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WHY DO TRADE COSTS VARY?

by

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ABSTRACT: Trade theorists and policymakers have until recently ignored trade costs, but as tariffs have fallen it is apparent that trade costs are a significant obstacle to international trade and that they vary from country to country. Using disaggregated Australian import data, we analyse country-by-country variations in trade costs, controlling for distance and the bulkiness of commodities. Exporting countries' institutional quality is more strongly related to trade cost for air freight than sea freight; the relationship is commodity-specific and strongest for manufactured goods. Country-specific characteristics influencing trade costs provide a link between institutions and economic development.

JEL codes F10, F13, O24

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WHY DO TRADE COSTS VARY?

An economically meaningful and operational approach to studying variations in the costs of international trade costs is to examine the gap between free-on-board (fob) values when a good reaches the port of exit in the exporting country and import values which include cost, insurance and freight (cif). The cif-fob gap is an economically meaningful measure of the wedge between the cost of producing and moving a good to the exporter's port and the price paid by the importer upon the good's arrival in the destination country. The cif/fob price gap is operationally useful because some national statistical offices have data on fob and cif values at disaggregated levels. In this paper we utilize such data for Australian imports since 1990 at the six digit HS level to analyse cross-country differences in trade costs.

Of the few countries collecting consistent cif/fob data Australia is particularly well-suited to this exercise.[1] Australia is an island; no imports arrive by land and there is no need to allow for geographical contiguity.[2] Zero cells will always exist at the 6-digit level of aggregation, but because Australia is a reasonably large economy – the world's 14th largest importer in 2006 (WTO *International Trade Statistics 2007*, Table 1.9) - these are relatively few. Apart from trade with New Zealand and other Pacific islands, no significant preferential trading arrangements influence Australia's trade. Hence, Australia provides a good natural experiment of the trade costs associated with each of the 228 trade partners identified in the Australian Bureau of Statistics data.

The data allow us to decompose, at least partially, country and commodity characteristics which impact on trade costs. A country's geographical characteristics such as distance from major market are immutable and distinct from institutional and other characteristics which are amenable to policy change. In general, a country selling bulky goods will have higher transport costs than a country selling high

[1] Similar datasets for the USA, New Zealand, and some South American countries are described in David Hummels (2007, 152-3) and in Jane Korinek and Patricia Sourdin (2008). Mirror techniques, matching fob values reported by exporting countries to cif values reported by importing countries, are unsatisfactory due to large measurement errors (David Hummels and Volodymyr Lugovskyy, 2006).

[2] Hummels (2007), reviewing the literature on trade costs, emphasises the difficulty of measuring costs of land transport (the mode used by over a fifth of international trade) and how they interact with costs of sea and air transport, which may be substitutes to varying degrees. For Australia the only substitution option is between sea and air transport.

value/bulk goods.[3] Once geographical characteristics and weight have been controlled for, we can analyse variations in trade costs using measures of institutional quality and other explanatory variables. The determinants of trade costs are estimated separately for both sea and air freight. However, the choice of transport mode may be endogenous, e.g. the preference for air is likely to be increasing with distance and air freight may be a way of avoiding inefficient internal transport and ports in the exporting country.[4]

Until recently trade costs were ignored both in trade theory and by policymakers. As tariffs fell in the 1950s and 1960s, attention turned to non-tariff barriers to trade, and as NTBs fell in the 1980s and 1990s attention turned to trade costs.[5] In an influential survey paper, James Anderson and Eric van Wincoop (2004) estimated that in the high-income countries trade costs, defined as all costs of getting a good to the final user apart from the marginal cost of producing the good itself, amount on average to a 170% ad valorem barrier to trade. This dramatic result highlighted the potential significance of trade costs, although it was using a very broad definition of trade costs and the estimates relied on indicative case studies or indirect evidence from gravity models.

Trade costs are important for theory and in practice. Adrian Wood (2007) makes the point that the bigger the wedge between the price received by the foreign supplier and the price paid by the importer, the lower the elasticity of supply; this can explain the "missing trade" found by Daniel Trefler (1995) and perhaps explain the border effect. James Markusen and Anthony Venables (2007) relate the degree of specialization in an economy to the interaction of comparative advantage and trade costs. High trade costs inhibit a country from taking advantage of potential gains from specialization and trade in order to promote economic development. In a global model of the pattern of bilateral trade, Michael Waugh (2008) finds that the calibrated

[3] Although bulk accounts for some commodity fixed effects, we are unable to take account of other characteristics such as perishability or fashion which influence the choice of air or sea transport.

[4] The time advantage of air is more pronounced over longer distances. To the extent that transport costs are related to weight rather than value, they are closer to a specific than an ad valorem charge, and hence trade costs are declining with respect to unit value; if the charge is by ton-kilometer, then for a given value the preference for air is likely to be increasing with distance.

[5] Trade facilitation was included in the Doha Development Round of multilateral trade negotiations and has featured increasingly prominently in regional trade agreements (Richard Pomfret and Patricia Sourdin, 2009). In 2001 Asia-Pacific Economic Cooperation (APEC) members adopted a goal of reducing trade costs by five percent over five years, and the commitment was repeated in 2006, although without an agreed measure of trade costs it is difficult to monitor progress towards such a goal.

trade costs are systematically asymmetric, with poor countries facing higher costs to export their goods relative to rich countries; removing the asymmetry in trade costs, cross-country income differences decline by up to 34 percent. Importers may be concerned about time rather than financial costs; Carolyn Evans and James Harrigan (2005), using proprietary data from a major US department store chain, find that the retailer's demand for timely deliveries influenced its choice of source countries. David Hummels (2001) has estimated that the cost of a day's delay in transport adds on average 0.8% to the value of a manufactured good, and there is a growing literature emphasising the costs of having to keep larger inventories if trade is slow or unreliable.

However, we have little direct information on the size of trade costs and only limited evidence on their determinants. Nuno Limao and Anthony Venables (2001) found a large variation in the cost of shipping a container from Baltimore to different countries, some of which is physically determined (landlocked countries have higher transport costs) but much of it is due to differences in infrastructure. Ximena Clark, David Dollar and Alejandro Micco (2004) came up with similar results for the costs of shipping a container from Latin American countries to the USA, and emphasised the quality of institutions (corruption, logistical efficiency, and so forth) as the key determinant of port efficiency. An important point from these studies, and one well-known to transport managers, is that trade costs vary considerably among country pairs and they are not simply related to distance.

A similar conclusion informs research on bilateral trade flows. In the micro-founded gravity model of Anderson and van Wincoop (2003), country-specific trade resistance terms are accounted for by exporting-country fixed effects, but the source of the country fixed effects is indeterminate. Recent research on trade and distance has moved beyond aggregated gravity models to analyse with data disaggregated by commodity the interaction between variables such as weight/value and timeliness requirements and the choice of mode of transport and their joint impact on bilateral trade patterns.[6] The present paper complements this work by using disaggregated data to analyse variance of trade costs across countries.

[6] James Harrigan and Haiyan Deng (2008), Matias Berthelon and Caroline Freund (2008), Peter Egger (2008) and Mauricio Mesquita Moreira et al. (2008) contribute to this literature and provide references to other work.

1. Data

The Australian Bureau of Statistics (ABS) data provide annual fob and cif values of Australia's imports for 1990-2007 at the HS 6-digit level of aggregation, as well as reporting weight for many commodity groups and separating out sea, air and parcel post. After deleting parcel post, re-imports into Australia, country categories such as "Unidentified", ships supplies and Australian forces overseas, and the miscellaneous category (HS99), we had a usable dataset of 2,097,969 observations, or between 103 and 133 thousand observations per year. The weighted average ad valorem trade costs (cif-fob)/fob for each trading partner in 1990-2007 are reported in Appendix 1.

Overall, average trade costs associated with imports into Australia fell continuously and substantially from 8.0% in 1990 to 4.9% in 2007, despite the huge increase in the price of oil after 1998 (Table 1).[7] Average trade costs are higher than Australia's applied tariff rates, which were 4.5% in 2002 and 3.8% in 2006.[8] The pattern of falling costs applies to both sea and air transport (Figure 1). Trade costs relative to value are lower for air freight than for sea transport, because higher value goods are sent by air.

Globally, air shipping has increased rapidly over the last forty to fifty years.[9] David Hummels (2007) argues that this is due to a substantial decline in relative costs of air shipping (air freight costs fell substantially in real terms while sea freight costs had no clear trend) and also to a continuous decline in the bulk/value ratio of world trade, associated with an increasing share of manufactures. Bulk commodities (e.g. oil, iron ore, coal and grains), which are shipped almost totally by sea, constitute the majority of world trade by weight, but are a smaller and shrinking share of international trade by value (Hummels, 2007, 132). Over the period covered by our

[7] There is a slight increase between 1999 and 2000 and a more substantial increase between 2003 and 2004, both of which may be related to oil price increases, but in every other year the average trade cost is constant or falling from the previous year. The decline in trade costs may be understated due to a composition effect; if air costs fell faster than sea costs, the lightest or most time-sensitive goods formerly shipped by sea may now be airfreighted, increasing average transport costs by both modes while providing more cost-effective transport for all.

[8] Average tariff rates as reported in the WTO *2008 Trade Policy Review of Australia*, available at www.wto.org. The Australian tariff profile on the same website reports a weighted average applied tariff in 2005 of 6.5%.

[9] Between 1965 and 2004 the share of air in the total value of US imports increased from 8% to 32% and in US exports from 12% to 53%. Worldwide average revenue per ton-kilometre air-freighted (in constant 2000 US dollars) fell from $3.87 in 1955 to under $0.30 in 2004; the biggest decline was in 1955-72 before rising oil prices led to a flattening of the decline during the 1970s, but since the late 1980s air transport costs by this measure more than halved (Hummels, 2007).

data this pattern is visible in the 1990s, when the share of imports arriving by air increased from 26.9% in 1990 to 31.2% in 2000, but the share then declined and by 2007 was almost the same (27.0%) as in 1990 (Figure 2). At the same time, the gap between ad valorem trade costs by air and by sea increased, from sea being less than 30% higher in 1990 to being almost 50% higher in 2007 (Table 1). This suggests that the shift to air became more attractive for a greater range of higher value goods, while the overall share of sea was maintained by the increasing value of bulk goods as oil and other primary product prices surged in the decade after 1998.

Table 2 illustrates the distribution of trade costs by country in 2007. Although there is a wide range, over half of the 211 trading partners exporting to Australia in 2007 had average trade costs between 3.5% and 7.9%. The outliers with trade costs less than 2% or over 20% of fob value tend to be minor trading partners. The ten largest sources of imports all have trade costs between 2.9 and 6.3%, but there is no clear pattern of these countries' average trade costs being determined by distance or level of development. For the fifty-one African countries the average ad valorem trade costs in 2007 were 7.3%, which suggests a negative relationship between trade costs and economic development.[10]

The simple correlation between ad valorem trade costs and $d_{i,A}$ (the distance between the ith county and Australia) is -0.001.[11] The negative sign disappears if a simple regression is run in logarithms or with a squared distance term, but the coefficient is always less than 0.1. Even with the most favourable non-linear specification, a doubling of distance increases ad valorem trade costs by less than a tenth.[12] For the half million observations identified by consistent measures of weight, the correlation between weight and costs is 0.0013.[13] In sum, ad valorem trade costs are positively related to distance and to weight, but in the Australian data both of

[10] The 51 exclude the island economies of Mauritius, Reunion and Seychelles. Four African countries sent no exports to Australia in 2007. Excluding the two extreme observations of zero for Libya and 51% for Morocco the African average was just over 6.5%, which is still about a third bigger than the average for the rest of the world.

[11] Distances are taken from the Centre d'Etudes Prospectives et d'Informations Internationales database, available at www.cepii.fr/anglaisgraph/bdd/distances.htm The correlations are similar irrespective of which of the four distance measures are used.

[12] Berthelon and Freund (2008) conclude from their disaggregated gravity model analysis that the importance of distance over time is related to the substitutability of goods, i.e. distance is more relevant to the cost of trading differentiated manufactured goods than to trade in homogeneous primary products.

[13] The quantity data include measures by number, square meters and many commodity-specific units. For 556,468 observations they were in metric tons, kilograms, grams or metric carats.

these are weak correlations implying that the variation in ad valorem trade costs is principally determined by other variables.

Table 3 and Figure 3 illustrate the pattern of ad valorem trade costs over time, using exporter-commodity fixed effects to control for distance and commodity characteristics. The pattern for goods arriving by sea is similar to that with the raw data in Figure 1. The adjusted costs, however, reveal the higher costs of air transport once commodity characteristics (e.g. weight/value) are taken into account. The adjusted values indicate a larger percentage decline in maritime trade costs between 1990 and 2007 than shown by the unadjusted data. The picture for air transport is of a dramatic decline in adjusted trade costs during the 1990s, but no clear trend since 1999.

