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Country Trade Costs, Comparative Advantage and the Pattern of Trade: Multi-Country and Product Panel Evidence

By

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Abstract

This paper investigates whether differences across countries in overall country-specific trade costs affect comparative advantage. It does so by examining whether the commodity composition of countries' trade is driven by differences in countries' trade costs, as well as by differences in traditional factor endowments. Industry export shares across up to 71 countries and 158 manufacturing industries for five year periods over the period 1972 to 1992 are shown to be greater in trade cost sensitive industries for countries with relatively low national trade costs. This is after controlling for factor-intensity differences across industries and for endowment differences (physical and human capital) between countries. Further, these relationships are more evident in exporting to global markets than to local or regional markets.

JEL classification: F14

Keywords: Trade costs, comparative advantage

Outline

Non-Technical Summary

Overall trade costs include all the costs associated with delivering a good from the producer to final users overseas, other than the cost of producing the good itself. A number of recent studies have indicated that these costs, if broadly defined is this way, are greater than we had believed If this is so, then there are good grounds for believing that patterns of international trade may be affected not only by relative production costs but also by these trade costs. The literature on international trade has tended to concentrate on the trade volume effects of trade costs and on whether goods are traded or not. There has been relatively little consideration of how trade costs affect trade patterns and sources of comparative advantage internationally. In the present study we concentrate on how trade costs matter empirically for the pattern of trade; in particular on whether differences in national trade costs are a source of comparative advantage. It follows on from a recent strand of the literature that considers whether specific types of trade costs affect comparative advantage and the composition of trade. Nunn (2007) for example finds that countries with good contract enforcement (good "rule of law" conditions) export more goods for which contract enforcement is more important. In similar fashion, Levchenko (2007) shows that countries with better institutions specialize in goods that are more complex in terms of the range of inputs used in production. To the extent that institutions, in general or specific types of institutions, affect trade (rather than production) costs, then trade costs are represented as a source rather than modifier of comparative advantage and trade patterns. In this paper we extend on this tradition by considering the whole gamut of institutional and infrastructure characteristics of countries which induce inter-country differences in overall national trade costs. We view these differences in country trade costs as reflecting sustained and systematic features of geography and stage of development. They may arise from differences in the overall quality of countries' infrastructure and institutions, and in the competitiveness or effectiveness of their business and policy environments. Indeed, we find empirical support for country trade costs being an 'endowment' which affects the pattern of comparative advantage and export composition. This is revealed in export performance at the industry level for a sample of up to 71 countries and 158 industries for 5 year periods over the period 1972 to 1992. Countries with lower trade costs are found to export more of those products for which trade costs are more important, having controlled for traditional endowment influences on export performance in manufacturing products and for other industry, country and time specific effects. Further, we find stronger support for trade costs being a source of global rather than 'local' or regional comparative advantage.

1. Introduction

A number of recent studies have indicated that trade costs, especially if broadly defined to include less easily identified and measurable information-related costs of transacting internationally as well as the costs of transportation, are greater than we had believed (Anderson and van Wincoop, 2004; Hummels, 2007). If this is so, then there are good grounds for believing that patterns of international trade may be affected not only by relative production costs but also by these trade costs, indeed even to a possibly greater extent. Deardorff (2004), for instance, shows theoretically that a country may have a comparative advantage (or disadvantage) in a good relative to the world based on the country's costs of production relative to the world average production costs, but if trade costs are sufficiently high the country may import (export) this good. The literature on international trade has tended to concentrate on the trade volume effects of trade costs (e.g. in the gravity model literature), and on the related issue of traded and non-traded goods (Dornbusch et al., 1977). There has been relatively little consideration in either the theoretical or empirical literature on how trade costs affect trade patterns and the sources of comparative advantage. In the present study we concentrate on how trade costs matter empirically for the pattern of trade; in particular on whether differences in national trade costs are a source of comparative advantage.

