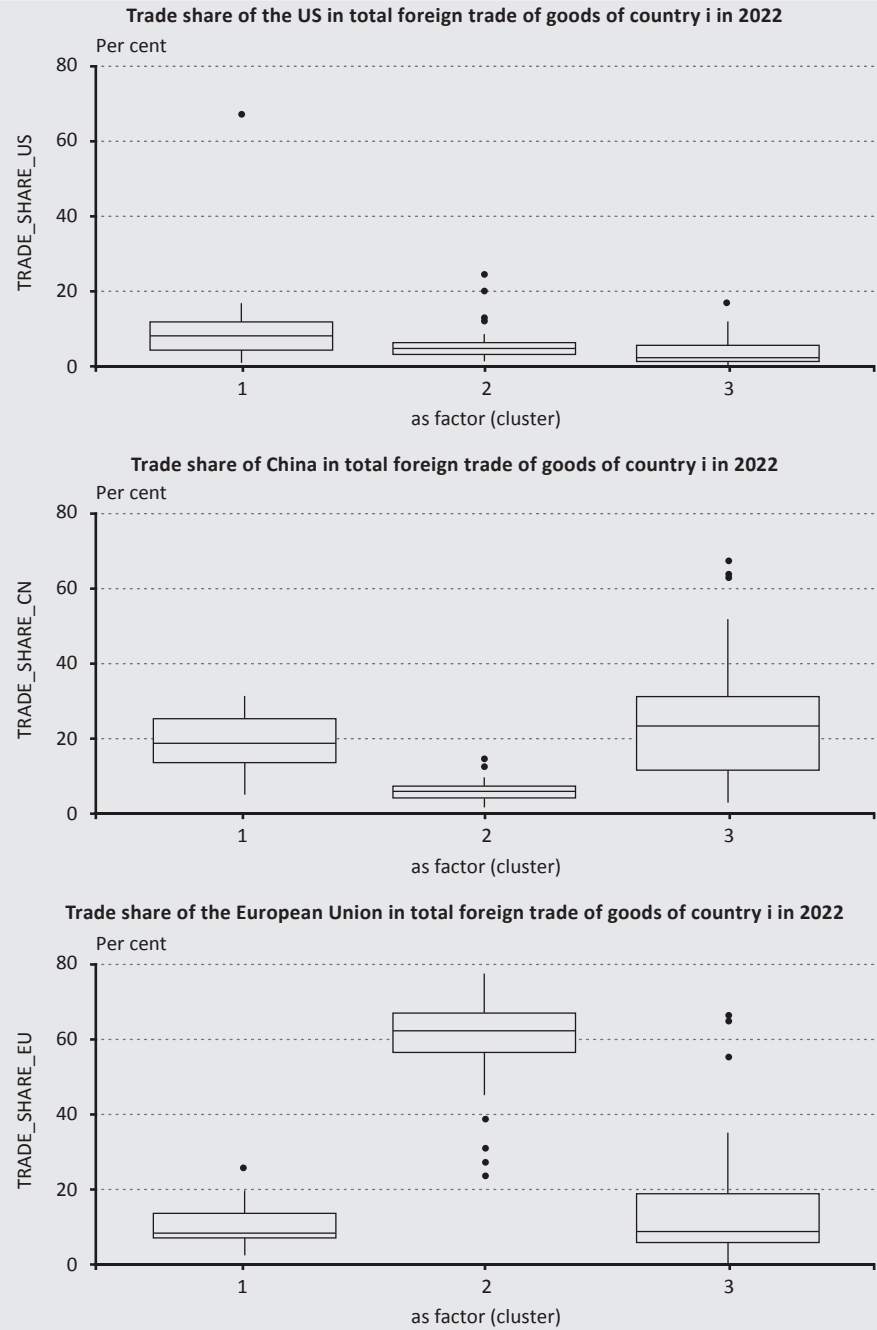
Note: The figures were created using R. Check full country names in Table 5.