A number of other variables have been identified in the literature as influencing transport costs. Transport costs are subject to scale economies and may depend upon the potential size of the bilateral trade. Unbalanced trade can influence trade costs, if the ship or plane has to travel empty in one direction.[14] Both scale economies and unbalanced trade are likely to be more significant for sea than for air freight. Trade costs may also be influenced by how many shipping lines or airlines serve the bilateral route and by how much monopoly power they have.[15]

Trade costs are also influenced by institutional and policy factors. In this paper the institutions in the importing country, Australia, are constant for all bilateral trade flows, and differences will be observed dependent upon the exporting country's institutions. Limao and Venables (2001) identified onshore infrastructure as an

[14] Gordon Wilmsmeier, Jan Hoffmann, and Ricardo Sanchez (2006) find that unbalanced trade (measured by the ratio of imports to exports in a country's bilateral trade) is a significant determinant of freight costs in Latin America and they argue that their estimated coefficients are too low because the imbalances "need to be applied to broader trade routes" such as South America's Pacific coast and North America. This is less relevant to Australia, where the only major non-Australian port for an empty ship to pick up cargo in the Southwest Pacific is Auckland. However, a potential complication from using Australia as the yardstick for measuring countries' trade costs is the importance of bulk commodities in Australian exports. Although the trade costs of Australian exports are not the subject of this paper, there may be an indirect non-random impact on Australian import costs from the empty space in returning bulk carriers.

[15] David Hummels, Volodymyr Lugovskyy and Alexandre Skiba (2007) show that one sixth of importer/exporter pairs are served by a single liner service, and over half are served by three or less. They also present evidence of shipping companies charging higher rates on goods with inelastic demand, which is consistent with the exercise of market power. In contrast, the measures of market power in Clark et al. (2004) are not statistically significant. Massimo Geloso-Grosso (2008) and Roberta Piermartini and Linda Rousova (2008) using a gravity model both find a robust positive relationship between liberalization and the volume of air traffic.

important variable.[16] Clark, Dollar and Ximena (2004) focused on port efficiency.[17] Port costs may be high for geographical reasons (e.g. lack of deep water harbours) or low for scale reasons (e.g. a Rotterdam or Hong Kong effect, which encompasses more than pure exporting country variables). They may be high because corruption leads to extra demurrage costs or because political obstacles restrict investment in port facilities. Julia Devlin and Peter Yee (2005) document the wide variation in logistics costs among the Middle Eastern and North African countries and how they can influence shipping costs, e.g. inefficient trucking services lead to longer stand time on the dockside and costly inventory accumulation as well as reducing export volumes so that there are infrequent shipping services.[18] There is a large literature on the Digital Divide between developed and developing countries and on the positive effect of Internet adoption on economic growth.[19] We address this complex of determinants by using the Transparency International Corruption Perceptions Index as a proxy for 'institutional quality' in the exporting country.

2. Determinants of Trade Costs

In our estimating equation, ad valorem trade costs $((\text{cif-fob})/\text{fob})_i^k$ for commodity k from country i depend on the distance between the county and Australia ($d_{i,A}$), the value/weight ratio (VW_i^k = cif value divided by weight in kilograms),), a dummy for landlocked countries to proxy added border crossings (B_i), exporting-country GDP

[16] Their infrastructure index is based on kilometers of road, paved road and railway per square kilometer and telephone main lines per capita.

[17] Their principal measure of port efficiency is survey data drawn from the Global Competitiveness Report published by the World Economic Forum. John Wilson, Catherine Mann and Tsunehiro Otsuki (2003) and Wilmsmeier et al. (2006) use the same source, and Sanchez et al. (2003) use Latin American survey data. Bruce Bloningen and Wesley Wilson (2008) show that survey data overstate the importance of port efficiency because respondents include other country fixed effects. A problem with using the Global Competitiveness Report data or the Bloningen-Wilson econometric estimates of port costs is that the former only cover about fifty countries and the latter cover 100 ports in 42 countries.

[18] The World Bank logistics perceptions index provides proxy measures for cross-country variations in logistic quality (http://info.worldbank.org/etools/tradesurvey/mode1a.asp).

[19] Caroline Freund and Diana Weinhold (2004) found that internet use had no impact on world trade in 1995 but after 1997 it had an increasing impact. Luis Andrés et al. (2007), using data from the International Telecommunications Union database on the number of internet users, document for 199 countries the wide variations in internet diffusion and how this is influenced by policy decisions such as the degree of competition among providers. Unfortunately data on the quality of internet access, intensiveness of use or geographic concentration are not available for a large enough number of countries to use in cross-country analyses.

(Y_i) or total bilateral trade to capture scale effects, and the Transparency International Corruption Perceptions Index for the exporting country (TI_i):

$$(1) \qquad ((\text{cif-fob})/\text{fob})_i^k = f\,(d_{i,A},\ VW_i^k,\ B_i,\ Y_i,\ TI_i)$$

Table 4 reports OLS regression results using 2006 data.[20]

In the full sample of 18,082 observations, distance and the value/weight ratio have the expected signs and are statistically significant at the one percent level. Surprisingly, the landlocked dummy has a negative sign and is statistically significant, which is difficult to explain as the literature strongly indicates that landlockedness is associated with higher trade costs.[21] Exporting country GDP and the corruption index both have the expected negative relation to ad valorem costs. The mode of transport, captured by a dummy variable of 1 for sea and 0 for air in the first column of Table 4, indicates that sea transport is less expensive than air transport once commodity and country characteristics are controlled for.

To examine whether the determinants of trade costs differ according to the mode of transport, the last two columns of Table 4 split the sample into goods arriving by sea and goods arriving by air. Distance and weight have the expected signs with both modes and, unsurprisingly, the coefficients are larger for imports arriving by sea than for air freight.[22] Exporting country GDP has the expected negative sign for both modes, significant at the 1% level for sea and at the 10% level for air, suggesting that scale may be important, especially for sea transport. We are aware that GDP may be picking up other relationships including good institutions, and ran the same regression replacing GDP by the sum of imports from the trading partner; the results reported in panel b of Table 4 are essentially the same. Finally, the institutional quality variable has the expected negative sign for air transport (as in the full sample) but for imports arriving by sea the coefficient is zero. In the presence of corruption, exporters prefer air transport in order to minimize costs and delays within the exporting country; goods for which poor institutions may be unimportant, e.g. bulk commodities, are shipped by sea whereas more time-sensitive, easily pilfered or otherwise institution-sensitive

[20] The Transparency International Corruption Perceptions Index is on a scale from 0-10, with a higher number indicating less corruption; 163 countries were covered in 2006 and 180 in 2007. The GDP data are the current dollars series from the Penn World Tables. Distance (the great circle distance between the largest city in each country and Sydney) and the landlocked dummy are from the CEPPII database referred to in the previous section.

[21] Jean-François Arvis, Gael Raballand, and Jean-François Marteau (2007) provide a literature and issues survey on the cost of being landlocked.

[22] The coefficients are significant at the one percent level for both sea and air, with larger coefficients and bigger t-statistics for sea.

goods are sent by air and among the latter set the lower the perceived corruption in the exporting country the lower the trade costs.

Table 5 reports similar regressions with a panel, 1998-2006.[23] We experimented with a number of scale variables; total imports from the trading partner as in Table 4b, total imports of commodity k from country i in year t (log trade), and total imports by mode of transport. Results for all three measures for seaborne trade are reported, and just for the log trade measure (our statistically preferred measure) for air. Compared to Table 4, the standard errors are much smaller due to the larger number of observations, but there is no qualitative change in the results. In Table 5 the corruption index is significant even for sea trade, although the coefficient is smaller than for air trade. The distance and bulkiness variables remain larger for sea than for air. The coefficient on the scale variable is much smaller with the panel, and is larger for air than for sea, unlike in Table 4. The R^2 is virtually unchanged for the full sample, but by mode the R^2s are smaller with the panel (0.15 compared to 0.25 for air and 0.19 compared to 038 for sea)

To capture industry-specific influences on trade costs, we included dummies for HS two-digit categories in the 2006 regressions. For goods arriving by sea these dummies were almost all not significantly different from zero.[24] For goods coming by air, however, the coefficients on the dummies were mostly statistically significant, suggesting that industry-specific features (perhaps capturing timeliness, fragility and so forth) influence air transport costs.

Table 6 reports results for the basic regression run at the industry level (i.e. by 2-digit HS categories) with 2006 data. The estimating equation includes log distance, the landlocked dummy, log value/weight, log of total bilateral imports and the Transparency International corruption perceptions index, as in Table 4b.[25] For goods shipped by sea, distance and bulk are the key determinants of ad valorem trade costs in almost all categories, with only occasionally statistically significant coefficients on the landlocked dummy (often with the wrong sign) and on the scale variable. The

[23] The range was determined by availability of all variables, notably the Transparency International Corruption Perceptions Index. Results with the borders (landlocked) variable are not reported because, as in Table 4, the coefficient was not positive and significantly different form zero.

[24] Only HS 44 (wood and wood products), 63 (miscellaneous textiles) and 71 (pearls and precious stones) had coefficients significantly different from zero at the 1% level; the first two are heterogeneous and the third is not a major sea-freighted category.

[25] Appendix 2 contains descriptions of the HS 2-digit categories. Categories with few observations (n<30) were omitted. There may be a selection bias due to the weight variable (i.e. goods whose quantity is measured by number, area, volume and so forth are excluded).

corruption variable has a statistically significant negative sign for only five categories (HS14, 18, 19 34 and 48), and only for the first and last of these were the coefficients significant at the 1% level.[26] In sum, the sea results in Table 6 provide a fairly traditional picture of the determination of transport costs.

For air freight, distance and value/weight are also the most frequently statistically significant exogenous variables. The striking difference to the sea results is that the corruption index is negative and statistically significant for 17 out of the 55 categories in Table 6. These categories are mainly manufactured goods, and they include no raw or lightly processed animal or vegetable products (18 cocoa and cocoa products is the only remotely agricultural category).[27] At first sight, they appear to be sectors in which global value chains are well-developed, such as electrical equipment, clothing, rubber and plastic.

3. Conclusions

Transport and related trade costs are often viewed as technologically determined, but many measured 'trade costs' are not non-policy barriers. Port infrastructure, corrupt customs officials and other costs clearly are policy-related, while other variables may be indirectly policy related (e.g. lack of competition among shippers may be due to low volumes or to non-implementation of anti-monopoly policy). Trade risks affect insurance rates, and country variations are related to institutions such as poor law enforcement. Even with ideal institutions, of course, some trade costs will remain because there are real costs to moving goods over any distance. This paper is a first step to get inside the black box of trade costs measured by cif-fob, to understand which are policy-related (and can be reduced by trade facilitation measures) and which are exogenously determined.

The rich dataset presents a striking picture of falling trade costs since 1990, but trade costs still remain a significant component of the wedge between the prices of domestic and imported goods and ad valorem trade costs are larger than ad valorem tariffs on imports into Australia. Trade costs are related to distance and to weight, but

[26] HS14 is vegetable plaiting materials, 18 cocoa and cocoa products, 19 preparations of cereals, 34 soap, artificial waxes, etc, and 48 paper and paperboard products.

[27] HS26 is ores and slag and 29 organic chemicals. HS39 and 40 are plastic and rubber products, 48 is paper and paperboard products, and 68 is articles of stone, plaster etc. HS52, 54, 55, 56 and 60 are textiles and clothing categories. HS 72, 73, 74 and 75 are metals and metal products. HS85 is electrical machinery and equipment.

simple correlations are weak. There is no simple relationship between the size of the trading partner and trade costs. There is also no clear relationship to per capita income levels, although costs are higher on trade with African countries. Although sea freight is cheaper than air per kilogram, imports arriving by air have lower ad valorem trade costs because air freight is used for higher value goods. The choice of transport mode is, however, more complex than simply having more valuable lighter goods shipped by air. Air transport will be favoured when timeliness is important, and for such goods poor exporting-country institutions may be a particularly significant obstacle.

The econometric results reported in Tables 4-6 indicate that distance and bulk have the expected relationship to trade costs, and that trade costs fall with the volume of trade (whether proxied by GDP or measured by bilateral imports). The distance and weight variables are statistically significant for both modes, but the coefficients are larger and confidence intervals tighter for sea than for air. Good institutions, as measured by the Transparency International corruption perceptions index, are associated with lower trade costs, but the relationship is stronger for air freight.