The study draws upon that strand of the empirical factor proportions literature that explores the cross-commodity or –industry relationship between export performance and the factor intensities of commodities or industries. This strand dates back to correlations established by Keesing (1966) between US export performance and industry skill intensities; a positive correlation for the highest skills and a negative one for unskilled labour. Similarly regressions of US net exports (aggregate and bilateral) by industry reported by Baldwin (1971) showed a range of significant relationships to cross-industry factor intensities. This strand of the literature was rendered unfashionable, however, by the criticism, forcibly made by Leamer (1980, 1984), that cross-commodity or industry comparisons had weak theoretical underpinning. He demonstrated that industry export performance did not depend in a strict Heckscher-Ohlin (H-O) model on the input characteristics or factor intensities of industries. As with that strand of the empirical literature interested in measuring the factor content of trade to test the Heckscher-Ohlin-Vanek (HOV) model, the cross industry methodology has been revived. Among other things, this revival has been driven by recognition of and allowance for non-factor price equalization (and cross country differences in production techniques). With the factor price equalization (FPE) requirement removed, the commodity (industry) structure of production and trade can be determined. Romalis (2004), for example, shows that, conditional on factor prices, industry export performance in a quasi-H-O model is determined by industry input characteristics, or more specifically in terms of the interaction of industry factor intensity and relative factor prices (or relative national endowments of factors). The empirical application of the model (US import shares of 123 countries in 370 industries) shows a strong influence in particular of relative skill intensity and abundance on countries' shares of US imports; skill abundant countries capturing greater market share of skill-intensive goods and the exports of low human capital countries being concentrated on low skill-intensive industries.

Although the theoretical model used by Romalis (2004) incorporates trade costs, there is no consideration of trade costs in the empirical modelling. With assumed uniformity of trade costs across pairs of trading partners, trade costs do not alter relative (production and trade inclusive) costs across countries. Trade costs in this theoretical set-up serve rather to fashion the incentive to trade or not; the number of non-traded commodities (with intermediate factor intensities) increasing with trade costs. If trade costs differ across pairs of trading partners, any given country will source a particular commodity from the lowest trade cost-inclusive source. But the lowest cost source may now also differ across importing countries. This leads Deardorff (2004) to distinguish between 'local' and 'global' comparative advantage.[1] A country may have a comparative advantage (disadvantage) in a good relative to the world, when one compares its relative costs of production globally, but if trade costs are sufficiently high (or at least for some countries) a global comparison may be inappropriate for determining trade patterns. Rather the appropriate comparison may be with those 'local' countries, that is those countries having the lowest costs of trading with the country. Comparative advantage should be defined in this context to explain trade to take into account trade costs, giving greater weight to less distant and lower trade cost countries.

The literature discussed thus far is either concerned with how endowments affect relative international production costs or with how trade costs may modify or alter endowment-driven trade patterns. There is, however, a strand of the literature that considers types of production and/or trade costs as a source of comparative advantage. Nunn (2007) for instance considers whether the ability to enforce contracts (thereby reducing the costs of acquiring intermediate inputs) affects a country's comparative advantage in the production of goods requiring relationship-specific investments. Using data for 1997 for exports by 146 countries in 182 industries, he finds that countries with good contract enforcement (good "rule of law" conditions) export more of the goods for which contract enforcement is

[1] Markusen and Venables (2007) also show that a country's pattern of specialisation and trade is determined by the interaction of its relative endowments and its trade costs.

more important. In similar fashion Levchenko (2007) shows that countries with better institutions specialize in goods that are institutionally dependent (i.e. more complex in terms of the range of inputs used in production). To the extent that institutions, in general or specific types of institutions, affect trade (rather than production) costs, then trade costs are represented as a source rather than modifier of comparative advantage and trade patterns. In this paper we extend on this tradition by considering the whole gamut of institutional and infrastructure characteristics or endowments of countries which induce differences in overall national trade costs.

The remainder of the paper is organised as follows. The concept of national differences in trade costs is explored and illustrated in section 2. In section 3 the theoretical implications of alternative aspects of trade costs are reviewed. This in turn provides the underpinning for the empirical approach set out in section 4. The results of applying this empirical approach are provided and discussed in section 5. Finally, section 6 offers the summary conclusions of the study.

2. Country Trade Costs

When broadly defined, trade costs include all costs in delivering a traded good from its producer to a final user overseas (other than the marginal cost of producing the good itself). Anderson and van Wincoop (2004) define trade costs so as to include transport costs (freight and time), costs induced by tariff and non-tariff barriers, information costs, contract enforcement costs, legal and regulatory costs, and local distribution costs in export markets. These authors review a range of literatures and methodologies to provide direct and indirect (inferred) estimates of the individual components of aggregate or country-wide trade costs. They report an overall (average) ad valorem tax equivalent for trade costs broadly defined in this way for a representative industrial country (USA) of 170%; broken down multiplicatively into local distribution costs (55%) and international transaction costs (74%). It is recognised that there will be variation in overall trade costs across countries (in particular between industrial and developing countries), but also that there are constraints on the systematic measurement of aggregate costs across countries and over time by this type of a bottom-up approach.

