

World Trade 1970-2010: Globalisation, Regionalisation and Reallocation

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Abstract

Using data for more than 200 countries, split into nine regions, we study world trade in goods during 1970-2010. The largest changes are the declining relative importance of Western Europe, and the increasing role for Asia. The intra-regional trade of Asia grew particularly fast; from 4 to 16% of world trade. Due to growing intra-regional trade in Europe and Asia, world trade became more intra-regional until 1995. Manufacturing trade is more regionalised, whereas commodity trade is more globalised. After 1995, extra-regional trade flows grew faster so there was “globalisation” with trade travelling longer distances and a rising share for commodities. From 2000, smaller trade regions such as Africa and Latin America have increased their shares of world trade; reversing the trend over the 30 preceding years.

Key words: World trade, globalisation, regionalisation, transports.

JEL codes: F10, F15, R40.

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1. Introduction¹⁾

Does globalisation create a “global village” with economic and political integration worldwide, or is the main trend “regionalisation” where countries integrate within geographical regions rather than across regions and continents (see e.g. Anderson and Norheim 2003)? Within Europe, the development after the Second World War was dominated by intra-regional integration and fast expansion of intra-regional trade. During recent years, Asia has expanded strongly and an issue is whether Asian growth was dominated by global or regional integration. During the last decade, other developing regions have also experienced faster growth and similar questions apply to them: Will Africa or South America become integrated, or will they remain global suppliers of raw materials to remote regions? Trade is a useful indicator in order to shed light on these issues, and the paper examines trade within and between world regions over a long period.

While e.g. the World Trade Organisation (WTO) provides annual statistics for world trade, analysis covering several decades faces new challenges concerning data and country coverage. Analysis of international trade over long time periods is hampered by limited data coverage for earlier years. Hence there is a trade-off between country and time coverage, and for extended historical analysis, country coverage must be reduced. For example, Nenci (2011) analyses world trade since 1870 using data for 23 countries. For causal analysis, it may not be a problem with missing trade, but for describing world trade as such, we would like to have high country coverage. For this reason, we choose the period 1970-2010 which has high country coverage but is still long enough to provide long-term trends.

Each trade flow is normally reported at both ends: by the exporter and the import. We extend data coverage further by exploiting this property of trade data: missing countries reappear in the reported data from their trade partners, and we use such “mirror data” (see e.g. Hummels and Lugovskyy 2006) to construct an almost complete time series of world trade flows 1970-2010, with data for more than 200 countries.

In the paper we do not undertake causal analysis but provide a systematic description of world trade over time. The analysis reveals a number of stylised facts:

- Manufacturers vs. commodity producers: Western Europe, North America and Asia, joined by Central Europe during the period, constitute the core group of manufacturing exporters. For the other five regions, commodity exports dominate.
- Intra- vs. inter-industry trade: For the nine regions, the share of manufacturing in imports has converged. Hence there are four regions with large two-way trade in

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manufactured goods, and five regions largely exchanging commodity exports against manufacturing imports. For the commodity-producing regions, intra-regional trade is generally small.

- Reallocation: The relative decline of Western Europe and the rise of Asia are important trends that apply throughout the period. During the last decade, there was decline also for North America, and trade growth for the commodity-based regions. Considerable trade imbalances have developed; e.g. the USA had weak export growth and trade deficits with several other regions have emerged.
- Over time, there was an S-shaped curve development for three related phenomena; (i) The share of manufacturing in world trade; (ii) The share of intra-regional trade in world trade; and (iii) The share of the main manufacturing regions in world trade. During 1975-1995, there was “regionalisation” driven by intra-regional trade in Europe and Asia, dominated by manufactured goods. After 1995, there has been “globalisation” with more extra-regional trade, more commodity trade, and trade growth for the commodity exporting regions.

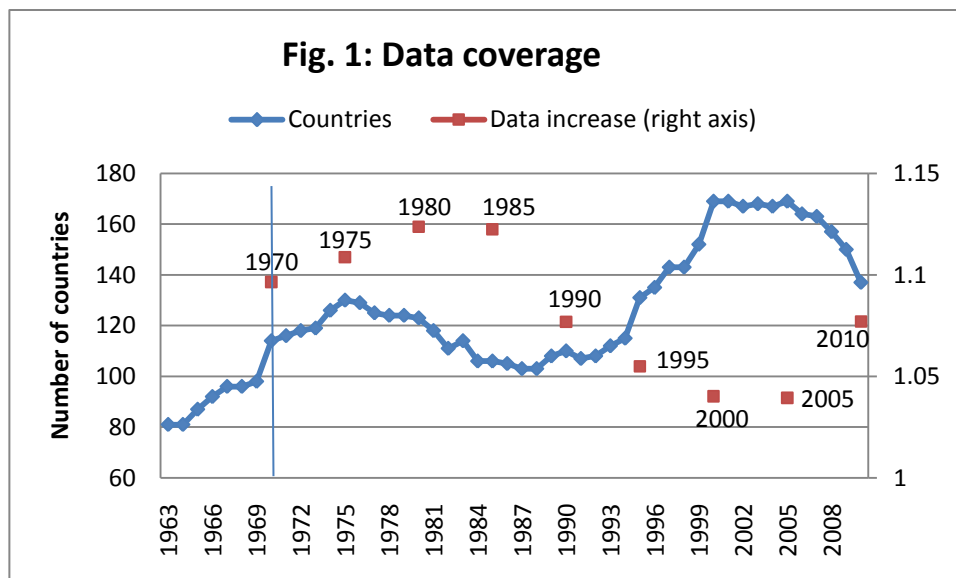
Hence the conclusion is that the balance between “regionalisation” and “globalisation” changed over time, with globalisation in the lead during the last decade.

Towards the end of the paper, we also discuss the implications of world developments for transport and energy consumption. A large share of international trade is seaborne, and sea freight is more energy efficient than other transport modes. We examine how changes in the pattern of trade may affect transport and thereby energy consumption. Will regionalisation promote trade by truck over short distances, or will globalisation lead to growth in long-distance sea or air freight? We conclude that while growing international trade is likely to increase energy consumption, this “carbon footprint” is dampened as long as sea freight dominates international trade.

2. Constructing a data set covering 98-99% of world trade 1970-2010

For analysing global trade over 40 years, we need an extensive data set covering as many countries as possible. While such data has become more easily available from the WITS/COMTRADE² data base, the coverage of countries is more limited for the earlier years. Trade data is provided in different classifications, and the most extensive time series is provided under SITC-1; i.e. the first version of the Standard International Trade Classification. Figure 1 shows the number of countries covered with such data for different years.

² WITS (World Integrated Trade Solution, see wits.worldbank.org) is a web-based software solution for data retrieval provided by the World Bank and UNCTAD. COMTRADE is the United Nations international trade data base.



Data for 1963 is provided for 81 countries and increases to a maximum of 167-169 in 2000-2005. The increase is mainly due to better data reporting, but also because of new countries, e.g. after the break-up of the Soviet Union. For analysing changes over time, it is necessary to avoid changes in the sample over time. A standard solution would then be to use the minimum number of countries in the chosen period. This would imply that only 80-85% of world trade would be covered.

In order to solve this problem, we improve data coverage by starting with 1970 where the number of reporting countries has increased to 114 (however dropping to 103 in 1987). Second, we use so-called “mirror data” in order to retrieve missing data: All trade flows may be registered by the exporting or importing country, and if one of these observations is missing we can use the other to obtain an approximation. For example, if Fiji has not reported its exports to the USA, we can use the imports of the USA from Fiji to find the number. Such data has also been used in the construction of some other databases (Nicita and Olarrega 2007), but we use it here more systematically in order to obtain an almost complete data set. Mirror data contain some error due to misreporting of the country of origin or destination, but this problem is more serious for bilateral trade flows than for studying trade for large geographical regions. For example, goods from Asia to Europe are often shipped via hubs such as Amsterdam or Rotterdam, and the destination may be reported as the Netherlands even for some of the goods that are shipped onwards to other European countries. For studying trade between Asia and Europe, such misreporting is not a problem since the destination region is unaffected.

Export and import data are slightly different since the former is reported on a f.o.b. (free-on-board) basis, imports are measured on a c.i.f. (cost-insurance-freight) basis. Since some costs are added on the way, the cif-fob ratio should be larger than one. For many years, the IMF used a value of 1.1 in order to fill in data gaps in their balance of payments or direction of trade statistics. We will follow this practice, although it is an approximation that may deviate from the true values which may

vary considerably across countries (Hummels and Lugovskyy 2006). If we denote the constructed values with an asterisk, these will be $M_{ij}^* = X_{ji} * 1.1$ (for constructed imports) and $X_{ij}^* = M_{ji} / 1.1$ (for constructed exports). So the value constructed imports for country i from country j will be 10% larger than the value of observed exports from country j to country i.