The institutional variable is important for manufactured goods and irrelevant for agricultural goods (and probably primary products in general). A tentative conclusion is that corruption increases the costs of trade in manufactures, and the relationship is only important when the characteristics of the commodity favour air over sea transport (e.g. high value/weight or where reliable timely delivery is important). Poor institutions may limit the extensive margin of trade by excluding some potential exports.[28]

The empirical results are preliminary. An attractive feature of the Australian data is the absence of land transport, but even with just two modes there is an important feedback mechanism because the choice of mode is not simple and it is related to the impact of exporting-country institutions. There is also an endogeneity concern related to the vicious circle of high trade costs reducing trade flows and low trade volumes being a cause of high trade costs. The data constrained us to define trade costs as cif-fob; as argued in the introduction this is a useful measure, but it may

[28] Hillberry and Hummels (2008), using US domestic trade data, find that distance and other frictions reduce trade primarily by reducing the number of commodities shipped and the number of establishments shipping. Our results point to high trade costs also discouraging shipment of some products, but the relationship is limited to a subset of commodities which a country is less likely to export if it has poor institutions (or more precisely if perceived corruption is high).

be too narrow for some purposes because it is more akin to 'transport costs' than to all of the costs of trading across international borders. Moreover, by focussing only on dollar values of trade costs, we do not directly address the role of time, which some authors (Hummels, 2001; Evans and Harrigan, 2005) identify as more important than financial costs, at least for some goods.

A consensus has emerged among economists that institutions are the fundamental determinant of differences in growth performance. Given that poor institutions raise trade costs on manufactured goods that appear to be part of global value chains and given the connection between trade in such commodities and economic growth, our findings provide a transmission mechanism from poor institutions to slow growth and stunted economic development. Countries with poor institutions are constrained to increase their trade by exporting more of the same commodities, which for poor countries may condemn them to exporting goods without positive growth-stimulating externalities. Countries with good institutions will, *ceteris paribus*, have lower trade costs in the most dynamic segment of international trade, time-sensitive manufactures, and be better able to participate in global value chains and benefit from globalization.

Table 1 and Figure 1: Average Trade Costs, Australian Imports, 1990-2007

Year	All Imports	Air	Sea
1990	0.080	0.066	0.085
1991	0.076	0.057	0.082
1992	0.075	0.062	0.079
1993	0.073	0.061	0.076
1994	0.070	0.058	0.074
1995	0.067	0.055	0.071
1996	0.066	0.053	0.070
1997	0.066	0.054	0.070
1998	0.064	0.047	0.071
1999	0.056	0.041	0.062
2000	0.057	0.040	0.063
2001	0.057	0.040	0.063
2002	0.051	0.038	0.054
2003	0.051	0.037	0.056
2004	0.055	0.040	0.061
2005	0.055	0.039	0.060
2006	0.051	0.037	0.055
2007	0.049	0.036	0.053

Note: the means are import-weighted (ad valorem trade costs = Σcif/Σfob – 1) and hence biased downwards because goods or trading partners with higher trade costs will be underrepresented.

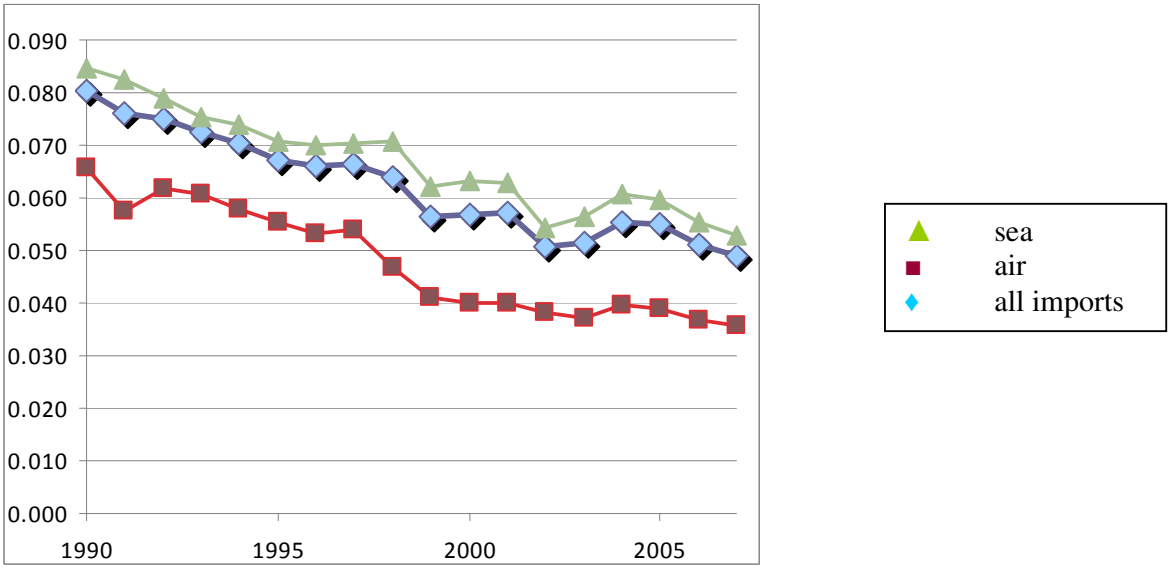

Figure 2: Share of Australian Imports arriving by Sea and by Air

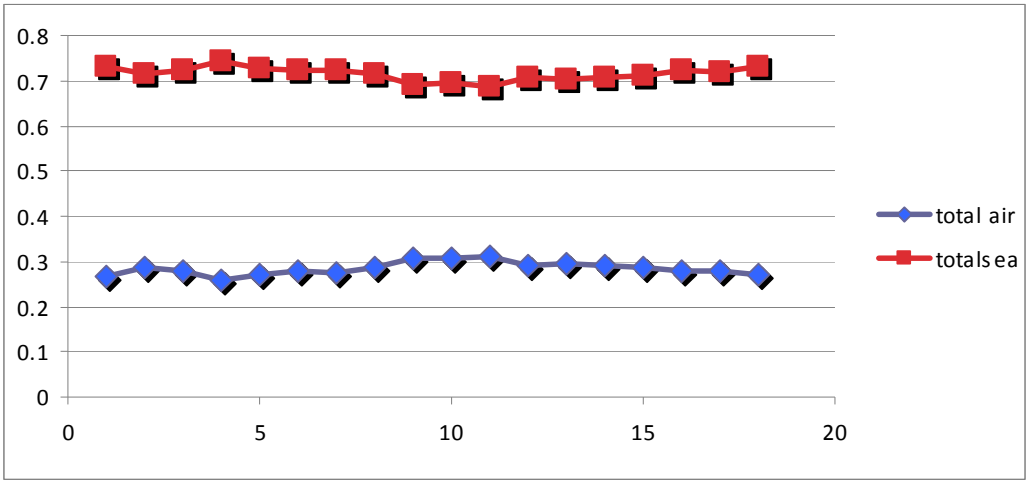

Table 2: Average Trade Costs by Country 2007

Ad valorem trade costs	**Number of observations**
Less than 2 percent	13
2 – 3.9	31
4 - 5.9	57
6 – 7.9	43
8 – 9.9	23
10 – 11.9	17
12 -13.9	8
14 -15.9	4
16 - 17.9	3
18 -19.9	3
20.0 percent or more	9
Total	**211**

Ten largest import sources		**Ten lowest trade costs**		**Ten highest trade costs**	
USA	0.050	Puerto Rico	0.010	El Salvador	0.198
China	0.063	Swaziland	0.011	Bhutan	0.205
Japan	0.048	Chad	0.012	Pitcairn Island	0.269
Germany	0.040	Papua New Guinea	0.013	Tonga	0.285
Singapore	0.042	Grenada	0.014	Norfolk Island	0.456
UK	0.029	Anguilla	0.015	Guyana	0.492
Malaysia	0.040	Ireland	0.016	Morocco	0.513
New Zealand	0.049	Laos	0.016	Christmas Island	0.547
Korea	0.045	Gibraltar	0.017	Nauru	0.640
France	0.035	St. Helena	0.017	Yemen	0.648

Table 3: Ad valorem trade costs, adjusted for exporter-commodity effects, 1990-2007

year	sea	air
1990	0.076	0.160
1991	0.074	0.157
1992	0.069	0.152
1993	0.068	0.145
1994	0.066	0.139
1995	0.063	0.135
1996	0.062	0.131
1997	0.062	0.135
1998	0.061	0.131
1999	0.054	0.105
2000	0.053	0.108
2001	0.051	0.112
2002	0.046	0.113
2003	0.045	0.114
2004	0.049	0.114
2005	0.051	0.113
2006	0.047	0.105
2007	0.044	0.104

Figure 3: Ad valorem trade costs, adjusted for exporter-commodity effects, 1990-2007

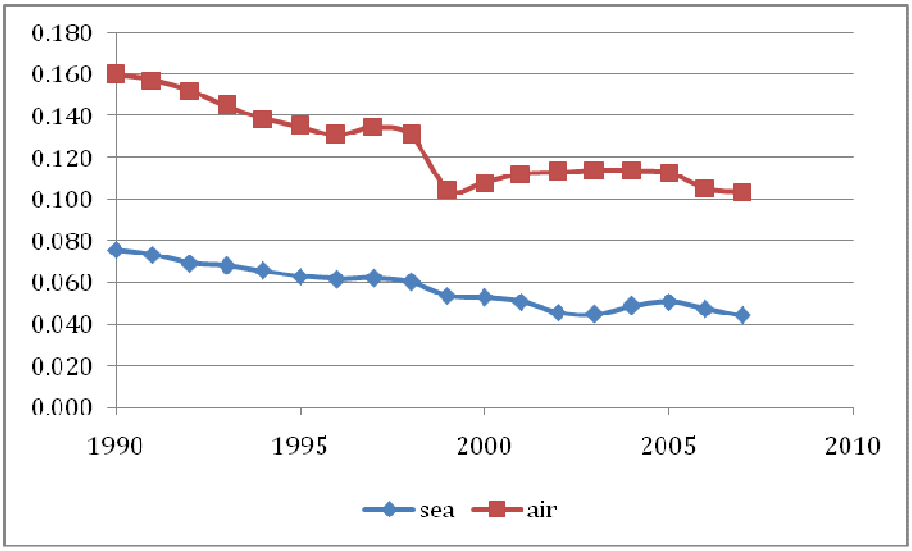

Table 4: Baseline Regressions, 2006 data: dependent variable $\log((cif-fob)/fob)_i^k$

4a Ladval = ldist llckd lval/wgt lgdp TI

	Full sample	**Air only**	**Sea only**
Log distance	.365 (.0144)	.242 (.032)	.418 (.015)
landlocked	-.203 (.0285)	-.154 (.0592)	-.186 (.0307)
Log value/weight	-.311 (.00362)	-.253 (.006)	-.381 (.00465)
Log gdp	-.0241 (.00376)	-.0165 (.0088)	-.0208 (.00383)
TI corruption index	-.0174 (.00258)	-.0502 (.0058)	.0000573 (.00266)
sea	-1.488 (.015)		
constant	-3.440 (.123)	-2.532 (.246)	-5.498 (.133)
Number of observations	18,082	5,551	12,531
F	F(6, 18075) = 2019.15	F(5, 5545) = 394.81	F(5, 12525) = 1530.61
R-squared	0.401	0.263	0.379
Root MSE	.792	.972	.684

4b ladval = ldist llckd lval/wgt limports TI

	Full sample	**Air only**	**Sea only**
Log distance	.297 (.0126)	.182 (.0258)	.349 (.0136)
landlocked	-.174 (.0272)	-.269 (.0566)	-.199 (.0292)
Log value/weight	-.310 (.00359)	-.250 (.006)	-.381 (.00465)
Log total imports	-.0238 (.00304)	-.0189 (.0075)	-.379 (.00457)
TI corruption index	-.0167 (.00260)	-.0586 (.0060)	.00339 (.00264)
sea	-1.467 (.0150)		
constant	-2.978 (.142)	-2.835 (.289)	-4.723 (.152)
Number of observations	18,682	5,716	12,966
F	F(6, 18675) = 1992.89	F(5, 5710) = 389.64	F(5, 12960) = 1592.34
R-squared	0.390	0.254	0.381
Root MSE	.800	.996	.681

Note: standard errors are in parentheses

Table 5: Baseline Regressions, 1998-2006 data: dependent variable $\log((cif-fob)/fob)_i^k$

	Full sample		Air only	Sea only		
	.					
Log distance	0.271 (.003)	0.273 (.003)	.233 (.006)	.294 (.004)	.301 (.003)	.292 (.004)
Log value/weight	-.267 (.001)	-.280 (.001)	-.230 (.002)	-.293 (.002)	-.318 (.002)	-.293 (.002)
TI corruption index	-.026 (.001)	-.022 (.001)	-.026 (.001)	-.017 (.001)	-.014 (.001)	-.018 (.001)
Log total imports	-.005 (.001)			-.009 (.001)		
Log trade		-0.058 (.001)	-0.089 (.002)		-.049 (.001)	
Log imports by mode						-.009 (.001)
sea	-1.441 (.004)	-1.335 (.004)				
constant	-3.328 (.034)	-3.648 (.031)	-3.636 (.059)	-4.821 (.036)	-5.066 (.032)	-4.803 (.037)
Number of observations	244,928	244,928	91,271	153,657	153,657	153,657
F						
R-squared	0.388	0.405	0.153	0.194	0.218	0.194
Root MSE						

Note: standard errors are in parentheses

Table 6: Regression by HS 2-digit Industry, 2006 data.