Some, but only some trade costs, will vary also across products, with variation in policy barriers or in the transportability of goods. (We do in part allow for these differences by measuring differences in the trade cost sensitivity of product groups at the industry level.) There are, however, likely to be systematic differences in trade costs across countries for all products associated with geographic and developmental differences in the quality and efficiency of countries' institutions, infrastructure, business and policy environments. It is these differences in (average) overall trade costs that we wish to concentrate on for the present purpose. The comprehensive measurement of country trade costs is, however, problematic. This is in part because data availability constrains measurement across large numbers of developed and developing countries and over time. It is also because it is difficult to aggregate across all policy-sources of trade costs (i.e. across tariffs and non-tariff barriers) and simultaneously across policy and non-policy (e.g. transport and other geography) sources of trade costs.[2] As a result, we consider alternative proxies of trade costs, which capture policy and non-policy sources to differing degrees. We borrow estimates from Hiscox and Lastner (2008) of trade openness, based on an annual, country specific (fixed) effect estimated from a gravity model of bilateral trade flows which controls for national incomes of, and distance between, any two trading partners. The larger the (overall) country specific effect the more trade policy open the economy is viewed to be. There are potential limitations of the proxy, given that a general gravity model is not estimated and trade policy is presumed to be multilateral. However an index (ICY), which correlates quite well with other trade policy indicators and does capture some non-policy sources of trade costs, is available for 76 countries and for each year over the period 1960 to 2000.

We also use the measures of access to markets and sources of supply proposed by Redding and Venables (2004); market access (MA_c) of each exporting country being the distance-weighted sum of the market capabilities of all partner (j) countries, and supply access (SA_c) of each importing country being the distance weighted sum of the supply capabilities of all partner countries, such that:

$$MA_c = \sum \left(\pi_{cj}\right)^{1-\sigma} M_j \qquad (1)$$

$$SA_c = \sum \left(\pi_{cj}\right)^{1-\sigma} S_j \qquad (2)$$

where π_{cj} = bilateral transport costs

M_j = market capacity

S_j = supply capabilities

and σ = elasticity of substitution.

[2] Recent work for instance by Kee, Nicita and Olarreaga (2009) aggregates across tariff and non-tariff barriers for a large range of countries, but it does so for one year and abstracts wholley from non-policy sources in measuring trade restrictiveness.

MA_c and SA_c are predicted from a gravity model of bilateral trade, which controls for distance, a dummy for a common border, GDP in both countries and country and partner dummies. The coefficients of the country and partner dummies provide the estimates for the market and supply capacities, and coefficients on distance and border dummy variables are used to estimate bilateral transport costs. We use this same methodology to estimate MA_c and SA_c for the same sample of countries as that for which the Hiscox-Lastner (H-L) index is available and eighteen additional countries, and for each of the years 1972, 1977, 1982, 1987 and 1992. (See Appendix 1 for the gravity model estimates used to construct MA_c and SA_c.)

For trade cost intensity or sensitivity, again we explore alternative possible proxies for trade cost intensity (t_i). One is the share of intermediate inputs in the value of final output (input int); the greater is this in the production of the goods of a particular industry, the more transactions intensive and potentially imported input intensive is production assumed to be. The presumption is that there may be a greater incentive to specialise in the production of goods that are more dependent on intermediate inputs in low trade cost countries. The alternative indicator of trade cost sensitivity focuses on the direct sensitivity of trade volumes to the effects of trade barriers or costs. We take the elasticity of substitution (es) estimates reported by Hummels (1999) for each 2 digit import category, from an import demand function estimated (using OLS) for pooled data for US, New Zealand, Argentina, Brazil, Chile and Paraguay. Finally, we use (like Levchenko, 2007) an Herfindahl index of intermediate input use. This allows us to explore whether concentration of intermediate input use on a limited number of inputs is more important in affecting the location of international production than overall input dependency. (The data and data sources for both the measures of country trade costs and trade cost sensitivity or intensity at the industry level are described in section 4 below.)