With this use of mirror data, we increase the value of world trade covered in the data set by 4-12%, depending on the year in question. This is measured by the right hand side axis and the points for selected years in the Diagram. We will undertake the analysis for 5-year intervals, so there are nine observations over time. By the use of mirror data, we obtain a data set for 1970-2010 which covers a very large share of world trade for the whole period. Since the non-reporting countries are generally smaller than the ones that are in the data, the data we “recover” from mirror data contains many small observations. For this reason, the number of observations in the dataset increases by 34%, from 272 038 to 365 385 for all years combined. What is still missing is the trade between the non-reporting countries. We do not know the value of this so we cannot say exactly the percentage of true world trade covered, but our guesstimate would be about 98-99%. In the data set, more than 250 countries or territories are represented. As noted, new countries have been formed, and countries have changed, so the country sample changes over time. In 1970, we have data for 201 countries, and the number rises to a maximum of 237 in 2000. The dissolution of the Soviet Union and Yugoslavia created more than 20 new countries, and some small states and territories are also added in the data for later years. The addition of new countries creates a minor problem for comparability over time (more about this below).

3. Regional classification

We are interested in analysing trade within and between major geographical regions of the world, and therefore divide the world into nine major regions. Since one purpose is to relate trade to transports, we are interested in geographical areas rather than political areas. Furthermore, political affiliations such as EU membership or countries in Eastern Europe have changed dramatically over the period. Our classification is therefore geographical rather than political.

The regional classification is provided in Appendix Table 1. Some of the regions are geographical and straightforward:

- Africa (57 countries) includes all of Africa including Egypt to the north-east.
- We split the Americas in two, with Mexico in North America and countries south of Mexico and the Caribbean in Latin America.
- Asia (32 countries) includes all Asia from Afghanistan and to the east, but excludes all countries in the former Soviet Union, as well as Oceania and the Pacific Islands which constitutes a separate region.
- The Middle East includes Israel and countries in the region, including Iran but excluding former Soviet republics.

For Europe, dramatic changes in political affiliation and country formation have occurred in the period and we choose regional groups that are geographical and not conforming to the current political map:

- The Former Soviet Union (FSU) was not dissolved before 1991 but constitutes a region in the analysis for the whole time period, including the Baltic and Eurasian States that were initially part of the FSU.
- Central Europe includes the former Visegrad countries as well as Balkan countries, Greece, Cyprus and Turkey.
- Western Europe includes EU-15 except Greece, plus the Nordic countries and some smaller states.

In addition to these regions, there is also a tenth “Not elsewhere included” category including Antarctica, “bunkers” and miscellaneous. This is included for the completeness of data but results will not be reported in the analysis. For energy-related issues, it should nevertheless be observed that “bunkers” is of some importance (due to trade in fuels), and the NEI category’s share of world trade has been up to 2% in some years.

As long as the Soviet Union was one country, all the internal trade between the Soviet republics was not registered as international trade. The dissolution of the SU and the formation of new countries implied an automatic increase in world trade after 1991. This increment is however modest: equivalent to 0.24% of world trade in 1995, and therefore does not represent a major inaccuracy in the time series. This issue is also studied by Quaresma and Roser (2012), who find that the dissolution of the Soviet Union, Yugoslavia and Czechoslovakie taken together added less than 1% to world trade due to the formation of new countries. We prefer to live with this “time inconsistency” in order to have a data set as complete as possible.

4. Trends in world trade flows 1970-2010

In post-war Europe, the growth of intra-European trade was a major driving force for growth, promoted by the formation of the EU and EFTA in 1957/1960. It should nevertheless be observed that growth itself can promote intra-regional trade, for two reasons:

- The first reason is that trade depends on geography so if your neighbours grow faster, trade with them will intensify. High growth in Western Europe after the Second World War therefore promoted intra-European trade.
- A second reason is that as countries grow richer, they often produce a greater diversity of manufactured products such as cars, electronics and other differentiated goods. This stimulates so-called intra-industry trade; i.e. the two-way trade in similar products. This was a major component of trade growth in Europe after the Second World War (see e.g. Balassa and Bauwens 1988), and we shall see that it is later replicated for Asia (see e.g. Fukao et al. 2003).

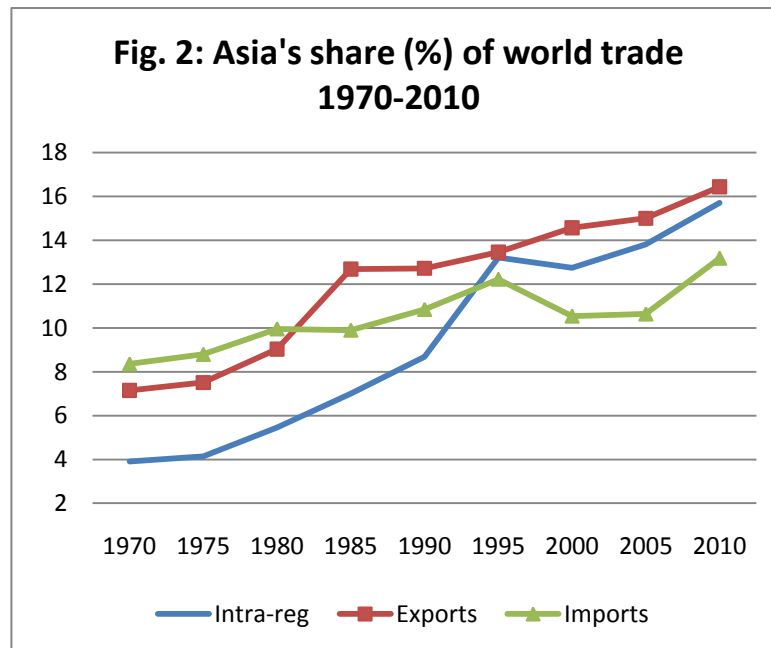
For the fast growth in Asia during recent decades, an important question is therefore whether it stimulated globalisation with increased trade across world region, or intra-regional trade within Asia. For calculating growth rates, figures have been converted from current USD using the U.S. GDP deflator. Hence the growth rates are in constant dollars but do not reflect an accurate calculation of volume changes. For reference we also include a column with average annual GDP growth; although the data series is here less complete in terms of country coverage so the estimates are more uncertain. In the Appendix, more detailed evidence is presented on the regional composition of world trade in 2010 (Appendix Table 2), and growth rates 1970-2010 (Appendix Table 3) for the various intra- and inter-regional trade flows. Table 1 below shows average annual growth rates for intra-regional trade, extra-regional export, and extra-regional imports, for each region.

Table 1: Average annual growth rates for trade 1970-2010 (constant 2005 USD). Averages from calculations based on import and export data.				
Region	Trade flow			GDP**
	Intra-regional trade	Extra-regional imports	Extra-regional exports	
Africa	7.39	5.19	5.11	2.80
Asia	10.11	7.61	8.35	5.87
Central Europe	6.51	6.82	6.84	7.19
Former Soviet Union	13.83*	6.70	8.33	5.39
Latin America	6.45	5.59	5.61	5.07
Middle East	9.14	7.70	7.78	5.73
North America	5.74	6.42	4.56	3.33
Oceania & Pacific	4.75	5.82	5.88	4.42
Western Europe	5.03	5.53	5.72	4.04

* For the Former Soviet Union, the growth of intra-regional trade is for 1995-2010.
 **GDP growth rates are for deviating time periods for Africa (1980-2005), Former Soviet Union (1995-2010) and Oceania/Pacific (1970-2005).

With the exception of Central Europe, trade grew faster than GDP in all cases so the regions became more open and there was an expansion of international trade. Trade growth however varies across regions and in the following, we use diagrams for shares of total world trade, in combination with the growth rates in Table 1, to interpret the development.

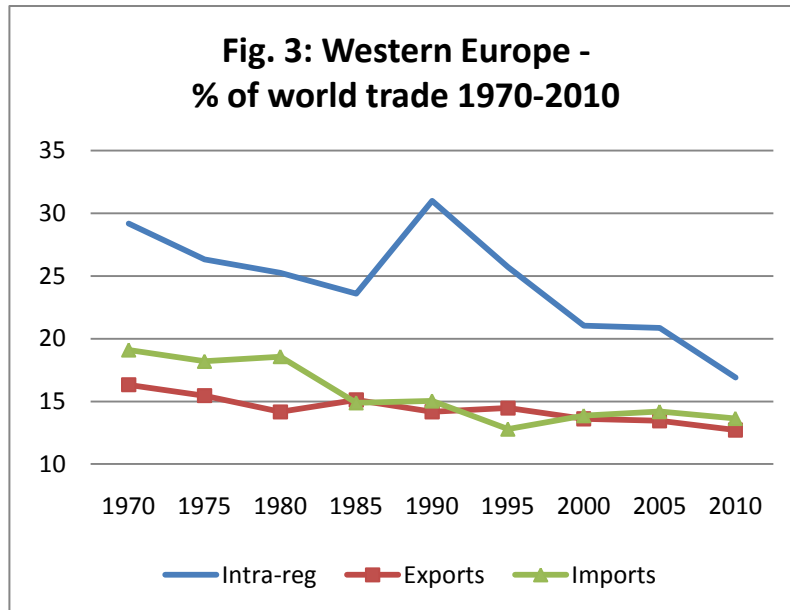
The strong growth in Asia is well known but the results show some important nuances that are often neglected in the public debate and perception. Figure 2 shows Asia's share of world trade in 1970-2010, split into intra-Asian trade, exports and imports.