HS 2-digit category	Sea							Air					
	$ld_{i,A}$	B_i	lVW_i^k	$l\Sigma M_i$	TI	const		$ld_{i,A}$	B_i	lVW_i^k	$l\Sigma M_i$	TI	const
03	.141**	-.075	-.401***	-.011	-.003	-3.185***		.393***	.573	-.388***	-.056	-.024	-2.534
04	.535***	-.484**	-.183*	-.004	-.000	-7.219***		-.620	drop	-.160	.557**	-.441	-5.229
05	.268	1.069	-.401***	-.014	.079*	-4.389*		.243	-.746	-.266**	-.239	-.061	2.236
07	.240***	.228	-.229***	-.015	.039**	-4.139***		-.254	-1.057	.128	-.061	-.003	2.056
08	.315***	-.577*	-.419***	-.035**	.035**	-4.353***		-.100	drop	.011	.111	-.093	-2.461
09	.432***	-.236*	-.173***	-.004	-.002	-6.386***		-.048	1.049*	-.167	-.006	-.079	-.334
10	.518**	.501	-.314***	.065	.090*	-8.753***							
11	.578***	-.254	-.413***	-.036	.067***	-6.935***							
12	.402***	-.026	-.323***	-.013	-.068	-5.579***		.356**	.246	-.455***	-.031	-.048	-2.905
13	.255	-.654*	-.055	-.063	.050	-4.330**		.848***	.003	-.715***	.033	.007	-7.817***
14	-.635*	drop	-.404***	-.035	-.120***	5.235							
15	.221**	-.123	-.254***	-.036**	.027	-3.782***		.434*	-.464	-.154	.036	-.079	-5.496*
16	.194**	.091	-.309***	.021	.014	-4.649***		.509**	-.125	-.471***	-.126	.080	-2.326
17	.541***	.197	-.263***	.002	-.027	-7.018***		.249	.414	-.266*	-.189	.192*	-.277
18	.654***	-.275	-.164**	.071**	-.052*	-9.738***		.495**	-.115	.323***	-.004	-.098*	-6.154***
19	.446***	.039	-.382***	.002	-.030**	-5. 819***		-.428	1.507	.411	.149	-.146	-1.500
20	.354***	-.209**	-.274***	-.061***	-.006	-4.133***		-.211	1.070*	.100	.071	-.003	-1.646
21	.436***	-.128	-.351***	-.061***	-.016	-4.807***		.314*	.259	-.087	.140***	-.039	-7.095***
23	.157	-.077	-.570***	-.011	.051**	-3.845***							
24	.336	-.961**	-.088	-.137**	.039	-3.189		.369	-.552	-.539***	-.082	-.034	-.860
25	.215**	-.590	-.390***	-.022	-.038	-3.276***		.471	-.865	.075	-.119	.075	-4.486
26	.330	drop	-.538***	.092*	.005	-7.300***		-.663*	.574	.105	-.127	-.211**	6.989
27	.239*	.446	-.305***	.047	-.018	-5.274***		-.426	-.612	-.027	-.008	.018	2.353
28	.517***	.048	-.416***	.015	.050***	-7.521***		.123	-.246	-.144***	.001	.023	-3.020*
29	.501***	-.548***	-.367***	.001	.026***	-7.265***		.172*	-.107	-.310***	.068***	-.045**	-3.999***
31	.152	.558	-.427***	.012	.004	-3.680***							
32	.472***	-.285**	-.424***	-.037*	.038***	-6.006***		.200*	-.217	-.287***	-.019	-.025	-2.077

33	.385***	-.447***	-.315***	-.054***	-.013	-4.670***		.288***	-.251	-.323***	-.004	-.028	-3.087***
34	.348***	-.128	-.181***	-.041**	-.027*	-4.590***		.419***	-.401	-.134**	.050	.014	-6.526***
35	.444***	.076	-.370***	.017	-.034	-6.526***		.231	.431	-.221***	-.019	-.026	-2.673
38	.337***	-.231*	-.541***	.006	.029**	-5.451***		.219	-.111	-.147***	.044	-.020	-4.331***
39	.312***	.060	-.284***	-.045***	.003	-4.266***		.329***	.141	-.156***	.056**	-.081***	-5.022***
40	.356***	-.010	-.240***	.037	.016	-6.657***		.119	-.100	-.162**	.051	-.130***	-2.602
44	.421	drop	-.442**	-.080	.033	-3.905							
47	.397***	drop	-.451***	.078*	.096***	-8.007***							
48	.385***	-.213**	-.260***	-.013	-.028***	-5.320***		.145	-.256	-.110***	.057**	-.059***	-3.603***
51	.438**	-.282	-.542***	-.121***	.039	-3.374		.656**	-.233	-.216*	.006	-.068	-6.479**
52	.162	-.112	-.327***	-.045*	.021	-2.835*		.484	.513	-.036	.057	-.208***	-5.937*
53	-1.118	1.375	-.590***	.082	-.110	7.186							
54	.420***	.121	-.373***	-.028	-.010	-5.311***		.319*	-.846***	-.101	-.083	-.112***	-1.523
55	.293***	-.393*	-.306***	-.045	-.022	-3.789***		.000	.737	-.195*	-.034	-.102*	.444
56	.177	.016	-.186***	.001	-.009	-4.124**		.189	-.371	-.143**	.005	-.171***	-2.000
60	.371***	-.201	-.155***	.047	.034	-7.332***		.530***	-.209	-.380***	.015	-.069**	-5.326***
68	.074	-.245	-.371***	-.076	-.041	-0.602		.459*	.413	-.368***	-.036	-.116*	-3.138
69	.479	-.219	-.315***	.046	.002	-7.625*							
70	.379	-.120	-.484***	-.067	-.022	-3.668*		.192	-.671	-.239**	.080	-.093	-4.086
71								.856***	.148	-.174***	.048	-.091	-10.937***
72	.215***	-.249	-.447***	-.005	.028**	-4.544***		-.007	.691	-.002	.223***	-.118***	-6.056***
73	.264***	-.423***	-.330***	-.029	-.019	-4.044***		.105	-.322	-.143***	.041	-.071**	-2.820*
74	.561***	-.238	-.076*	.050	.026	-10.124***		.206	-.284	-.046	-.026	-.122***	-2.191
75	.372	1.236**	-.156*	.173	-.028	-10.980**		-.105	1.229**	-.098	.127	-.172*	-3.038
76	.324***	-.109	-.124***	.026	-.003	-6.599***		.349*	.680	-.348***	-.022	-.029	-3.300
81	.124	drop	-.420***	.063	.033	-5.543*		.374*	-.430	-.300***	.015	-.025	-4.889**
83	.433***	-.363	-.271***	-.059	.040	-5.636***		-.462	-.355	-.335***	-.091	-.038	6.034*
85	.436***	-.223	-.225***	-.020	-.016	-6.286***		-.274	-.061	-.317***	-.015	-.080*	2.271

Notes: categories with less than 30 observations are omitted; * significant at 10%, ** significant at 5%, and *** significant at 1%.

References

Anderson, James, and Eric van Wincoop. 2003. "Gravity with Gravitas: A Solution to the Border Puzzle." *American Economic Review,* 93(1): 170-92.

Anderson, James, and Eric van Wincoop. 2004. "Trade Costs." *Journal of Economic Literature,* 42(3): 691-751.

Andrés, Luis, David Cuberes, Mame Astou Diouf, and Tomás Serebrisky. 2007. "Diffusion of the Internet: A Cross-country Analysis." World Bank Policy Research Working Paper WPS4420.

Arvis, Jean-François, Gael Raballand, and Jean-François Marteau. 2007. "The Cost of being Landlocked: Logistics Costs and Supply Chain Reliability." World Bank Policy Research Working Paper WPS4258.

Berthelon, Matias, and Caroline Freund. 2008. "On the Conservation of Distance in International Trade." *Journal of International Economics,* 75: 310-20.

Bloningen, Bruce, and Wesley Wilson. 2008. "Port Efficiency and Trade Flows." *Review of International Economics*, 16(1): 21-36.

Broda, Christian, **Joshua Greenfield and David Weinstein**. 2006 "From Groundnuts to Globalization: A Structural Estimate of Trade and Growth." NBER Working Paper No. 12512.

Broda, Christian, and David Weinstein 2006. "Globalization and the Gains from Variety." *Quarterly Journal of Economics,* 121(2) - May

Clark, Ximena, David Dollar, and Alejandro Micco. 2004. "Port Efficiency, Maritime Transport Costs, and Bilateral Trade." *Journal of Development Economics,* 75: 417-50.

Devlin, Julia, and Peter Yee. 2005. "Trade Logistics in Developing Countries: The Case of the Middle East and North Africa." *The World Economy*, 28(3): 435-56.

Egger, Peter. 2008. "On the Role of Distance for Bilateral Trade." *The World Economy,* 31: 653-62.

Freund, Caroline, and Diana Weinhold. 2004. "On the Effect of the Internet on International Trade." *Journal of International Economics,* 62(1): 171-89.

Evans, Carolyn, and James Harrigan. 2005. "Distance, Time and Specialization: Lean Retailing in General Equilibrium." *American Economic Review,* 95(1): 292-313.

Freund, Caroline, and Diana Weinhold. 2004. "On the Effect of the Internet on International Trade." *Journal of International Economics,* 62(1): 171-89.

Geloso-Grosso, Massimo. 2008, "Liberalizing Air Cargo Services in APEC", GEM (Groupe d'Economie Mondiale) Working Paper available at http://gem.sciences-po.fr/content/publications/pdf/GelosoGrosso_Air%20cargo_122008.pdf

Harrigan, James, and Haiyan Deng. 2008. "China's Local Comparative Advantage." National Bureau of Economic Research Working Paper 13,963.

Hillberry, Russell, and David Hummels. 2008. "Trade Responses to Geographic Frictions: A decomposition using micro-data." *European Economic Review,* 52: 527-50.

Hummels, David. 2001. "Time as a Trade Barrier"
http://www.mgmt.purdue.edu/faculty/hummelsd/research/time3b.pdf

Hummels, David. 2007. "Transportation Costs and International Trade in the Second Era of Globalization." *Journal of Economic Perspectives*, 21(3): 131-154.

Hummels, David, and Volodymyr Lugovskyy. 2006. "Are Matched Partner Trade Statistics a Usable Measure of Transport Costs?" *Review of International Economics,* 14(1): 69-86.

Hummels, David, Volodymyr Lugovskyy, and Alexandre Skiba (2007. "The Trade Reducing Effects of Market Power in International Shipping." National Bureau of Economic Research Working Paper 12,914.

Korinek, Jane, and Patricia Sourdin. 2008. "Maritime Transport Costs and Trade: New Data and New Evidence." Paper presented at the International Economic Association Congress, Istanbul.

Limao, Nuno, and Anthony Venables. 2001. "Infrastructure, Geographical Disadvantage and Transport Costs." *World Bank Economic Review,* 15(3): 451-79.

Markusen, James, and Anthony Venables. 2007. "Interacting Factor Endowments and Trade Costs: A multi-country, multi-good approach to trade theory." *Journal of International Economics,* 73: 333-54.

Micco, Alejandro; and Tomás Serebrisky. 2004, "Infrastructure, Competition Regimes, and Air Transport Costs: Cross-Country Evidence", World Bank Policy Research Working Paper No. 3355.

Moreira, Mauricio Mesquita, Christian Volpe and Juan Blyde. 2008. *Unclogging the Arteries: The Impact of Transport Costs on Latin American and Caribbean Trade.* Inter-American Development Bank, Washington DC.

Piermartini, Roberta; and Linda Rousova. 2008, "Liberalization of Air Transport Services and Passenger Traffic", *World Trade Organization Staff Working Paper ERSD-2008-06* - http://www.wto.org/english/res_e/reser_e/ersd200806_e.pdf.

Pomfret, Richard, and Patricia Sourdin. 2009. "Have Asian Trade Agreements reduced Trade Costs?" *Journal of Asian Economics*, (forthcoming).