Table 5
List of countries in each cluster (in alphabetical order)

Cluster 1 "US" 25 countries	Cluster 2 "EU" 38 countries	Cluster 3 "CN + RU" 26 countries
Afghanistan (AF)	Albania (AL)	Algeria (DZ)
Australia (AU)	Austria (AT)	Armenia (AM)
Bahrain (BH)	Belgium (BE)	Azerbaijan (AZ)
Bangladesh (BD)	Bosnia and Herzegovina (BA)	Belarus (BY)
Canada (CA)	Bulgaria (BG)	Cambodia (KH)
East Timor (Timor-Leste, TL)	Croatia (HR)	China (CN)
Egypt (EG)	Czech Republic (CZ)	India (IN)
Iraq (IQ)	Denmark (DK)	Indonesia (ID)
Japan (JP)	Estonia (EE)	Iran (IR)
Jordan (JO)	Finland (FI)	Kazakhstan (KZ)
Kuwait (KW)	France (FR)	Kyrgyzstan (KG)
Malaysia (MY)	Georgia (GE)	Laos (LA)
Nepal (NP)	Germany (DE)	Mongolia (MN)
New Zealand (NZ)	Greece (GR)	Myanmar (MM)
Oman (OM)	Hungary (HU)	North Korea (KP)
Qatar (QA)	Ireland (IE)	Pakistan (PK)
Saudi Arabia (SA)	Israel (IL)	Papua New Guinea (PG)
Singapore (SG)	Italy (IT)	Philippines (PH)
South Korea (KR)	Latvia (LV)	Russia (RU)
Sri Lanka (LK)	Lebanon (LB)	Serbia (RS)
Taiwan (TW)	Libya (LY)	Syria (SY)
Thailand (TH)	Lithuania (LT)	Tajikistan (TJ)
United Arab Emirates (AE)	Moldova (MD)	Türkiye (TR)
United States (US)	Morocco (MA)	Turkmenistan (TM)
Vietnam (VN)	Netherlands (NL)	Uzbekistan (UZ)
	North Macedonia (MK)	Yemen (YE)
	Norway (NO)	
	Poland (PL)	
	Portugal (PT)	
	Romania (RO)	
	Slovakia (SK)	
	Slovenia (SI)	
	Spain (ES)	
	Sweden (SE)	
	Switzerland (CH)	
	Tunisia (TN)	
	Ukraine (UA)	
	United Kingdom (GB)	