Asia's share of world GDP rose from 16 to 27% during this period, and the trade growth reflects this high growth. Trade grew much faster than GDP, and the fastest growing trade component was intra-regional trade. In second place we find exports, and the relatively slowest growth was observed for Asia's imports from other regions. During the period, Asia started with a significant trade deficit towards the rest of the world but ended with a considerable surplus. Hence the results confirm the perception of Asia as an export machine towards the rest of the world; but with the added important observation that the fastest trade growth was actually *within* Asia. In 2010, China had considerable trade surpluses with North America and Western Europe, but (modest) trade deficits with Africa, Latin America, Middle East and Oceania/Pacific.³

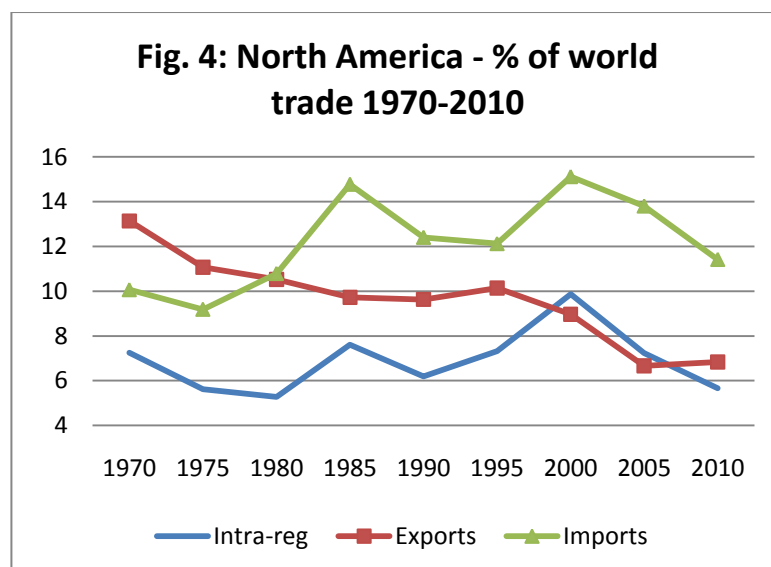
Accompanying the growing shares for Asia is a decline for Western Europe and, to some extent, North America. Western Europe, as we have defined it, was at its peak in 1970 with respect to trade, with a share of world trade at 46-48% (depending on whether import or export data is used). As shown by Figure 2, this share declined dramatically during the period:

³ Figure 2 is based on import data but export data gives the same pattern, with only minor deviations. In Appendix Tables 2 and 3, averages from export and import data are provided.



In 1970, intra-regional trade in this group of countries alone represented 29% of world trade, and during the four decades it dropped to 17%. Intra-WEU trade has a surge in the 1980s when the EU internal market was in the making, leading to intra-regional trade growth and an intermediate peak in 1990. Thereafter, there has been a fast decline in the share. WEU's share of world GDP peaked at 35 % in 1980, and thereafter declined to 26 % in 2010. Hence intra-regional trade in Western Europe was particularly stagnant, in relative terms. Trade with the rest of the world grew faster, although its share in world trade also declined. With average annual growth of 5%, WEU intra-regional trade was one of the slowest growing components of all world trade flows in Table 1.

For the USA, the distinctive feature is a relative decline for exports while intra-regional trade and imports have maintained their shares of world trade. This has led to a sizeable trade deficit with the rest of the world in 2010 (Fig. 4).

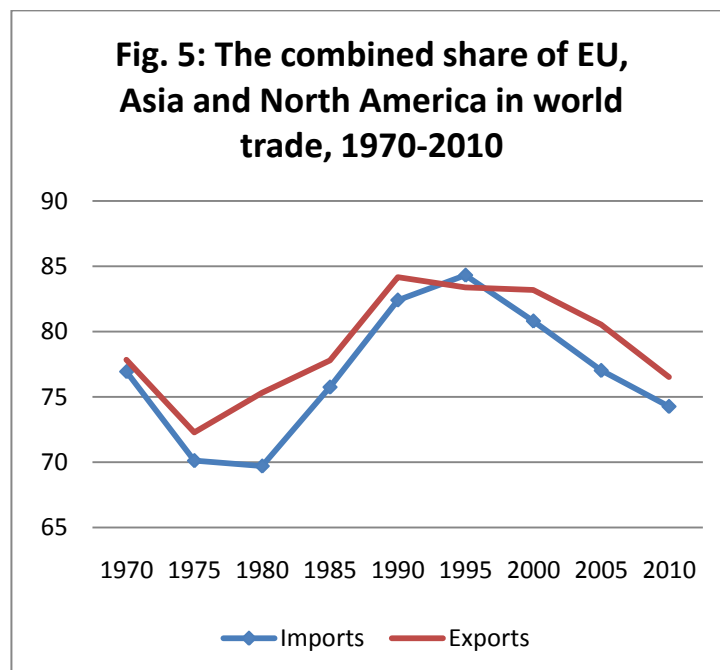


In 2010, the USA had a sizeable trade deficit not only with China and Asia, but also with Africa, North America and Western Europe. For this reason, China represented about 35% of the U.S. trade deficit in 2010. This equalled 540-707 billion USD in 2010 (depending on whether export or import data is applied). The share of U.S. exports in world trade fell from 13.1 to 6.8% during the period.

Intra-regional trade in North America was boosted by the formation of NAFTA in 1993, but developed less impressively during the last decade. Extra-region imports grew faster than GDP and faster than exports but slower than intra-regional trade.

The levels of intra-regional trade for these three regions are not directly comparable due to the different size of nations. While Western Europe is subdivided into countries of which some are very small, Asia and North America include large countries. The trade within USA, China and India is not reported in the international trade statistics, but this is the case for Luxembourg and other small countries in Europe. This is one reason why the reported level of intra-regional trade is so high in Europe. We have nevertheless seen that growth and integration in Asia has made the share of intra-regional trade rise very fast.

Western Europe, Asia and North America are the largest regions in world trade, having a combined share of around ¾ in 1975 as well 2010, but with some fluctuations over time. This is shown in Fig. 5.

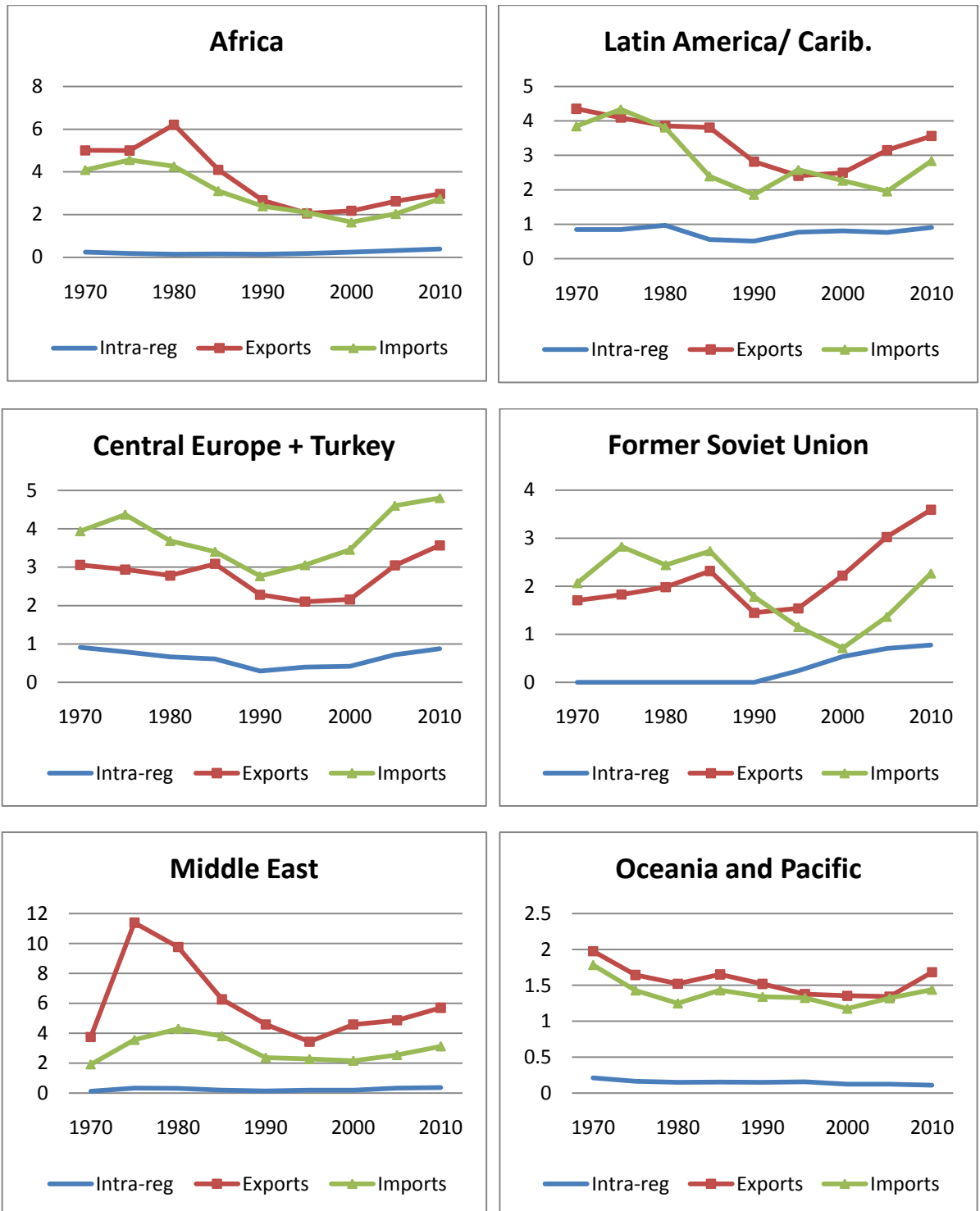


As we shall see, commodity price fluctuations as well as regional growth rate variations contributed to this S-shaped development. An interesting phenomenon is that during the last decade, the share of the remaining six “smaller” world trade regions has increased. This is shown in Figure 6.