Sanchez, Ricardo, Jan Hoffmann, Alejandro Micco, Georgina Pizzolitto, Martin Sgut and Gordon Wilmsmeier. 2003. "Port Efficiency and International Trade: Port Efficiency as a Determinant of Maritime Transport Costs." *Maritime Economics and Logistics,* 5: 199-218.

Trefler, Daniel. 1995. "The Case of the Missing Trade and Other Mysteries." *American Economic Review,* 85(6): 1029-46.

Waugh, Michael. 2008. "International Trade and Income Differences." http://myweb.uiowa.edu/mwaugh/uploads/56836/job_market_ITID.pdf

Wilmsmeier, Gordon, Jan Hoffmann, and Ricardo Sanchez. 2006. "The Impact of Port Characteristics on International Maritime Transport Costs." In Kevin Cullinane and Wayne Talley ed. *Port Economics: Research in Transportation Economics vol.16,* 117-40. Oxford UK: JAI Press/Elsevier:.

Wilson, John, Catherine Mann and Tsunehiro Otsuki. 2003. "Trade Facilitation and Economic Development: A New Approach to Quantifying the Impact." *World Bank Economic Review,* 17: 367-89.

Wood, Adrian. 2007. "Openness is a Matter of Degree: How Trade Costs reduce Demand Elasticities." Unpublished - Queen Elizabeth House, University of Oxford, 16 November version.

APPENDIX 1: Average Trade Costs by Country, Australian Imports, 1990-2007

Country of Origin	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007
Afghanistan	0.070	0.050	0.103	0.047	0.052	0.104	0.023	0.034	0.043	0.072	0.051	0.047	0.051	0.077	0.080	0.066	0.078	0.189
Albania	0.369	0.045	0.207	0.155	0.018	0.058	0.072	0.106	0.050	0.156	0.008	0.031	0.033	0.034	0.032	0.050	0.043	0.047
Algeria	0.215	0.199	0.007	0.000	0.200	0.050		0.023	0.093	0.265	0.277	0.276	0.199	0.181	0.156	0.040	0.023	0.056
Angola	0.144			0.081	0.049	0.023	0.212	0.018	0.022	0.074	0.088	0.076	0.008	0.050	0.112	0.288	0.031	0.109
Anguilla		0.060					0.159	0.062		0.098				0.120	0.058		0.018	0.015
Antarctica																0.000	0.195	0.000
Antigua and Barbuda		0.203					0.021	0.333	0.176		0.039	0.293	0.352	0.089	0.505	0.120	0.127	0.050
Argentina	0.157	0.167	0.166	0.120	0.128	0.131	0.131	0.111	0.087	0.072	0.081	0.102	0.096	0.096	0.087	0.080	0.080	0.139
Armenia					0.091		0.055		0.079	0.092	0.335	0.030	0.014	0.116	0.077	0.200	0.150	0.028
Austria	0.073	0.080	0.063	0.065	0.061	0.058	0.097	0.087	0.074	0.086	0.059	0.060	0.044	0.043	0.044	0.044	0.045	0.045
Azerbaijan					0.159	0.104	0.099	0.105	0.082	0.044	0.126			0.078	0.270	0.068	0.122	0.110
Bahamas	0.007	0.011	0.012	0.016	0.035	0.030	0.041	0.046	0.056	0.040	0.090	0.123	0.152	0.123	0.076	0.103	0.100	0.095
Bahrain	0.091	0.118	0.115	0.056	0.116	0.087	0.138	0.158	0.081	0.126	0.081	0.074	0.082	0.091	0.116	0.125	0.069	0.085
Bangladesh	0.182	0.179	0.178	0.161	0.150	0.145	0.159	0.148	0.161	0.146	0.144	0.154	0.138	0.123	0.169	0.150	0.102	0.088
Barbados	0.245	0.160	0.114	0.108	0.138	0.081	0.043	0.045	0.081	0.068	0.069	0.054	0.067	0.058	0.058	0.048	0.043	0.034
Belarus			0.595	0.224	0.275	0.135	0.158	0.185	0.128	0.241	0.155	0.149	0.088	0.087	0.077	0.146	0.067	0.052
Belgium														0.054	0.057	0.051	0.051	0.047
Belgium-Luxembourg	0.084	0.074	0.074	0.075	0.071	0.062	0.056	0.061	0.066	0.058	0.059	0.063	0.060	0.054				
Belize		0.273	0.109	0.006				0.042	0.065	0.068	0.095	0.069	0.216	0.071	0.053	0.099	0.076	0.073
Benin											0.200	0.090		0.287		0.000	0.001	
Bermuda	0.013	0.024	0.066	0.095	0.078		0.039	0.636	0.613	0.003	0.003	0.296	0.092	0.226	0.021	0.003	0.086	
Bhutan				0.008	0.012	0.040		0.127	0.155	0.034	0.040	0.157	0.118	0.013	0.057	0.122	0.419	0.205
Bolivia	0.266	0.291	0.269	0.136	0.112	0.155	0.097	0.127	0.087	0.102	0.101	0.083	0.070	0.058	0.078	0.086	0.063	0.062
Bosnia and Herzegovina			0.079	0.162	0.034		0.081	0.077	0.080	0.056	0.042	0.038	0.087	0.081	0.110	0.108	0.097	0.083
Botswana	0.622	0.238	0.302		0.514	1.041	0.165	0.109	0.189	0.102	0.080	0.214	0.136	0.144	0.047	0.047	0.226	0.063
Brazil	0.135	0.159	0.149	0.135	0.140	0.123	0.136	0.127	0.116	0.100	0.064	0.071	0.097	0.102	0.125	0.111	0.113	0.096
Brit.Ind.Ocean Territory					0.053	0.074	0.055	0.143	0.158	0.067	0.055				0.022			0.038
Brunei Darussalam	0.074	0.070	0.061	0.053	0.083	0.039	0.108	0.031	0.068	0.045	0.061	0.089	0.051	0.067	0.081	0.046	0.042	0.032
Bulgaria	0.133	0.123	0.107	0.123	0.094	0.089	0.099	0.129	0.076	0.071	0.065	0.080	0.085	0.066	0.078	0.082	0.077	0.074

Burkina Faso		0.011		3.135				0.030	0.333		0.754	0.100		0.147	0.260		0.294	0.193
Burundi							0.140		0.310		0.197	0.063	0.053	0.067	0.105	0.069	0.044	
Cambodia	0.090	0.013	0.029	0.045	0.096	0.188	0.069	0.097	0.072	0.080	0.081	0.090	0.066	0.063	0.072	0.066	0.033	0.025
Cameroon	0.066	0.076	0.057	0.105	0.091	0.092	0.042	0.088	0.071	0.095	0.084	0.047	0.059	0.074	0.098	0.139	0.086	0.090
Canada	0.119	0.113	0.120	0.116	0.106	0.085	0.093	0.089	0.085	0.078	0.072	0.069	0.081	0.073	0.075	0.078	0.081	0.088
Cape Verde					0.003				1.398			0.010	0.073	0.082			0.065	0.076
Cayman Islands	0.113	0.090	0.087	0.104	0.097	0.082	0.076	0.079		0.130	0.023		0.052	0.301	0.261	0.027	0.209	0.111
Central African Repub	0.323		0.005	0.137	0.288	9.563					0.559	0.270	0.269	0.173	0.071	0.065	0.089	0.085
Chad		0.014							0.950		0.087			0.045	0.060	0.032	0.106	0.012
Chile	0.147	0.152	0.153	0.166	0.144	0.076	0.085	0.119	0.143	0.105	0.112	0.139	0.132	0.096	0.122	0.135	0.113	0.073
China	0.093	0.091	0.085	0.087	0.081	0.075	0.073	0.071	0.069	0.064	0.063	0.058	0.050	0.060	0.070	0.065	0.059	0.063
Christmas Island	0.000		0.401	0.193	0.404	0.469	0.181	0.477	0.316	0.198	0.341	0.152	0.210	0.479	0.368	0.578	0.753	0.547
Cocos (Keeling) Island	0.169	0.191	0.252	0.798	0.923	0.022	0.783	0.046	1.357	0.188	0.011	0.010	0.025	0.155	0.226	0.065	0.047	0.020
Colombia	0.184	0.181	0.179	0.160	0.109	0.080	0.074	0.073	0.071	0.072	0.075	0.079	0.076	0.068	0.065	0.068	0.072	0.071
Comoros, Republic of	0.060	0.024	0.040	0.008	0.050	0.009	0.010	0.007	0.009	0.008	0.012	0.006	0.006				0.127	
Congo	0.073				0.102	0.235	0.254	0.091	0.163	0.072	0.145	0.132	0.078	0.171	0.055	0.005	0.017	0.084
Cook Islands	0.007	0.051	0.015	0.010	0.025	0.029	0.026	0.011	0.002	0.005	0.004	0.004	0.004	0.008	0.034	0.013	0.016	0.020
Costa Rica	0.123	0.112	0.141	0.136	0.081	0.059	0.079	0.050	0.033	0.017	0.035	0.047	0.059	0.047	0.037	0.042	0.034	0.028
Cote d'Ivoire	0.089	0.074	0.063	0.074	0.073	0.068	0.054	0.061	0.055	0.062	0.063	0.060	0.033	0.027	0.033	0.044	0.042	0.047
Croatia			0.121	0.124	0.111	0.104	0.078	0.085	0.097	0.072	0.068	0.071	0.063	0.063	0.086	0.075	0.061	0.061
Cuba	0.058	0.026	0.026	0.023	0.044	0.046	0.059	0.035	0.036	0.047	0.058	0.043	0.034	0.050	0.041	0.053	0.039	0.037
Cyprus	0.144	0.137	0.117	0.079	0.083	0.081	0.087	0.067	0.061	0.053	0.043	0.048	0.065	-0.077	0.059	0.079	0.050	0.060
Czech Republic				0.144	0.137	0.140	0.124	0.123	0.089	0.068	0.100	0.093	0.091	0.085	0.085	0.085	0.082	0.084
Czech and Slovak Fed Rep	0.195	0.194	0.177	0.161														
Dem Rep of Congo, Zaire	0.036	0.024	0.057	0.079	0.059	0.034	0.047	0.106	0.171	0.036	0.013	0.359	0.107	0.137	0.055	0.060	0.054	0.047
Denmark	0.074	0.070	0.068	0.063	0.066	0.058	0.059	0.054	0.057	0.048	0.048	0.048	0.044	0.045	0.044	0.047	0.043	0.044
Djibouti	1.462										0.449				0.059		0.052	0.057
Dominica	0.032		0.011	0.143	0.010	0.090	0.179	0.172	0.027	0.080	0.035	0.034	0.042	0.051	0.255	0.090	0.072	0.043
Dominican Republic	0.084	0.151	0.081	0.122	0.084	0.120	0.106	0.167	0.071	0.074	0.079	0.092	0.094	0.084	0.077	0.074	0.088	0.049
East Timor, Dem Rep of													0.042	0.053	0.059	0.051	0.053	0.036
Ecuador	0.144	0.121	0.112	0.134	0.108	0.117	0.155	0.131	0.146	0.118	0.112	0.132	0.116	0.078	0.107	0.124	0.094	0.084
Egypt	0.112	0.276	0.178	0.177	0.129	0.108	0.104	0.105	0.102	0.086	0.084	0.110	0.172	0.105	0.070	0.156	0.183	0.113