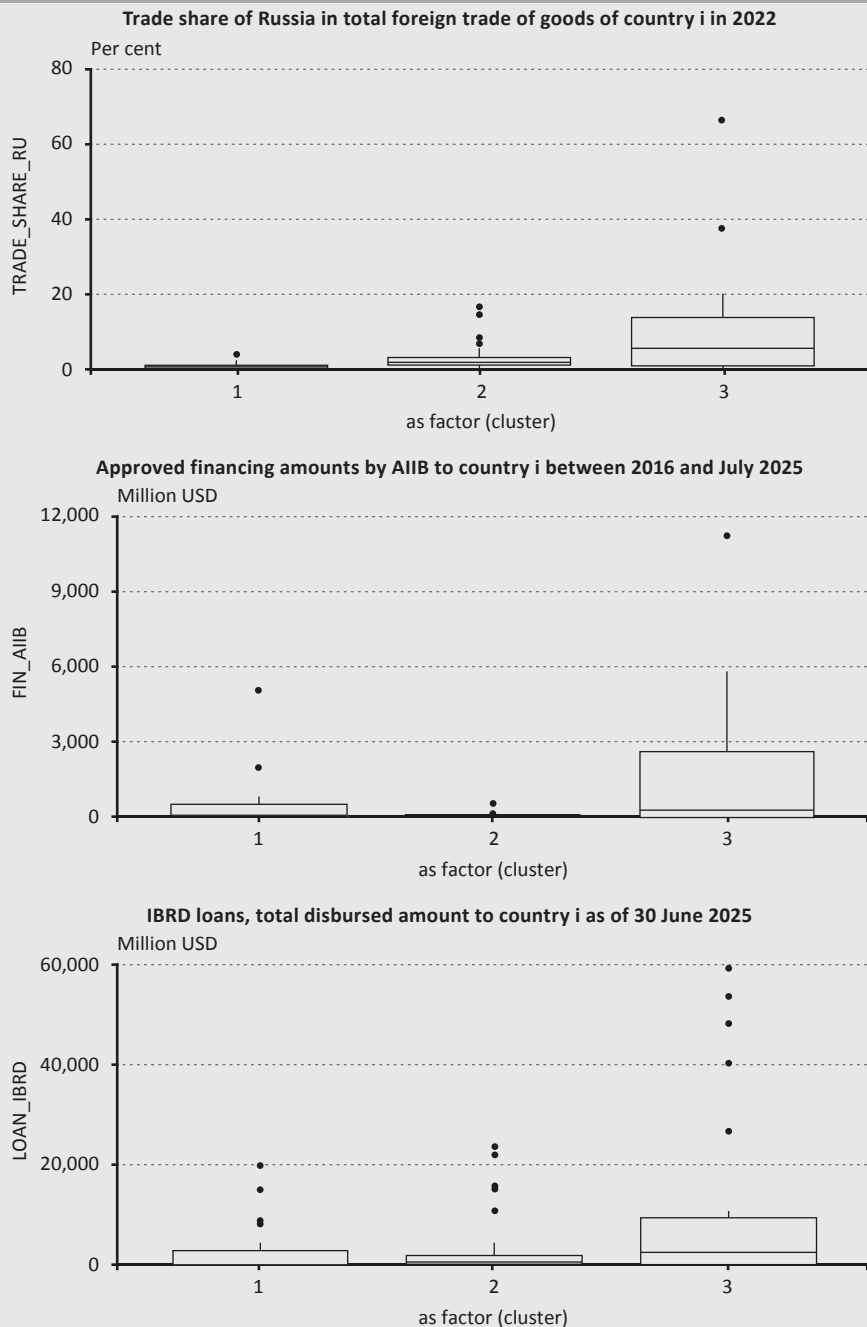
Note: N = 89

Figure 3
Boxplots



Note: Cluster 1: "US", Cluster 2: "EU", Cluster 3: "CN + RU". The figures were created using R.

Figure 3
Boxplots



Note: Cluster 1: "US", Cluster 2: "EU", Cluster 3: "CN + RU". The figures were created using R.