Fig. 6: World trade 1970-2010: Trends for six other regions

Note: Curves show % of total world trade, based on import data. Imports and exports include the regions' trade with the rest of the world, excluding intra-regional trade.

Note: The Former Soviet Union was dissolved in 1991 and before that, intra-regional trade was not reported.



Hence there is a U-shaped pattern in most cases, with growing trade towards the end of the period. Growing trade in the last decade 2000-2010 is not only observed for Africa, but applies to all regions in Fig. 6 with the exception of Oceania & Pacific. In most cases, there was a reversal of the trend from 1990, 1995 or 2000: with falling curves before and rising shares thereafter. This is another indication that the decade 2000-2010 was promising in the sense that several lagging developing countries accelerated, and the results here show that it applied not only to GDP, but also to trade shares.

Another striking feature in Figure 6 is that the level of intra-regional trade is conspicuously low in many cases; especially Africa and the Middle East stand out as regions with minimal intra-regional trade. This lack of integration in Africa is considered as one of Africa's core challenges (see e.g. Limao and Venables 2001). From Fig. 6, we nevertheless see an increase in intra-regional African trade after 2000.

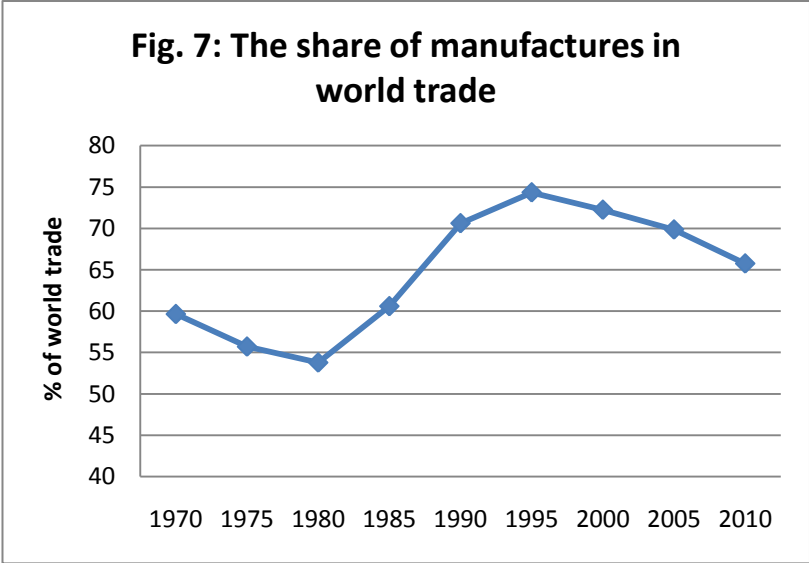
While the "small" trade regions still have small shares of world trade compared to WEU, Asia and North America, the potential for growth is considerable and if the positive trend in 2000-2010 continues, the shares may rise over time.

5. Manufacturing vs. commodity trade

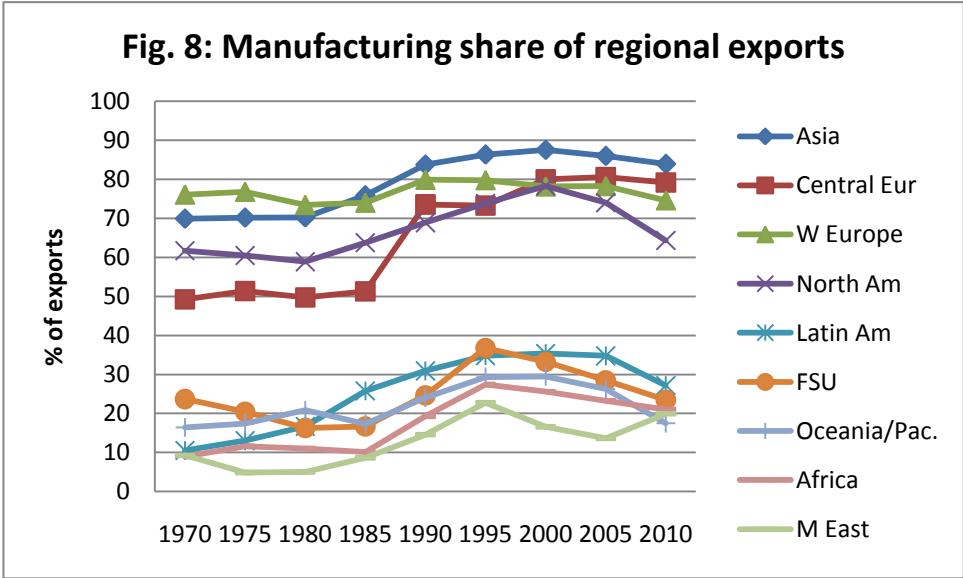
The composition of trade flows differs greatly across regions; e.g. some countries and regions rely on exports of raw materials while others have a competitive edge in manufacturing. In some trade flows, there is a large share of intra-industry trade (two-way trade within the same sectors), but in other cases there is mainly inter-industry trade where e.g. manufactures and raw materials are exchanged. Comparing across sectors, the share of intra-industry trade is particularly high for manufactured goods, especially differentiated goods such as machinery and transport equipment.

The analysis above has shown that since 1995, there has been considerable trade growth for regions that rely particularly on raw material exports; e.g. the Middle East and the Former Soviet Union. As a consequence, the share of raw materials in world trade has increased. This is supported by Figure 7, which shows the share of manufactures in world trade.⁴ Observe that manufactures include sectors of different types, ranging from material-based manufactures such as wood products and semi-processed metals; labour-intensive goods such as clothing; and more skill- or capital-intensive goods such as machinery and chemicals. Hence this indicator essentially shows (inversely) the share of unprocessed raw materials and agriculture in exports.

⁴ The figures are based on an average of results from export and import data.



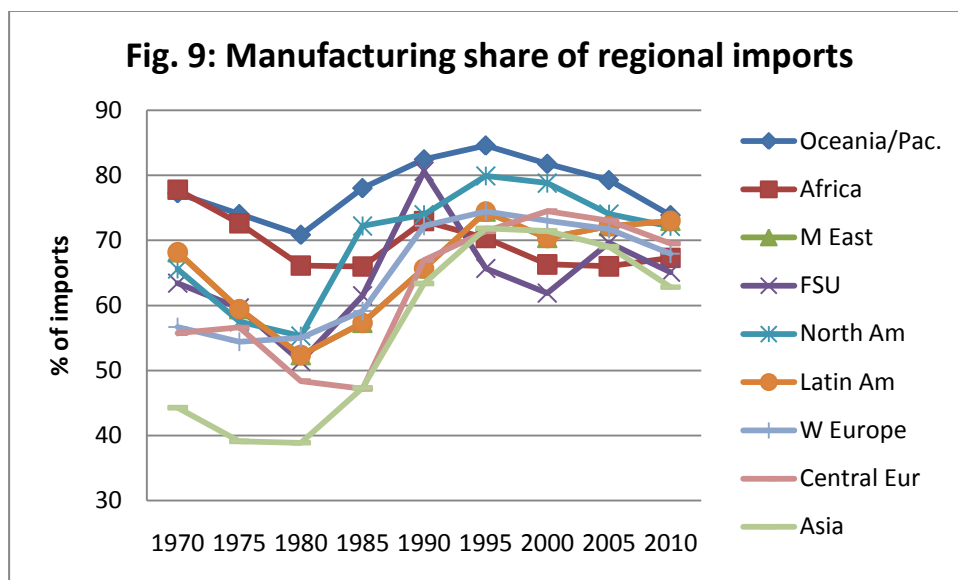
Hence there was an S-curve pattern where the share of manufactured goods rose sharply during 1980-1995, but declined thereafter. The curve resembles Figure 5 on the share for Western Europe, Asia and North America in world trade. The obvious explanation is that these three regions are the major manufacturing exporters. This is supported by Figure 8, showing the share of manufacturing in regional exports (including intra-regional exports) during the period.



Asia had a high share of manufacturing exports already at the start of the period, and later passed Western Europe to become the region with the highest manufacturing share in 2010. North America is slightly below but still in the top league. The last member of this club is Central Europe, where the manufacturing share of exports rose sharply during the 1980s and later surpassed that of Western Europe. For the remaining five regions (Latin America, Former Soviet Union, Oceania & Pacific, Africa and the Middle East), the manufacturing share of exports is much lower, however with a slight increase over time.