El Salvador	0.088	0.159	0.165	0.204	0.110	0.067	0.078	0.104	0.062	0.047	0.066	0.091	0.129	0.109	0.125	0.152	0.124	0.198
Equatorial Guinea				0.030	0.015	0.032	0.032							0.156	0.100	0.050		0.169
Eritrea						0.277	0.021	0.444	0.091	0.268	0.042	0.014	0.127	0.024	0.089	0.109	0.106	0.039
Estonia			0.254	0.162	0.166	0.155	0.289	0.103	0.093	0.011	0.090	0.090	0.155	0.140	0.165	0.164	0.148	0.115
Ethiopia	0.064	0.064	0.063	0.073	0.047	0.034	0.055	0.035	0.047	0.043	0.056	0.062	0.068	0.065	0.064	0.050	0.043	0.041
Falkland Islands				0.120		0.198	0.028	0.120	0.089			0.254	0.064				0.085	0.053
Fiji	0.061	0.055	0.052	0.039	0.045	0.056	0.037	0.040	0.035	0.034	0.039	0.036	0.038	0.037	0.038	0.043	0.050	0.062
Finland	0.130	0.125	0.129	0.117	0.117	0.100	0.102	0.098	0.108	0.081	0.087	0.082	0.081	0.079	0.072	0.078	0.079	0.067
Former Yug Rep Macedonia			0.182	0.166	0.153	0.139	0.114	0.142	0.142	0.089	0.108	0.118	0.100	0.092	0.115	0.141	0.125	0.106
France	0.071	0.059	0.061	0.063	0.060	0.058	0.050	0.060	0.061	0.054	0.055	0.058	0.048	0.037	0.032	0.031	0.040	0.035
French Antilles	0.078	0.106	0.093	0.084	0.116	0.088										0.052	0.057	0.103
French Guiana							0.034				0.244		0.054	0.052	0.101	0.134	0.044	
French Polynesia	0.101	0.097	0.129	0.052	0.028	0.049	0.013	0.010	0.011	0.019	0.017	0.031	0.009	0.019	0.026	0.028	0.016	0.019
Gabon		0.315				0.124			0.188	0.069	0.585	0.159	0.074	0.113	0.112	0.083	0.100	0.102
Gambia				0.014		0.858	0.123	1.350	0.490	0.044	0.158	0.042	0.020	0.091	0.037	0.328	0.069	0.107
Georgia				0.199	0.047	0.039		0.030	0.168	0.036	0.083	0.280	0.096	0.026	0.023	0.094	0.046	0.065
Germany	0.073	0.066	0.066	0.057	0.058	0.053	0.053	0.058	0.056	0.049	0.051	0.050	0.046	0.043	0.042	0.045	0.044	0.040
Ghana	0.517	0.063	0.097	0.153	0.137	0.178	0.189	0.124	0.111	0.122	0.122	0.135	0.117	0.095	0.087	0.064	0.056	0.055
Gibraltar	0.106	0.081	0.097		0.057	0.028	0.032	0.061	0.013	0.011		0.081	0.073	0.147	0.046	0.180	0.038	0.017
Greece	0.127	0.097	0.083	0.094	0.084	0.079	0.069	0.077	0.078	0.068	0.068	0.068	0.018	0.056	0.056	0.065	0.061	0.052
Grenada			0.079	0.331	0.222	0.074			0.563	0.006		0.940	0.200	0.067	0.044	0.026		0.014
Guam	0.079	0.100	0.087	0.140	0.111	0.038	0.448	0.197	0.225	0.167	0.066	0.089	0.041	0.027	0.112	0.042	0.096	0.044
Guatemala	0.161	0.219	0.259	0.227	0.182	0.122	0.137	0.070	0.061	0.079	0.070	0.103	0.103	0.112	0.098	0.074	0.075	0.064
Guinea			1.411		0.036		0.039	0.817	0.240	0.166	0.389	0.058	0.041	0.298	0.044	0.039	0.151	0.038
Guinea-Bissau				0.009				0.085								0.093		
Guyana	0.489	0.686	0.820	0.431	0.591	0.597	0.034	0.635	0.276	0.097	0.055	0.446	0.361	0.540	0.389	0.601	0.338	0.492
Haiti	0.038	0.062	0.082	0.065	0.077	0.436	0.068	0.050	0.113	0.084	0.101	0.099	0.113	0.062	0.054	0.034	0.057	0.072
Honduras	0.066	0.195	0.114	0.186	0.071	0.064	0.061	0.114	0.105	0.108	0.057	0.074	0.066	0.062	0.063	0.056	0.052	0.059
Hong Kong (SAR of China)	0.065	0.061	0.059	0.057	0.054	0.053	0.054	0.056	0.048	0.045	0.047	0.038	0.037	0.042	0.049	0.047	0.040	0.047
Hungary	0.135	0.138	0.096	0.094	0.089	0.084	0.078	0.070	0.061	0.059	0.046	0.049	0.036	0.048	0.046	0.050	0.043	0.036
Iceland	0.082	0.064	0.131	0.153	0.057	0.048	0.089	0.112	0.112	0.061	0.052	0.069	0.056	0.031	0.040	0.054	0.047	0.044
India	0.115	0.116	0.115	0.112	0.099	0.091	0.085	0.091	0.080	0.069	0.067	0.065	0.060	0.060	0.075	0.074	0.061	0.057

Indonesia	0.096	0.097	0.076	0.081	0.088	0.086	0.076	0.079	0.066	0.070	0.075	0.068	0.052	0.052	0.072	0.072	0.052	0.055
Iran	0.067	0.073	0.088	0.092	0.098	0.073	0.108	0.095	0.097	0.063	0.068	0.071	0.054	0.076	0.065	0.091	0.061	0.082
Iraq	0.128			0.249				0.095	0.102	0.074	0.066		0.063	0.095	0.101	0.161	0.052	0.060
Ireland	0.054	0.054	0.038	0.036	0.037	0.031	0.031	0.030	0.026	0.019	0.021	0.020	0.017	0.016	0.017	0.016	0.019	0.016
Israel	0.057	0.075	0.066	0.055	0.057	0.050	0.049	0.050	0.047	0.045	0.048	0.041	0.044	0.052	0.069	0.056	0.053	0.050
Italy	0.093	0.091	0.088	0.087	0.083	0.083	0.076	0.079	0.075	0.061	0.065	0.065	0.061	0.053	0.053	0.057	0.056	0.051
Jamaica	0.075	0.104	0.110	0.081	0.100	0.106	0.102	0.083	0.069	0.058	0.072	0.025	0.046	0.051	0.060	0.079	0.081	0.072
Japan	0.075	0.073	0.070	0.063	0.063	0.063	0.063	0.065	0.066	0.061	0.060	0.056	0.054	0.051	0.050	0.053	0.052	0.048
Johnston and Sand Island											0.029							
Jordan	0.189	0.342	0.225	0.278	0.300	0.451	0.338	0.392	0.425	0.157	0.120	0.047	0.117	0.137	0.169	0.159	0.147	0.123
Kazakhstan				0.110	0.122	0.100	0.158	0.067	0.071	0.090	0.112	0.079	0.121	0.117	0.081	0.061	0.075	0.051
Kenya	0.132	0.122	0.188	0.113	0.114	0.089	0.083	0.074	0.078	0.079	0.081	0.067	0.056	0.052	0.065	0.079	0.090	0.114
Kiribati	0.151	0.453	0.033	0.062	0.192	0.141	0.084	0.044	0.041	0.059	0.063	0.039	0.065	0.036	0.078	0.131	0.147	0.157
Korea, Dem People's Rep	0.072	0.021	0.076	0.041	0.036	0.058	0.063	0.062	0.130	0.083	0.098	0.070	0.041	0.024	0.059	0.062	0.062	0.058
Korea, Republic of	0.072	0.077	0.066	0.062	0.065	0.064	0.068	0.056	0.052	0.059	0.055	0.047	0.043	0.043	0.049	0.051	0.045	0.045
Kuwait	0.186	0.174	0.122	0.138	0.092	0.087	0.116	0.120	0.146	0.217	0.097	0.268	0.098	0.099	0.121	0.069	0.077	0.080
Kyrgyzstan			0.083	0.185	0.058	0.058	0.162	0.087	0.130	0.154	0.122	0.151	0.095	0.298	0.147	0.269	0.142	0.023
Laos	0.266	0.179	0.174	0.432	0.181	0.088	0.167	0.082	0.080	0.105	0.109	0.124	0.024	0.048	0.151	0.007	0.005	0.016
Latvia			0.717	0.428	0.353	0.224	0.276	0.301	0.266	0.180	0.157	0.149	0.099	0.106	0.134	0.124	0.091	0.065
Lebanon	0.151	0.156	0.138	0.145	0.133	0.111	0.102	0.123	0.105	0.111	0.087	0.107	0.113	0.084	0.101	0.108	0.105	0.094
Lesotho	0.207	0.261	0.161	0.143	0.249	0.161	0.182	0.144	0.155	0.126	0.119	0.322		0.427	0.063	0.385	0.332	0.043
Liberia	0.004	5.287		0.043	0.038	0.006	0.288	0.330	0.088	0.109	0.282	0.233		0.104	0.305	0.085	0.372	0.060
Libya	0.882	0.498	0.600			0.095	0.034					0.573	0.041			0.023	0.042	0.000
Lithuania			0.700	0.328	0.129	0.219	0.186	0.098	0.114	0.067	0.044	0.117	0.179	0.116	0.124	0.208	0.104	0.058
Luxembourg														0.041	0.054	0.042	0.048	0.081
Macau (SAR of China)	0.073	0.067	0.075	0.076	0.071	0.077	0.066	0.074	0.055	0.049	0.050	0.036	0.043	0.053	0.060	0.059	0.051	0.048
Madagascar	0.149	0.172	0.200	0.279	0.163	0.140	0.108	0.082	0.096	0.106	0.070	0.050	0.044	0.049	0.114	0.085	0.099	0.085
Malawi	0.106	0.076	0.089	0.103	0.097	0.085	0.064	0.075	0.072	0.065	0.047	0.034	0.036	0.026	0.034	0.036	0.031	0.029
Malaysia	0.100	0.093	0.082	0.084	0.069	0.059	0.054	0.052	0.052	0.046	0.048	0.051	0.043	0.045	0.053	0.048	0.045	0.040
Maldives	0.109	0.197	0.100	0.059	0.347	0.095	0.080	0.427	0.072	0.079	0.073	0.008	0.090	0.048	0.132	0.060	0.037	0.019
Mali	0.108	0.053	0.159	0.077	0.424	0.200	0.036	0.082	0.044	0.074	0.043	0.013	0.035	0.046	0.053	0.064	0.049	0.065
Malta	0.088	0.148	0.105	0.066	0.036	0.021	0.020	0.023	0.034	0.048	0.046	0.041	0.039	0.029	0.042	0.073	0.081	0.067

Marianas Northern			0.384	0.546	0.138	0.201	0.053	0.135	0.064	0.081	0.052	0.072	0.050	0.036	0.023	0.030	0.550	0.079
Marshall Islands		0.680	0.634	0.358	0.043	0.333	0.436	0.292	0.118	0.077	0.103		0.550	0.393	0.140	0.377	0.202	0.162
Mauritania		0.083				0.107	0.352	1.214	1.373	0.122	0.352	0.280	0.111	0.141	0.215	0.009	0.104	0.019
Mauritius	0.129	0.086	0.095	0.148	0.137	0.181	0.174	0.213	0.162	0.164	0.144	0.090	0.075	0.099	0.156	0.140	0.091	0.079
Mexico	0.105	0.102	0.099	0.109	0.106	0.112	0.107	0.112	0.085	0.071	0.068	0.066	0.057	0.057	0.064	0.062	0.063	0.058
Micronesia Fed States of		0.010	0.010	0.028		0.170	0.100	0.123	0.084	0.275	0.140	0.139	0.035	0.010	0.245	0.069	0.124	0.155
Midway Islands											0.365	0.014						
Moldova			0.102	0.053	0.081	0.289		0.045	1.020	0.506	0.017	0.069	0.029	0.077	0.063	0.096	0.071	0.077
Mongolia	0.075			0.043	0.038	0.350	0.075	0.117	0.027	0.163	0.126	0.052	0.044	0.061	0.071	0.132	0.065	0.077
Montserrat			0.210			0.022					0.310		0.035	0.292	0.158	0.219	0.027	0.073
Morocco	0.156	0.235	0.152	0.256	0.161	0.100	0.094	0.163	0.252	0.297	0.315	0.349	0.231	0.335	0.314	0.384	0.361	0.513
Mozambique	0.051	0.045	0.070	0.086	0.155	0.232	0.132	0.279	6.276	0.126	0.168	0.278	0.198	0.026	0.118	0.060	0.091	0.032
Myanmar	0.047	0.037	0.046	0.042	0.046	0.047	0.052	0.056	0.056	0.060	0.051	0.042	0.043	0.041	0.044	0.050	0.042	0.042
Namibia	0.177	0.102	0.109	0.096	0.053	0.068	0.060	0.101	0.087	0.069	0.073	0.081	0.076	0.065	0.064	0.069	0.053	0.050
Nauru	0.220	0.251	0.283	0.236	0.260	0.229	0.421	0.445	0.391	0.343	0.232	0.325	0.216	0.039	0.041	0.073	0.108	0.640
Nepal	0.141	0.211	0.367	0.340	0.345	0.307	0.326	0.237	0.210	0.191	0.128	0.157	0.152	0.140	0.144	0.144	0.129	0.120
Netherlands	0.081	0.071	0.077	0.066	0.069	0.070	0.067	0.062	0.070	0.058	0.062	0.067	0.058	0.057	0.057	0.060	0.062	0.054
Netherlands Antilles		0.112	0.109	0.095	0.091	0.191	0.368	0.259	0.458	0.377	0.375	0.616	0.306	0.245	0.208	0.131	0.128	0.113
New Caledonia	0.251	0.372	0.356	0.303	0.487	0.614	0.437	0.454	0.406	0.368	0.434	0.455	0.483	0.359	0.325	0.319	0.188	0.149
New Zealand	0.088	0.090	0.087	0.084	0.083	0.076	0.067	0.064	0.065	0.057	0.054	0.054	0.053	0.054	0.054	0.056	0.053	0.049
Nicaragua	0.039	0.154	0.069	0.128	0.077	0.226	0.076	0.166	0.046	0.062	0.039	0.058	0.058	0.099	0.099	0.054	0.090	0.110
Niger	0.166	0.067		0.043	0.293		0.284	0.465	0.177	0.011	0.049	0.064	0.023	0.096	0.226	0.073	0.072	0.060
Nigeria	0.266	0.076	0.192	0.103	0.073	0.043	0.510	0.110	0.183	0.079	0.031	0.041	0.259	0.243	0.215	0.138	0.198	0.081
Niue			0.275					0.168		0.019			0.016	0.126		0.074	0.088	0.141
Norfolk Island	0.047	0.155	0.095	0.091	0.529	0.136	0.053	0.040	0.048	0.042	0.053	0.055	0.160	0.027	0.466	0.400	0.256	0.456
Norway	0.118	0.115	0.123	0.101	0.095	0.095	0.077	0.091	0.074	0.086	0.088	0.066	0.054	0.054	0.060	0.055	0.063	0.053
Oman	0.107	0.082	0.151	0.121	0.161	0.134	0.003	0.118	0.134	0.068	0.076	0.073	0.071	0.037	0.096	0.105	0.102	0.064
Pakistan	0.079	0.077	0.073	0.070	0.062	0.054	0.053	0.054	0.053	0.053	0.059	0.061	0.054	0.059	0.073	0.082	0.071	0.070
Palau									0.892	0.475	0.022	0.100	0.425	0.018	0.012	0.060	0.018	0.098
Panama	0.114	0.025	0.007	0.194	0.234	0.156	0.220	0.100	0.047	0.077	0.100	0.049	0.068	0.111	0.078	0.171	0.037	0.048
Papua New Guinea	0.008	0.004	0.006	0.020	0.025	0.029	0.026	0.032	0.037	0.029	0.022	0.030	0.015	0.015	0.016	0.016	0.019	0.013
Paraguay	0.133	0.108	0.028	0.029	0.154	0.157	0.012	0.079	0.090	0.047	0.130	0.127	0.044	0.181	0.159	0.057	0.132	0.164