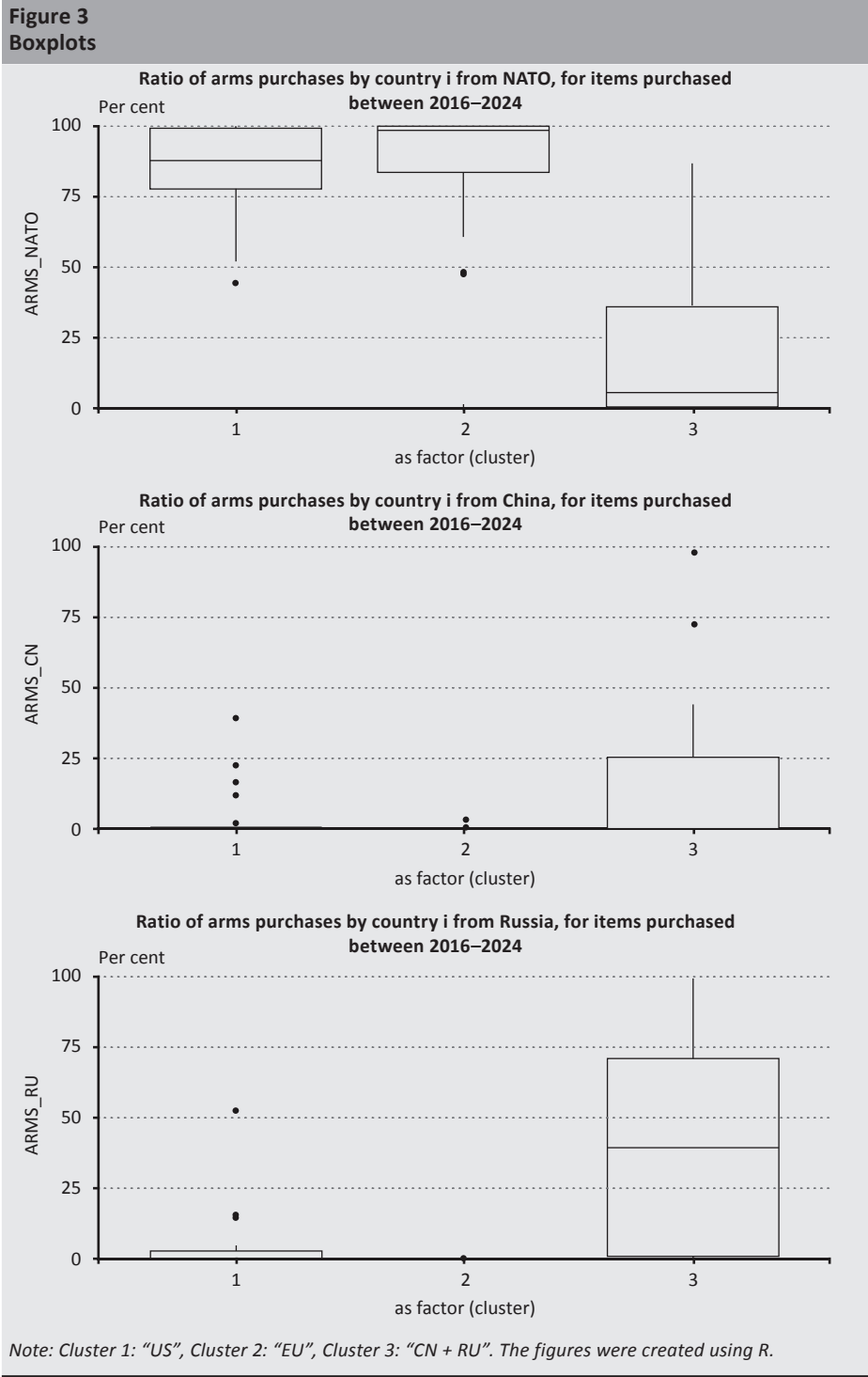
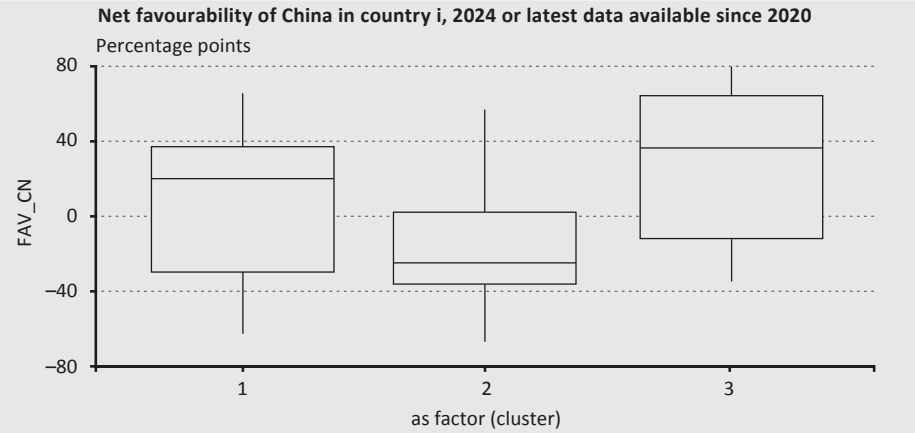


Figure 3
Boxplots



Note: Cluster 1: "US", Cluster 2: "EU", Cluster 3: "CN + RU". The figures were created using R.