Commodity price fluctuations affect the share of commodities vs. manufacturing in total trade. Commodity prices rose sharply in the 1970s and during 1998-2008,⁵ and this is part of the explanation of the falling manufacturing share in world trade during these periods. In addition, there are structural changes where production and consumption patterns are changed over time.

Whereas manufacturing export shares differ strongly between the top and bottom group, manufacturing import shares differ less and indeed appear to converge across regions. This is shown in figure 9.



These shares varied much more 40 years ago and especially Asia had a low share of manufactures in imports. This has however changed considerably over time, and in 2010 the range was 63-74%, compared to 44-78% in 1970.

As a result of this change, we now have four major regions with a high share of manufacturing in exports as well as imports (Asia, Western Europe, Central Europe, North America); and five regions with a much higher manufacturing share in imports than in exports. Although we do not undertake a detailed analysis of intra-industry trade here, the share of such trade is generally larger for the four former regions with large manufacturing trade in both directions. It is also highly likely that Asia's share of intra-industry trade has increased sharply over the period. This is supported by other research, and some contributions have documented the development of intra-industry trade within Asia driven by foreign direct investment and production networks (see e.g. Fukao et al. 2003, Wakasugi 2007, Riad et al. 2012).

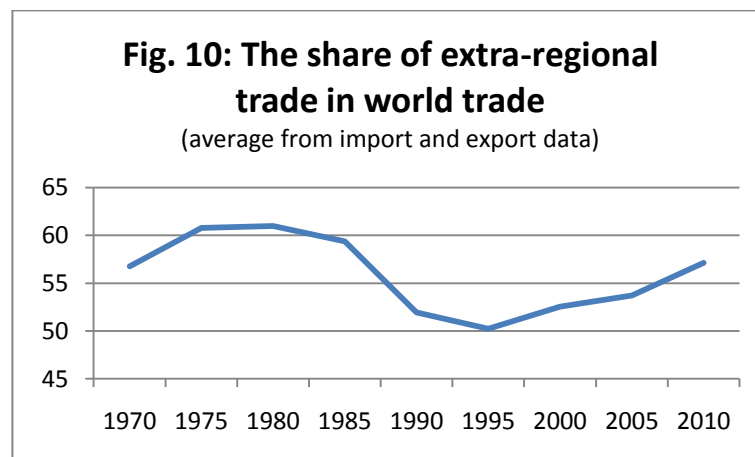
For all regions, the shares of manufacturing in exports and imports vary across trading partner regions. While a more detailed analysis of this is omitted here, Appendix Table 4 contains information on the share of manufacturing in all the intra- and inter-regional trade flows between the regions in 1970, 1990 and 2010.

⁵ See e.g. Bank of Canada commodity price index on <http://www.bankofcanada.ca/rates/price-indexes/bcpi/commodity-price-index-annual/>.

6. Globalisation or regionalisation?

The analysis has produced two S-curves; Figure 5 for the share of “main regions” or (as we have seen later) manufactures-exporting regions in world trade; and Figure 7 for the share of manufacturing in world trade. Since manufacturing trade is particularly dominant in the intra-regional trade flows, there is a corresponding (inverse) pattern for the share of extra-regional trade in world trade. Anderson and Norheim (1993) studied the first part of this period using data for OECD countries, and found that intra-regional trade grew faster. As we shall see, this trend has later been reversed.

By adding the extra-regional trade for all regions, we obtain Figure 10 on the share of extra-regional trade in world trade. The (this time inverse) S-shape is evident. In particular, the surge of intra-regional trade in Western Europe in the late 1980s, combined with more intra-regional trade in Asia, resulted in “anti-globalisation” from 1980 to 1995, with relatively more trade within regions. But from 1995 onward, there was “globalisation” with a rise in the share of extra-regional trade, however not yet to the peak level in 1980.



So in spite of the “regionalisation” promoted by growing intra-regional trade in Asia, extra-regional trade grew faster from 1995. Referring to Figures 5 and 7, it is likely that the recent “trade globalisation” is driven by the “new” traders in Fig. 6. Hence commodity trade is on average more long-haul than manufacturing trade, for which intra-industry trade within the major producing regions plays a greater role. While e.g. Western European countries exchange manufacturing products, the Middle East countries do not exchange much oil, and Africa’s trade with itself is modest.

7. Globalisation and the travelling distance of trade

An issue is whether growth and trade leads to higher transport costs and CO² emissions. If trade growth is primarily in the form of extra-regional trade over longer distances, this may be the result. If, on the other hand, trade growth is predominantly intra-regional, the growth in transported “volume x distance” may be lower. This measure of “trade globalisation” is somewhat crude for energy

considerations since it is affected by the subdivision of world regions. A more robust measure could be obtained by taking into account the bilateral distance of trade directly, since it would have the advantage of being independent of the regional classification. We therefore provide a second measure of trade globalisation, using the grand circle distance between capitals of all trading countries. Two measures of “trade globalisation” are provided:

- We present the average distance of world trade, weighted by trade value, for each year.
- Second, we examine the density of trade by distance; i.e. the distribution of trade according to the distance it travels, from neighbourhood trade over short distances, to trade with remote countries.

We use geographical data (coordinates) from the Global Cities database and for most countries we measure distance from the capital. In order to facilitate the interpretation of the following results, Table 2 shows the average distance of bilateral trade flows between our regions. We use a simple average, since trade-weighted averages would be understating distance (since trade is larger for small distances). The figures are average distances for non-zero bilateral trade flows in 2010. The shaded cells are distances in intra-regional trade.

	Africa	Asia	Central Eur	Former Soviet	Latin America	Middle East	North America	Oceania Pacific	Western Europe
Africa	3499	9640	5158	6159	9541	4837	11035	15163	5776
Asia	9541	3054	7752	6128	16063	5871	13304	8385	8847
Central Eur	5248	7893	811	2327	9827	2763	7987	15320	1707
Fm Soviet	6153	6125	2338	2091	11292	2615	9434	14196	3130
Latin America	9757	16081	9833	11120	2515	12143	4181	12772	8632
Middle East	4692	5907	2757	2726	12268	1237	11332	14376	4134
North America	11008	13437	8003	9335	4073	11258	2674	11518	6374
Oceania/ Pac.	15238	8521	15684	14578	12632	15081	11684	3371	15281
West. Europe	5801	8883	1705	3130	8669	4155	6451	15345	1428
All regions avg.	6639	9095	5725	5835	8809	5926	8926	12144	6331

Western Europe, Central Europe, Former Soviet Union and the Middle East are the regions with the lowest average trade distance. At the other end, Oceania/Pacific stands out as a region with very large trade distances: even for intra-regional trade, the average is above 3000 km. This is also the case for Africa, but Africa has intermediate distance to Europe and the Middle East. For this reason, the average for Africa is not much above Europe. Asia, Latin America and North America are on average more remote from other regions than Africa, and also with intra-regional trade distances in the range at or just below 3000 km. But the average distance between North and South America is in the intermediate range, at about 4000 km.

With this distance grid as a reference point, we may examine how the growth of various trade flows affects the distance travelled by trade. It is evident that:

- Increases in intra-European trade, including trade between Western and central Europe, will increase short-distance trade. While increased WEU-CEU trade could boost such trade from the 1990s, the strong decline in intra-WEU trade should cause a reduction in short-distance trade.
- The growth of intra-Asian trade adds to medium-distance trade flows. This is also the case for intra-American trade and Europe-FSU-Middle East trade.
- Other inter-regional trade flows, particularly Asia’s extra-regional trade, adds to the share of long-range trade, with distances at 6000 km or more.

Reflected all these influences, Figure 8 shows the trade-weighted *average distance travelled for world trade* for each year during the period examined (using the average of calculations from export and import data).