Peru	0.100	0.183	0.150	0.154	0.129	0.122	0.137	0.112	0.099	0.124	0.136	0.121	0.099	0.119	0.164	0.135	0.085	0.066
Philippines	0.133	0.121	0.108	0.099	0.073	0.069	0.083	0.060	0.063	0.051	0.056	0.045	0.039	0.047	0.057	0.074	0.071	0.054
Pitcairn Island								0.053	0.628	0.140	0.104	0.100	0.244	0.015		0.102	0.126	0.269
Poland	0.156	0.140	0.121	0.116	0.128	0.096	0.099	0.038	0.110	0.093	0.087	0.096	0.092	0.065	0.055	0.052	0.070	0.061
Portugal	0.105	0.096	0.104	0.088	0.084	0.077	0.072	0.071	0.064	0.054	0.047	0.056	0.047	0.044	0.047	0.051	0.056	0.047
Puerto Rico	0.024	0.014	0.016	0.014	0.020	0.015	0.015	0.015	0.024	0.015	0.010	0.023	0.012	0.012	0.011	0.009	0.011	0.010
Qatar	0.126	0.145	0.170	0.120	0.106	0.116	0.099	0.104	0.122	0.092	0.159	0.095	0.062	0.106	0.145	0.122	0.127	0.115
Reunion	0.100	0.131		0.057	0.009	0.355	0.053		0.042	0.021			0.140	0.027	0.967	0.084	0.054	0.112
Romania	0.105	0.155	0.103	0.127	0.113	0.098	0.106	0.122	0.096	0.078	0.077	0.081	0.075	0.077	0.068	0.113	0.086	0.078
Russian Federation			0.110	0.153	0.167	0.096	0.168	0.161	0.091	0.127	0.114	0.086	0.180	0.164	0.222	0.125	0.138	0.079
Rwanda		0.052		0.020	0.016			0.143	0.060		0.041	0.074	0.043	0.059	0.109	0.022	0.032	0.024
Samoa	0.145	0.101	0.121	0.050	0.061	0.023	0.073	0.078	0.029	0.037	0.082	0.044	0.035	0.057	0.163	0.045	0.061	0.042
Samoa (American)	0.208	0.230	0.232	0.206	0.225	0.243	0.141	0.094	0.137	0.185	0.186	0.166	0.148	0.150	0.125	0.118	0.094	0.086
Sao Tome and Principe				0.095	0.163	0.026	0.031	0.032		0.029					0.041	0.103	0.088	0.078
Saudi Arabia	0.106	0.142	0.101	0.106	0.122	0.107	0.107	0.118	0.197	0.135	0.116	0.149	0.076	0.099	0.108	0.080	0.079	0.066
Senegal					0.316	0.830	0.611	0.339	0.023	0.081	0.090	0.261	0.070	0.065	0.058	0.042	0.048	0.036
Serbia and Montenegro	0.143	0.133	0.120	0.069	0.085	0.108	0.093	0.125	0.106	0.105	0.127	0.099	0.116	0.107	0.125	0.131	0.102	0.091
Seychelles		0.280	0.197	0.136	0.152	0.120	0.137	0.023	0.059	0.092	0.114	0.155	0.127	0.094	0.108	0.042	0.030	0.069
Sierra Leone		0.056	0.124	0.118	0.950	0.002	0.734	0.031	0.107	0.063	0.082	0.037	0.266	0.140	0.107	0.095	0.065	0.065
Singapore	0.063	0.052	0.057	0.048	0.051	0.037	0.036	0.035	0.040	0.029	0.038	0.041	0.035	0.045	0.050	0.047	0.044	0.042
Slovak Republic				0.131	0.115	0.108	0.065	0.101	0.071	0.102	0.185	0.056	0.079	0.072	0.076	0.077	0.054	0.033
Slovenia		0.038	0.093	0.090	0.082	0.085	0.071	0.087	0.083	0.071	0.051	0.073	0.061	0.060	0.069	0.071	0.084	0.106
Solomon Islands	0.140	0.182	0.167	0.168	0.157	0.146	0.126	0.121	0.133	0.125	0.083	0.103	0.133	0.066	0.079	0.081	0.084	0.092
Somalia		0.040			0.285	0.123	0.087		2.256	0.012	0.682	0.279	0.341	0.101	0.253	0.130	0.057	0.082
South Africa	0.123	0.140	0.147	0.128	0.125	0.095	0.111	0.098	0.089	0.084	0.080	0.075	0.071	0.061	0.063	0.056	0.049	0.044
Spain	0.110	0.104	0.092	0.094	0.085	0.086	0.087	0.087	0.089	0.074	0.080	0.080	0.069	0.059	0.055	0.055	0.051	0.046
Sri Lanka	0.103	0.116	0.105	0.094	0.082	0.079	0.085	0.070	0.081	0.071	0.066	0.066	0.056	0.068	0.071	0.072	0.066	0.068
St Christopher and Nevis		0.343	0.037	0.061	0.083	0.042	0.297				0.013		0.010			0.136	0.012	0.033
St Pierre and Miquelon		0.009										0.014	0.140			0.088		
St. Helena					0.033	0.043	0.000	0.201	0.058		0.001	0.011	0.036	0.008	0.036		0.027	0.017
St. Lucia				0.184	0.099	0.017	0.058		0.255	0.206	0.163	0.447	0.074		0.061	0.036	0.059	0.120
St. Vincent & Grenadines	0.065	0.096	0.073	0.094	0.063	0.057	0.059	0.079				0.232	0.144	0.091	0.001		0.075	0.129

Sudan	0.290	0.062	0.110	0.102	0.146	0.134	0.061	0.029	0.060	0.039	0.213	0.119	0.048	0.462	0.142	0.053	0.144	0.130
Suriname	0.022	0.022		0.042	0.013		0.232	0.284	0.007	0.146	0.021	0.054	0.231	0.133	0.220	0.336	0.165	0.054
Swaziland	0.122	0.097	0.077	0.080	0.096	0.084	0.108	0.117	0.084	0.048	0.082	0.094	0.023	0.012	0.014	0.008	0.010	0.011
Sweden	0.072	0.070	0.056	0.055	0.064	0.052	0.046	0.045	0.047	0.039	0.051	0.053	0.048	0.043	0.042	0.042	0.038	0.041
Switzerland	0.045	0.041	0.044	0.037	0.037	0.038	0.037	0.039	0.042	0.035	0.032	0.027	0.027	0.025	0.023	0.024	0.023	0.022
Syria	0.070	0.175	0.257	0.289	0.187	0.174	0.180	0.176	0.175	0.127	0.134	0.146	0.143	0.155	0.179	0.191	0.104	0.118
Taiwan	0.074	0.074	0.065	0.061	0.059	0.057	0.060	0.057	0.055	0.050	0.046	0.043	0.038	0.044	0.048	0.048	0.044	0.048
Tajikistan									0.074			0.064	0.052	0.146	0.012	0.037	0.018	0.021
Tanzania	0.116	0.123	0.124	0.117	0.139	0.107	0.051	0.067	0.069	0.071	0.081	0.052	0.051	0.051	0.083	0.057	0.042	0.036
Thailand	0.091	0.086	0.077	0.076	0.066	0.061	0.057	0.057	0.057	0.056	0.060	0.060	0.050	0.051	0.055	0.053	0.044	0.040
Togo	0.239	0.575	0.411		0.930	0.744		0.073	0.128	0.070	0.081	0.424	0.446	0.410	0.556	0.100	0.760	0.041
Tokelau								0.217	0.169	0.064	0.048	0.126	0.315	0.240				
Tonga	0.076	0.069	0.081	0.097	0.132	0.144	0.168	0.173	0.142	0.139	0.237	0.252	0.242	0.219	0.210	0.187	0.211	0.285
Trinidad and Tobago	0.220	0.105	0.194	0.086	0.084	0.073	0.069	0.099	0.085	0.081	0.110	0.052	0.044	0.026	0.030	0.029	0.030	0.027
Tunisia	0.084	0.079	0.053	0.138	0.092	0.016	0.190	0.243	0.219	0.168	0.095	0.073	0.106	0.046	0.043	0.047	0.053	0.051
Turkey	0.128	0.113	0.103	0.108	0.116	0.102	0.114	0.111	0.099	0.086	0.092	0.093	0.083	0.080	0.078	0.084	0.065	0.070
Turkmenistan								0.045	0.034	0.048	0.045		0.121	0.049	0.062	0.050	0.042	0.040
Turks and Caicos Islands									0.606	0.089	0.101	0.068		0.103		0.116	0.042	0.069
Tuvalu	0.057	0.064	0.066	0.111		0.044		0.583		0.060	0.085	0.108	0.056		0.100	0.135	0.066	0.064
U.S. Misc Pacific Islnds					0.033		0.250	0.107	0.006	0.054	0.023	0.000	0.021	0.277				
U.S.S.R.	0.237	0.101	0.124															
US Minor Outlying Islands															0.036	0.021	0.044	0.094
Uganda	0.065	0.077	0.137	0.156	0.096	0.075	0.074	0.059	0.080	0.069	0.089	0.060	0.053	0.049	0.060	0.055	0.039	0.035
Ukraine			0.301	0.134	0.119	0.109	0.068	0.110	0.052	0.102	0.511	0.043	0.060	0.152	0.101	0.093	0.082	0.138
United Arab Emirates	0.090	0.089	0.069	0.087	0.089	0.093	0.082	0.105	0.156	0.064	0.088	0.087	0.067	0.072	0.087	0.093	0.051	0.040
United Kingdom	0.073	0.066	0.063	0.062	0.059	0.057	0.056	0.055	0.055	0.045	0.036	0.040	0.041	0.043	0.040	0.038	0.038	0.029
United States Virgin Is	0.063	0.063	0.065	0.079	0.083	0.071	0.097	0.072	0.036	0.030	0.034	0.039	0.194	0.067	0.026	0.020	0.031	0.027
United States of America	0.073	0.068	0.078	0.078	0.071	0.071	0.070	0.069	0.061	0.054	0.053	0.054	0.047	0.047	0.053	0.056	0.050	0.050
Uruguay	0.152	0.121	0.142	0.122	0.075	0.071	0.056	0.048	0.043	0.045	0.066	0.033	0.033	0.045	0.056	0.060	0.069	0.026
Uzbekistan				0.033	0.017		0.183	0.067		0.188	0.029	0.100	0.193	0.088	0.165	0.121	0.141	0.133
Vanuatu	0.252	0.080	0.077	0.059	0.077	0.042	0.081	0.053	0.106	0.076	0.188	0.152	0.122	0.052	0.118	0.122	0.095	0.113
Venezuela	0.258	0.130	0.081	0.075	0.052	0.067	0.111	0.144	0.218	0.270	0.141	0.166	0.181	0.146	0.162	0.131	0.073	0.079

Viet Nam	0.071	0.100	0.072	0.071	0.077	0.074	0.070	0.076	0.080	0.056	0.062	0.086	0.054	0.072	0.075	0.059	0.049	0.041
Virgin Islands, British	0.086			0.183	0.010	0.015	0.208	0.335	0.054	0.057	0.055	0.047	0.041	0.054	0.062	0.092	0.035	0.035
Wake Island								0.158										
Wallis & Futuna Islands									0.500		0.017			0.133	0.058	0.136		
Yemen	0.431	0.048		0.043	0.021	0.507	0.056	0.105	0.080	0.064	0.046	0.085	0.180	0.071	0.072	0.047	0.062	0.648
Zambia	0.141	0.103	0.099	0.279	0.166	0.136	0.233	0.149	0.280	0.065	0.070	0.147	0.062	0.065	0.032	0.077	0.029	0.035
Zimbabwe	0.163	0.161	0.174	0.173	0.168	0.105	0.075	0.108	0.165	0.102	0.078	0.061	0.083	0.057	0.075	0.071	0.054	0.044

Note: the means are import-weighted (ad valorem trade costs = Σcif/Σfob – 1) and hence biased downwards because goods or trading partners with higher trade costs will be under-represented.

Category changes:

- Soviet Union: USSR 1990-2; separate data for Estonia, Latvia and Lithuania from 1992 and for the other twelve Soviet successor states from 1993.
- Czechoslovakia: Czech and Slovak Fed Rep data for 1990-3 overlaps with separate data for Czech Republic and Slovak Republic in 1993.
- Yugoslavia: Serbia and Montenegro reported for all years. Slovenia from 1991, and Bosnia and Herzegovina, Croatia and FYR Macedonia from 1992.
- US Minor Outlying Islands reported for 2004-7 -- may have replaced U.S. Misc Pacific Islands, Johnston and Sand Island, Midway Islands and Wake Island (but not American Samoa, Marianas, Marshall Island or Guam).

Appendix 2: HS Nomenclature (2007 Edition)

SECTION I **LIVE ANIMALS; ANIMAL PRODUCTS**

01 Live animals.

02 Meat and edible meat offal.

03 Fish and crustaceans, molluscs and other aquatic invertebrates.

04 Dairy produce; birds' eggs; natural honey; edible products of animal origin, not elsewhere specified or included.

05 Products of animal origin, not elsewhere specified or included.

SECTION II **VEGETABLE PRODUCTS**

06 Live trees and other plants; bulbs, roots and the like; cut flowers and ornamental foliage.

07 Edible vegetables and certain roots and tubers.

08 Edible fruit and nuts; peel of citrus fruit or melons.

09 Coffee, tea, maté and spices.

10 Cereals.

11 Products of the milling industry; malt; starches; inulin; wheat gluten.

12 Oil seeds and oleaginous fruits; miscellaneous grains, seeds and fruit; industrial or medicinal plants; straw and fodder.

13 Lac; gums, resins and other vegetable saps and extracts.

14 Vegetable plaiting materials; vegetable products not elsewhere specified or included.

SECTION III **ANIMAL OR VEGETABLE FATS AND OILS AND THEIR CLEAVAGE PRODUCTS; PREPARED EDIBLE FATS; ANIMAL OR VEGETABLE WAXES**

15 Animal or vegetable fats and oils and their cleavage products; prepared edible fats; animal or vegetable waxes.

SECTION IV **PREPARED FOODSTUFFS; BEVERAGES, SPIRITS AND VINEGAR; TOBACCO AND MANUFACTURED TOBACCO SUBSTITUTES**

16 Preparations of meat, of fish or of crustaceans, molluscs or other aquatic invertebrates.

17 Sugars and sugar confectionery.

18 Cocoa and cocoa preparations.

19 Preparations of cereals, flour, starch or milk; pastrycooks' products.

20 Preparations of vegetables, fruit, nuts or other parts of plants.

21 Miscellaneous edible preparations.

22 Beverages, spirits and vinegar.

23 Residues and waste from the food industries; prepared animal fodder.

24 Tobacco and manufactured tobacco substitutes.

SECTION V **MINERAL PRODUCTS**

25 Salt; sulphur; earths and stone; plastering materials, lime and cement.

26 Ores, slag and ash.

27 Mineral fuels, mineral oils and products of their distillation; bituminous substances; mineral waxes.

SECTION VI **PRODUCTS OF THE CHEMICAL OR ALLIED INDUSTRIES**

28 Inorganic chemicals; organic or inorganic compounds of precious metals, of rare-earth metals, of radioactive elements or of isotopes.

29 Organic chemicals.

30 Pharmaceutical products.

31 Fertilisers.

32 Tanning or dyeing extracts; tannins and their derivatives; dyes, pigments and other colouring matter; paints and varnishes; putty and other mastics; inks.

33 Essential oils and resinoids; perfumery, cosmetic or toilet preparations.

34 Soap, organic surface-active agents, washing preparations, lubricating preparations, artificial waxes, prepared waxes, polishing or scouring preparations, candles and similar articles, modelling pastes, "dental waxes" and dental preparations with a basis of plaster.

35 Albuminoidal substances; modified starches; glues; enzymes.

36 Explosives; pyrotechnic products; matches; pyrophoric alloys; certain combustible preparations.

37 Photographic or cinematographic goods.

38 Miscellaneous chemical products.

SECTION VII **PLASTICS AND ARTICLES THEREOF; RUBBER AND ARTICLES THEREOF**

39 Plastics and articles thereof.

40 Rubber and articles thereof.

SECTION VIII **RAW HIDES AND SKINS, LEATHER, FURSKINS AND ARTICLES THEREOF; SADDLERY AND HARNESS; TRAVEL GOODS, HANDBAGS AND SIMILAR CONTAINERS; ARTICLES OF ANIMAL GUT (OTHER THAN SILK-WORM GUT)**

41 Raw hides and skins (other than furskins) and leather.

42 Articles of leather; saddlery and harness; travel goods, handbags and similar containers; articles of animal gut (other than silk-worm gut).

43 Furskins and artificial fur; manufactures thereof.

SECTION IX **WOOD AND ARTICLES OF WOOD; WOOD CHARCOAL; CORK AND ARTICLES OF CORK; MANUFACTURES OF STRAW, OF ESPARTO OR OF OTHER PLAITING MATERIALS; BASKETWARE AND WICKERWORK**

44 Wood and articles of wood; wood charcoal.

45 Cork and articles of cork.

46 Manufactures of straw, of esparto or of other plaiting materials; basketware and wickerwork.

SECTION X **PULP OF WOOD OR OF OTHER FIBROUS CELLULOSIC MATERIAL; RECOVERED (WASTE AND SCRAP) PAPER OR PAPERBOARD; PAPER AND PAPERBOARD AND ARTICLES THEREOF**

47 Pulp of wood or of other fibrous cellulosic material; recovered (waste and scrap) paper or paperboard.

48 Paper and paperboard; articles of paper pulp, of paper or of paperboard.

49 Printed books, newspapers, pictures and other products of the printing industry; manuscripts, typescripts and plans.

SECTION XI **TEXTILES AND TEXTILE ARTICLES**

50 Silk.

51 Wool, fine or coarse animal hair; horsehair yarn and woven fabric.

52 Cotton.

53 Other vegetable textile fibres; paper yarn and woven fabrics of paper yarn.

54 Man-made filaments.

55 Man-made staple fibres.

56 Wadding, felt and nonwovens; special yarns; twine, cordage, ropes and cables and articles thereof.

57 Carpets and other textile floor coverings.

58 Special woven fabrics; tufted textile fabrics; lace; tapestries; trimmings; embroidery.

59 Impregnated, coated, covered or laminated textile fabrics; textile articles of a kind suitable for industrial use.

60 Knitted or crocheted fabrics.

61 Articles of apparel and clothing accessories, knitted or crocheted.

62 Articles of apparel and clothing accessories, not knitted or crocheted.

63 Other made up textile articles; sets; worn clothing and worn textile articles; rags.

SECTION XII **FOOTWEAR, HEADGEAR, UMBRELLAS, SUN UMBRELLAS, WALKING-STICKS, SEAT-STICKS, WHIPS, RIDING-CROPS AND PARTS THEREOF; PREPARED FEATHERS AND ARTICLES MADE THEREWITH; ARTIFICIAL FLOWERS; ARTICLES OF HUMAN HAIR**

64 Footwear, gaiters and the like; parts of such articles.

65 Headgear and parts thereof.

66 Umbrellas, sun umbrellas, walking-sticks, seat-sticks, whips, riding-crops and parts thereof.

67 Prepared feathers and down and articles made of feathers or of down; artificial flowers; articles of human hair.

SECTION XIII **ARTICLES OF STONE, PLASTER, CEMENT, ASBESTOS, MICA OR SIMILAR MATERIALS; CERAMIC PRODUCTS; GLASS AND GLASSWARE**

68 Articles of stone, plaster, cement, asbestos, mica or similar materials.

69 Ceramic products.

70 Glass and glassware.

SECTION XIV **NATURAL OR CULTURED PEARLS, PRECIOUS OR SEMI-PRECIOUS STONES, PRECIOUS METALS, METALS CLAD WITH PRECIOUS METAL AND ARTICLES THEREOF; IMITATION JEWELLERY; COIN**

71 Natural or cultured pearls, precious or semi-precious stones, precious metals, metals clad with precious metal and articles thereof; imitation jewellery; coin.

SECTION XV **BASE METALS AND ARTICLES OF BASE METAL**

72 Iron and steel.

73 Articles of iron or steel.

74 Copper and articles thereof.

75 Nickel and articles thereof.

76 Aluminium and articles thereof.

77 (Reserved for possible future use in the Harmonized System)

78 Lead and articles thereof.

79 Zinc and articles thereof.

80 Tin and articles thereof.

81 Other base metals; cermets; articles thereof.

82 Tools, implements, cutlery, spoons and forks, of base metal; parts thereof of base metal.

83 Miscellaneous articles of base metal.

SECTION XVI**MACHINERY AND MECHANICAL APPLIANCES; ELECTRICAL EQUIPMENT; PARTS THEREOF; SOUND RECORDERS AND REPRODUCERS, TELEVISION IMAGE AND SOUND RECORDERS AND REPRODUCERS, AND PARTS AND ACCESSORIES OF SUCH ARTICLES**

84 Nuclear reactors, boilers, machinery and mechanical appliances; parts thereof.

85 Electrical machinery and equipment and parts thereof; sound recorders and reproducers,

television image and sound recorders and reproducers, and parts and accessories of such articles.

SECTION XVII **VEHICLES, AIRCRAFT, VESSELS AND ASSOCIATED TRANSPORT EQUIPMENT**

86 Railway or tramway locomotives, rolling-stock and parts thereof; railway or tramway track fixtures and fittings and parts thereof; mechanical (including electro-mechanical) traffic signalling equipment of all kinds.

87 Vehicles other than railway or tramway rolling-stock, and parts and accessories thereof.

88 Aircraft, spacecraft, and parts thereof.

89 Ships, boats and floating structures.

SECTION XVIII **OPTICAL, PHOTOGRAPHIC, CINEMATOGRAPHIC, MEASURING, CHECKING, PRECISION, MEDICAL OR SURGICAL INSTRUMENTS AND APPARATUS; CLOCKS AND WATCHES; MUSICAL INSTRUMENTS; PARTS AND ACCESSORIES THEREOF**

90 Optical, photographic, cinematographic, measuring, checking, precision, medical or surgical instruments and apparatus; parts and accessories thereof.

91 Clocks and watches and parts thereof.

92 Musical instruments; parts and accessories of such articles.

SECTION XIX **ARMS AND AMMUNITION; PARTS AND ACCESSORIES THEREOF**

93 Arms and ammunition; parts and accessories thereof.

SECTION XX **MISCELLANEOUS MANUFACTURED ARTICLES**

94 Furniture; bedding, mattresses, mattress supports, cushions and similar stuffed furnishings; lamps and lighting fittings, not elsewhere specified or included; illuminated signs, illuminated name-plates and the like; prefabricated buildings.

95 Toys, games and sports requisites; parts and accessories thereof.

96 Miscellaneous manufactured articles.

SECTION XXI **WORKS OF ART, COLLECTORS' PIECES AND ANTIQUES**

97 Works of art, collectors' pieces and antiques.