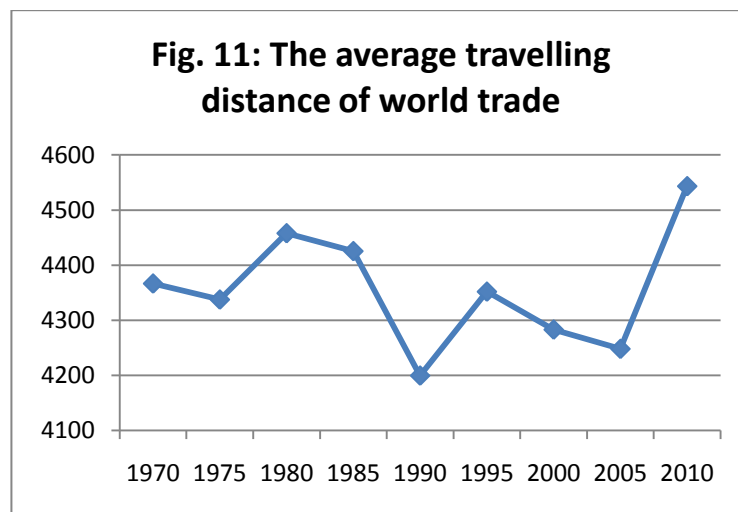
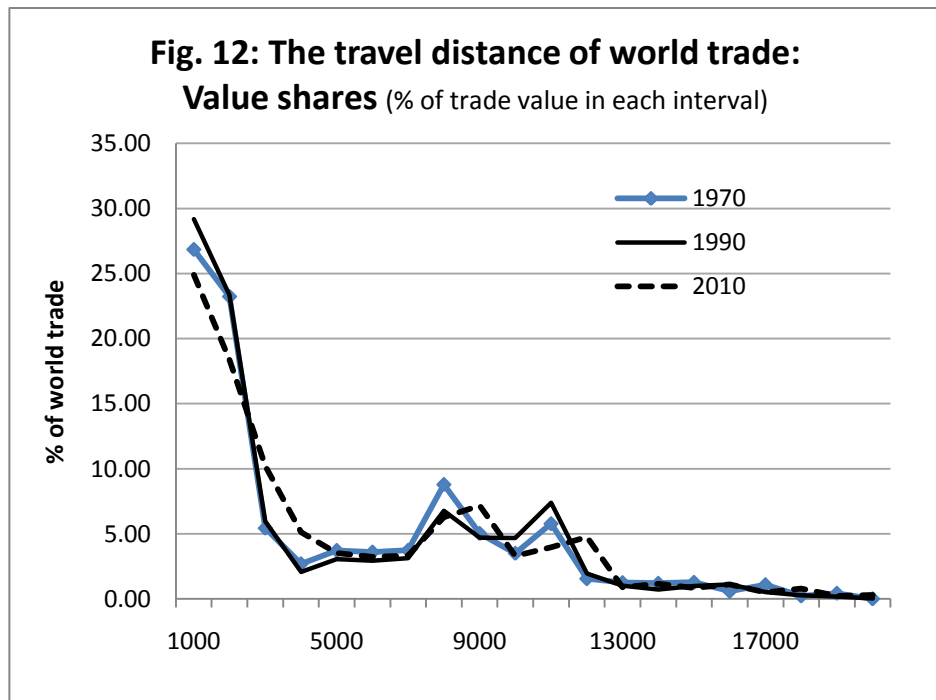


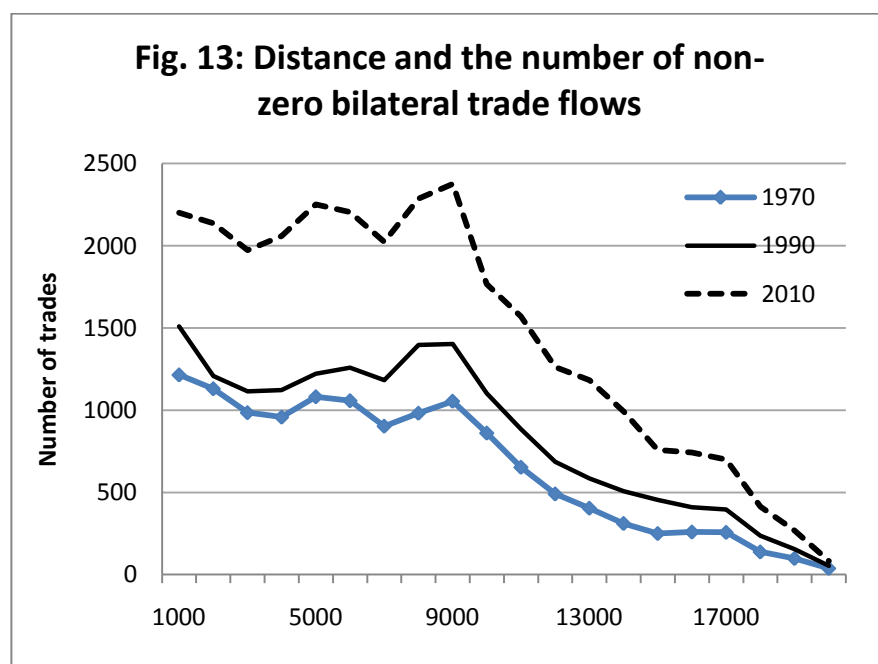
Fig. 11 more or less replicates the pattern in Fig. 10, with a decline in “trade globalisation” before 1990 and an increase towards the end of the period. The latter increase seems even stronger in Fig. 11. This confirms that on average, trade growth has been “transport-increasing” towards the end of the period.

The distance around the equator is approximately 40 000 km so the maximum distance of trade is about 20 000 km. Fig. 11 shows that the average was about 4500 km in 2010. Fig 12 shows the distribution in 1970, 1990 and 2010, using ranges of 1000 km. Hence the far left data point of each curve shows the percentage of trade travelling less than 1000 km; the next between 1000 and 2000 km, and so on.



Trade falls with distance, with little trade for very long distances and a lot in the range up to about 9000 km. During the period and especially after 1990, the share of the “neighbour trade” in the 0-2000 km range has fallen, reflecting the lower share for intra-European trade after 1990. On the other hand, there was a significant increase in the range 2-5000 km, boosted particularly by the growth of intra-Asian trade. These are the main changes in the distribution.

A different picture emerges if we consider the *counts* of bilateral trade rather than the values. There are many zero trade flows, especially between small and distant countries. This number has however been reduced strongly over time, as shown in Fig. 13.



The increase may be affected by data coverage (better reporting over time, new countries formed) and therefore overstated. The trend is nevertheless overwhelming since the number of bilateral trades has been more than doubled. The relative increase is particularly strong in the range 12-17000 km and this is mostly not Europe-Asia trade but must represent Asia-America trade or other long-distance trade flows. This partly reflects the “new trade regions” observed on Fig. 6. Hence a signal is that if the trend over the last decade continues, there may be a relative increase in long-distance trade.

The analysis of trade and distance therefore confirms that the growth of intra-Asian trade particularly promotes trade at an intermediate distance, while the trade growth in new regions tends to promote more long-haul trade. On average, trade became more “globalized” and long-distance after 1990, especially because of the shrinking share of intra-European short-distance trade. Observe that most trades have grown in volume or value, so the analysis addressed the relative rather than the absolute changes.

8. Implications for transport, energy and the environment

Increased trade generates more transport demand, and there is a direct and strong link from transportation to energy consumption to greenhouse gas emissions:

- Transport currently represents 23% of global greenhouse gas emissions and transport-related emissions have increased by 27% after 1990 (IPCC 2007, IEA 2011b).
- Transport consumes a large fraction of global oil supply; 62 % of oil consumption and 60% of oil-related CO² emissions in 2009 were from transports (IEA 2011a, b). 76% of transport-related emissions were from road transports.
- Oil constituted 41% of global energy consumption and was the source of 37% of global CO² emissions in 2009.

Hence there is a direct chain from trade to transport to energy consumption to greenhouse gas emissions. The link is mainly via oil, since cars, ships and airplanes are predominantly driven by oil-based fuels. For trains, the sources of energy are more diversified. On the whole, oil represents 98% of energy used in transport (Smokers and Kampman 2006, referring to IEA data).

A core issue for the energy impact of trade is that the energy intensity of different transport modes varies:

- Marine transport is the most energy-efficient transport per tonne-km and most of intercontinental trade is carried by sea. According to Corbett et al. (2008), the global fleet of oceangoing vessels consumes only 2-4% of annual fuel fossil consumption. We do not have an exact figure on the marine share of total transport, but the modest figure for fuel consumption suggests that sea transport is quite energy-efficient.

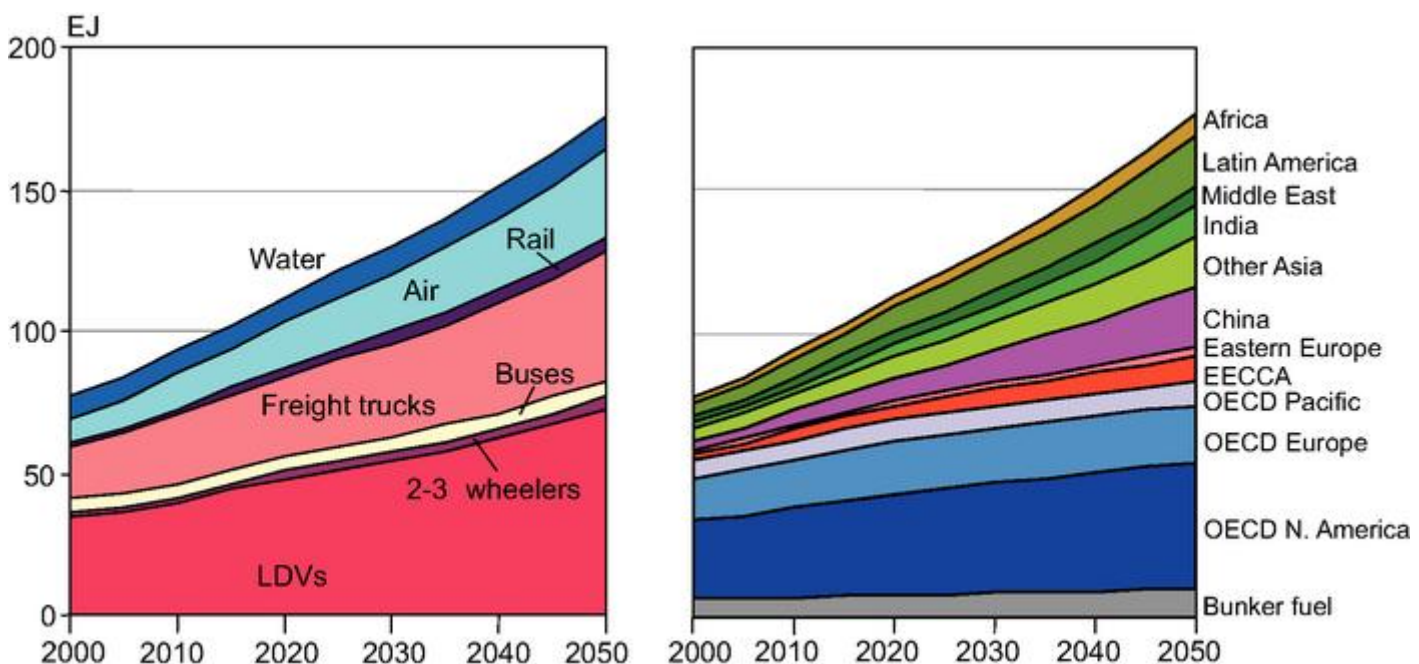
- For inter-continental and long-haul trade, air freight is an alternative. Air freight is particularly suitable for low-weight, high-value goods even fresh fish and agricultural produce is increasingly shipped by air. According to Button (2008), international air transport currently takes 2% of the volume but 40% of the value of global trade. 85% of the air transport volume is intercontinental. There is an increasing trend with fast growth over the last decade.
- For intra-regional and intra-continental trade, different transport modes are applied and the mix varies across continents. The USA has a relatively large share of train transport, while Europe relies more on trucks (Woodburn et al. 2008). But even for intra-regional trade, sea transport is sometimes an option, and in Asia this is even a necessity since many countries are split by sea. Often, transport is multi-modal by combining different modes.

Trade is a major source of transport demand, and the future development of trade will therefore be an important determinant of transport, energy consumption and emissions. How can our analysis of trade, regionalisation and distance shed light on this? Two aspects of the analysis may be relevant:

- First, we have seen that the trend in 2000-2010 is very different from 1970-2000. An issue is whether current energy forecasts are based on recent or long-term trends.
- Second, we may classify regional trade flows according to whether land or sea transport is more likely, and thereby derive predictions from the analysis.

In order to shed light on the first issue, we may compare observed trade growth rates with the regional energy forecasts provided by WBCSD (2004) (and used in a wide number of contexts). These are reproduced in Fig. 14, reproduced from WBCSD (2004).

Fig. 14: Projections of transport energy consumption by mode and region



.Source: WBCSD (2004)

Sea transport is expected to induce a very modest increase in energy use; whereas land transport has the major share. With respect to regions, a surprisingly high share of future growth is expected in North America. The projections are based on data that are better for land transport than sea transport

Actually, the regional energy predictions are not significantly correlated with our regional growth rates for 1970-2010 or 1970-2010.⁶ However, they are significantly correlated with measured regional trade growth for 2000-2010, with a correlation of 0.62. This is somewhat surprising since the forecasts were made in 2004, before 2000-2010 trends could be observed. The predictions are however based on a number of considerations so perhaps other evidence created this match between predictions and recent trade developments.

As a second approach, we may classify trade flows between regions according to whether transport is predominantly by sea, land or mixed. Using S, L, M to denote these options, based on a common sense assessment, we obtain Table 3.

	Africa	Asia	Central Eur	Former Soviet	Latin America	Middle East	North America	Oceania Pacific	Western Europe
Africa	M	S	M	M	S	S	S	S	S
Asia		M	M	M	S	S	S	S	S
Central Eur			L	L	S	M	S	S	L
Fm Soviet				L	S	M	S	S	M
Latin America					M	S	M	S	S
Middle East						L	S	S	S
North America							L	S	S
Oceania/ Pac.								S	S
West. Europe									M

If we add up trade according to this classification, we find the following shares for the three categories:

Year	Mixed	Sea	Land	Total
1970	40.6	45.6	13.8	100
1980	38.0	51.1	10.9	100
1990	45.4	44.2	10.4	100
2000	39.5	45.1	15.3	100
2010	41.2	45.2	13.6	100

⁶ The region classification is not fully comparable and has to be adapted to our classification, so the comparison may not be accurate.

There have been modest changes over time and a large share is “mixed” in the sense that it depends on infrastructure development. For example, intra-regional trade in Latin America or Africa can be transported on land, but this depends on the road and rail network and for Africa, this is poorly developed so it is likely that a substantial share is shipped by sea. Observe that we have also included intra-European trade in the mixed category, since, according to Corbett et al. (2008), 40-45% of the cargo tonne-km is waterborne (inland river and shortsea). For some trades, it should be noted that other transport modes such as air freight and pipelines are important. Air freight is physically possible for all trade flows, whereas pipelines are relevant mainly for the land/mixed categories.

According to this analysis, the allocation of trade across transport modes is not subject to dramatic change to the globalisation or regionalisation of trade as such, but infrastructure development is likely to be more decisive for future developments.

9. Concluding comments

This paper has provided analysis of trade between world regions during the period 1970-2010. We have shown a shocking decline in the role of Western European intra-regional trade after 1990, and stagnating U.S. exports, especially during the last decade. The contrast has been the impressive growth of Asia’s trade – led by intra-regional trade but also extra-regional exports leading to a large trade surplus. After 1995, however, the share of these three major regions in world trade has declined, and we observe a rising share for other regions, including Africa and Latin America. A continuation of this trend would be positive, but e.g. Africa has a long way to go, with almost absent intra-regional trade between the 53 countries involved. With the exception of Central Europe, the trade growth for these other regions during 1995-2010 was strongly influenced by commodity trade and rising commodity prices, and therefore had a cyclical component.

Focusing on globalisation vs. regionalisation, the analysis has shown that growth in Europa and later Asia led to more intra-regional trade until 1995, but after that extra-regional, commodity and long-distance trade has expanded its worldwide share. In support of this, we find that the average travelling distance of world trade has increased after 1990. Given that long-distance trade is mainly carried by sea, the energy efficiency of marine transports limits the energy and environmental footprint of this world trade expansion.

In current debates on global issues, the focus has often been on the large emerging nations rather than regions, with BRICS rather than regional issues in the headlines. As seen from Appendix Table 5, where we show the BRICS’ shares of the trade of their respective regions, some BRICS are truly dominating in their regions; especially Russia and Brazil, followed by China. South Africa and India are however still more modest players in international goods trade. For Asia, a regional perspective is also useful since China only constitutes half of Asia in the economic sense, and the growth of trade within Asia has been stronger than the extra-regional component.

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Appendix Table 1: Classification of country groups

Note: Countries and country classifications change over time and some countries appear in the data set only for selected years

AFR (Africa, 57)

Algeria, Angola, Benin, Botswana, Burkina Faso, Burundi, Cameroon, Cape Verde, Central African Republic, Chad, Comoros, Democratic Republic of the Congo, Congo, Cote d'Ivoire, Djibouti, Egypt, Equatorial Guinea, Eritrea, Ethiopia, Gabon, Gambia, Ghana, Guinea, Guinea-Bissau, Kenya, Lesotho, Liberia, Libya, Madagascar, Malawi, Mali, Mauritania, Mauritius, Mayotte, Morocco, Mozambique, Namibia, Niger, Nigeria, Réunion, Rwanda, Saint Helena, Sao Tome and Principe, Senegal, Seychelles, Sierra Leone, Somalia, South Africa, Sudan, Swaziland, United Republic of Tanzania, Togo, Tunisia, Uganda, Western Sahara, Zambia, Zimbabwe

ASIA (32)

Afghanistan, Bangladesh, Bhutan, British Indian Ocean Territories, Brunei Darussalam, Cambodia, China, Christmas Islands, Cocos(Keeling) Islands, Timor-Leste, Vietnam (former), China, Hong Kong Special Administrative Region, India, Indonesia, Japan, Republic of Korea, Lao People's Democratic Republic, China, Macao Special Administrative Region, Malaysia, Maldives, Mongolia, Myanmar, Nepal, Taiwan, Democratic People's Republic of Korea, Pakistan, Philippines, Ryuku Islands, Singapore, Sri Lanka, Thailand, Viet Nam

CEU (Central Europe, 18)

Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Cyprus, Czech Republic, Czechoslovakia, Greece, Hungary, The former Yugoslav Republic of Macedonia, Montenegro, Poland, Romania, Slovakia, Slovenia, Serbia, Turkey

FSU (Former Soviet Union, 16)

Armenia, Azerbaijan, Belarus, Estonia, Georgia, Kazakhstan, Kyrgyzstan, Latvia, Lithuania, Republic of Moldova, Russian Federation, Soviet Union, Tajikistan, Turkmenistan, Ukraine, Uzbekistan

LAC (Latin America, 47)

Anguilla, Antigua and Barbuda, Argentina, Aruba, Bahamas, Barbados, Belize, Bolivia (Plurinational State, f), Brazil, British Virgin Islands, Cayman Islands, Chile, Colombia, Costa Rica, Cuba, Dominica, Dominican Republic, Ecuador, El Salvador, Falkland Islands (Malvinas), Former Panama Canal Zone, French Guiana, Grenada, Guadeloupe, Guatemala, Guyana, Haiti, Honduras, Jamaica, Martinique, Montserrat, Netherlands Antilles, Nicaragua, Panama, Paraguay, Peru, South Georgia, St. Kitts & Nevis, St. Lucia, Saint Vincent and the Grenadines, St. Kitts-Nevis, Suriname, Trinidad and Tobago, Turks and Caicos Islands, Uruguay, Venezuela (Bolivarian Republic of) Virgin Islands

ME (Middle East, 14)

Bahrain, Iran (Islamic Republic of), Iraq, Israel, Jordan, Kuwait, Lebanon, Occupied Palestinian Territory, Oman, Qatar, Saudi Arabia, Syrian Arab Republic, United Arab Emirates, Yemen

NAM (North America, 6)

Bermuda, Canada, Greenland, Mexico, Saint Pierre and Miquelon, United States of America

NEI (not elsewhere included, 9)

Antarctica, Bouvet Island, British Antarctic Territories, Bunkers, Free Zones, French Southern & Antarctic Terr., Heard & McDonald Islands, Special categories, Unspecified

OPA (Oceania & Pacific, 27)

American Samoa, Australia, Cook Islands, Fiji, French Polynesia, Guam, Kiribati, Marshall Islands, Micronesia (Federated States of), Nauru, New Caledonia, New Zealand, Niue, Northern Mariana Islands, Pacific Islands, Palau, Papua New Guinea, Pitcairn, Samoa, Solomon Islands, Tokelau, Tonga, Tuvalu, United States Minor Outlying Islands, US mis. Pacific Islands, Vanuatu, Wallis and Futuna Islands

WEU (Western Europe, 25)

Andorra, Austria, Belgium, Denmark, Faeroe Islands, Finland, France, Germany, Gibraltar, Holy See, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, San Marino, Spain, Sweden, Switzerland, United Kingdom of Great Britain and Northern Ireland

Appendix Table 2: Shares of world trade in 2010 for trade flows within and between world regions

Average shares based on export and import data

Abbrev.	Exporting regions	Importing regions										All exports	Extra-reg. exports
		AFR	ASI	CEU	FSU	LAC	MEA	NAM	NES	OPA	WEU		
AFR	Africa	0.39	0.81	0.08	0.02	0.11	0.08	0.62	0.02	0.02	1.15	3.30	2.91
ASI	Asia	0.92	15.62	0.84	0.63	1.08	1.28	5.44	0.05	0.82	4.44	31.12	15.50
CEU	Central Europe	0.12	0.18	0.97	0.33	0.03	0.20	0.13	0.08	0.02	2.58	4.65	3.67
FSU	Former Soviet Union	0.07	0.62	0.59	0.78	0.04	0.09	0.21	0.55	0.00	1.34	4.28	3.50
LAC	Latin America	0.13	0.98	0.06	0.06	0.91	0.10	0.84	0.41	0.02	0.66	4.15	3.24
ME	Middle East	0.19	3.54	0.11	0.02	0.04	0.35	0.52	0.92	0.04	0.52	6.27	5.92
NAM	North America	0.23	2.57	0.17	0.09	1.01	0.31	5.75	0.00	0.18	1.92	12.23	6.49
NEI	Not elsewhere included	0.01	0.06	0.15	0.24	0.03	0.12	0.00	0.00	0.04	0.56	1.22	1.22
OPA	Oceania & Pacific	0.03	1.10	0.01	0.01	0.02	0.04	0.09	0.17	0.11	0.11	1.69	1.57
WEU	Western Europe	1.05	3.20	2.73	0.90	0.62	0.95	2.77	0.59	0.28	18.00	31.09	13.09
All imports		3.14	28.67	5.72	3.09	3.89	3.51	16.37	2.80	1.53	31.27	100.00	
Extra-regional imports		2.74	13.05	4.74	2.31	2.98	3.16	10.63	2.80	1.42	13.28		57.12

Note: Own calculations based on data from WITS/COMTRADE.

Appendix Table 3: Growth rates 1970- 2010 for trade flows within and between world regions													
Average annual growth rates from values in USD deflated by the U.S. GDP deflator, averages based on export and import data													
Abb- rev.	Exporting regions	Importing regions										All exports	Extra-reg. exports
		AFR	ASI	CEU	FSU	LAC	ME	NAM	NEI	OPA	WEU		
AFR	Africa	7.39	7.83	5.19	0.95	6.30	7.84	7.51	7.71	6.23	3.57	5.29	5.11
ASI	Asia	7.72	10.11	9.29	8.56	9.34	10.15	7.72	9.34	8.33	8.64	9.09	8.35
CEU	Central Europe	6.31	6.67	6.51	4.09	5.38	8.15	6.38	10.34	7.26	7.48	6.77	6.84
FSU	Former Soviet Union	6.02	9.02	5.90	0.00	12.84	8.00	12.07	0.00	8.14	8.52	8.87	8.33
LAC	Latin America	8.85	8.84	4.22	8.86	6.45	10.87	4.37	15.12	7.41	3.60	5.78	5.61
ME	Middle East	9.81	10.03	7.11	6.24	4.70	9.14	10.20	8.81	4.64	3.18	7.84	7.78
NAM	North America	3.96	5.75	5.18	7.05	4.87	6.24	5.74	-5.54	3.83	3.52	5.05	4.56
NEI	Not elsewhere included	5.64	5.53	15.82	0.00	8.14	9.98	0.08	0.00	10.66	5.77	7.28	7.28
OPA	Oceania & Pacific	4.45	7.36	2.36	2.71	6.08	7.25	2.93	15.54	4.75	1.91	5.78	5.88
WEU	Western Europe	3.81	7.69	6.72	7.15	3.90	6.20	5.19	4.40	3.81	5.03	5.30	5.72
All imports		5.38	8.68	6.77	7.47	5.77	7.81	6.16	7.08	5.73	5.24	6.36	3.17
Extra-regional imports		5.19	7.61	6.82	6.70	5.59	7.70	6.42	7.08	5.82	5.53	3.19	
Note: Own calculations based on data from WITS/COMTRADE.													

Appendix Table 4: The share of manufactures in regional trade flows 1970, 1990 and 2010										
Exporting region	Year	Importing region								
		AFR	Asia	CEU	FSU	LA	MEA	NAM	OPA	WEU
Africa	1970	33	7	9	19	6	31	10	19	6
	1990	46	24	13	74	16	38	7	53	19
	2010	47	10	29	15	14	40	10	31	23
Asia	1970	87	56	66	59	91	77	84	79	62
	1990	85	74	85	68	91	86	94	86	91
	2010	82	80	92	91	87	86	93	76	89
Central Europe	1970	51	63	53	57	72	48	46	71	34
	1990	76	90	75	97	72	74	63	71	65
	2010	79	69	71	83	90	75	84	84	84
Fm Soviet	1970	37	30	25	n.a.	78	66	29	52	14
	1990	43	42	28	n.a.	64	80	28	79	18
	2010	35	25	19	49	70	46	22	46	16
Latin America	1970	23	5	9	5	23	7	8	11	8
	1990	39	32	21	22	45	34	31	59	24
	2010	32	10	22	6	53	11	37	31	25
Middle East	1970	45	4	17	35	8	44	46	7	6
	1990	27	9	13	90	8	53	19	20	15
	2010	42	13	41	66	43	65	30	25	35
North America	1970	72	43	50	41	75	70	69	82	57
	1990	62	60	53	20	73	66	72	83	72
	2010	53	57	49	68	64	69	67	76	65
Oceania/Pac.	1970	45	10	7	0	25	8	9	52	8
	1990	14	15	6	3	10	11	30	58	17
	2010	37	8	47	10	28	38	44	53	28
West. Europe	1970	85	86	81	91	88	87	84	92	73
	1990	82	88	83	88	86	82	84	90	78
	2010	73	85	80	83	86	84	91	89	72

Note: Results based on export data

Appendix Table 5: BRICS shares in % of trade flows within and between world regions, 2010

Shares of each country in the total trade of its region with own/other regions. Averages based on export and import data

Trade partner region		South Africa/AFR		China/Asia		India/Asia		Brazil/LAC		Russia/FSU	
		Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports	Exports	Imports
AFR	Africa	28	10	45	51	13	21	52	73	51	57
ASI	Asia	22	19	28	26	3	4	43	36	70	66
CEU	Central Europe	10	11	47	44	4	9	41	44	68	50
FSU	Former Soviet Union	18	2	64	42	3	6	62	50	45	27
LAC	Latin America	8	13	44	52	5	8	33	19	61	69
ME	Middle East	21	27	33	18	23	18	69	75	50	35
NAM	North America	9	18	45	29	4	5	25	22	59	69
NEI	Not elsewhere included	13	7	0	15	39	20	0	0	99	95
OPA	Oceania & Pacific	33	32	28	36	2	5	30	45	47	69
WEU	Western Europe	12	16	46	36	7	8	47	45	72	61