Differences in Country Trade Costs

Average national trade costs based on each of the measures for the sample period (averages across each of the years 1972, 1977, 1982, 1987 and 1992) are set out in Appendix 2. There are elements of consistency across the alternative measures, but also differences associated with different components of trade costs. There is a general tendency across the alternative measures for the industrial countries to have relatively low trade costs compared to developing countries, as one might expect. Indeed, from table 1, which records the ten lowest and highest trade cost countries, it is evident that some industrial countries (e.g. Belgium-Lux, France, UK, and Netherlands) are relatively low trade cost countries by all the measures. By contrast, there is more heterogeneity of the membership of the high trade cost category, with large developing countries tending to be captured by the ICY indicator and smaller (often more remote or landlocked) countries (e.g. Mauritius, Malawi, Madagascar and Zambia) being represented as high trade cost countries by the market access (MA) and supply access (SA) indicators. We see from table 2 that the rankings of average trade costs by region are relatively stable over time for the ICY indicator, with Europe, Oceania and North America consistently ranked the first, second and third lowest cost regions. Indeed, Europe is the lowest cost region at the start and end of the period for all three trade measures. There are, however, some changes of rank for specific regions according to the measure used. For example, Africa became relatively more costly over the sample period according to the ICY and MA indicators, while Asia became relatively less costly according to all three indicators (and markedly so according to the SA indicator). These changes are in line with other information on the relative marginalisation of Africa and greater integration of Asia over this time period.

Table 1: Trade Costs and Country Ranking

Country	ICY	Country	MA	Country	SA
Lowest					
Belgium-Lux	5.29	France	41.78	Germany	9.51
Netherlands	10.12	United Kingdom	41.6	Barbados	8.08
Fm German FR	12.85	Fm German FR	41.52	Venezuela	6.79
France	13.18	Netherlands	40.36	Morocco	6.36
Japan	14.97	Belgium-Lux	39.82	Belgium-Lux	6.27
Germany	17.94	Germany	39.3	United Kingdom	6.25
Italy	17.99	United States	38.83	Netherlands	6.21
United States	18.1	Italy	38.27	France	5.88
Spain	19.11	Spain	37.34	Tunisia	5.67
United Kingdom	19.28	Austria	37.02	Portugal	5.67
Highest					
Egypt	53.55	Papua New Guinea	24.26	Argentina	2.34
Turkey	53.73	Madagascar	23.83	Uruguay	2.26
Mexico	54.23	Costa Rica	23.27	Brazil	2.24
Brazil	55.11	Bolivia	23.23	Mauritius	2.03
Colombia	55.15	Zambia	23.22	Malawi	1.96
Ethiopia	55.4	Mauritius	22.89	Zambia	1.36
Argentina	56.07	Barbados	21.74	Madagascar	0.9
Pakistan	56.2	Malawi	20.69	Zimbabwe	0.69
South Africa	60.48	Suriname	19.76	Ethiopia	0.61
India	63.07	Fiji	18.91	Tanzania	0.21

Notes: The ICY, MA and SA variables are reported at their log means for the five years of the sample. Higher values of MA and SA indicate lower trade costs while higher values of ICY are indicative of higher trade costs. In the econometric analysis inverse measures of MA and SA are used to give consistent direct measures of trade costs for all three measures.

Table 2: Average regional Trade Costs through Time

Continent	ICY 1972	ICY 1992	MA 1972	MA 1992	SA 1972	SA 1992
Africa	48.77	44.75	40.61	18.74	-4.67	5.98
Asia	52.23	39.69	40.30	25.53	-4.85	7.03
Europe	23.30	25.74	44.26	30.86	-.39	8.71
North America	39.97	36.00	39.51	22.06	-1.06	5.34
South America	45.24	43.58	37.68	23.27	-3.19	4.77
Oceania	35.39	29.23	38.54	20.95	-1.82	5.02

Notes: Higher values of MA and SA indicate lower trade costs while higher values of ICY are indicative of higher trade costs. In the econometric analysis inverse measures of MA and SA are used to give consistent direct measures of trade costs for all three measures.

One would not be surprised to conceive of the low trade cost countries identified above as being relatively high trade countries in volume terms (having controlled for other factors). The gravity modelling methodology has been used extensively to show how different types of trade costs, or how the reduction of specific sources of trade cost, affect the volume of (specific or general) bilateral trade. Indeed we can show this with our current measures. Figure 1 shows the negative relationship between country export values and country trade costs (using the market access measure) on average for the present sample period; lower (higher)trade cost countries exporting more (less). What may be less intuitive is the idea of a trade composition effect of differences in country trade costs. The present data also suggests that countries with high (low) trade costs export goods that, on average, have a low (high) trade cost sensitivity (see figure 2). The present work seeks to explore this relationship in more detail, and to assess the thesis that differences in overall country trade costs is an additional national characteristic or endowment affecting comparative advantage and the commodity composition of trade.

Figure 1: Average Country Trade Costs and Export Volume (1972-92)

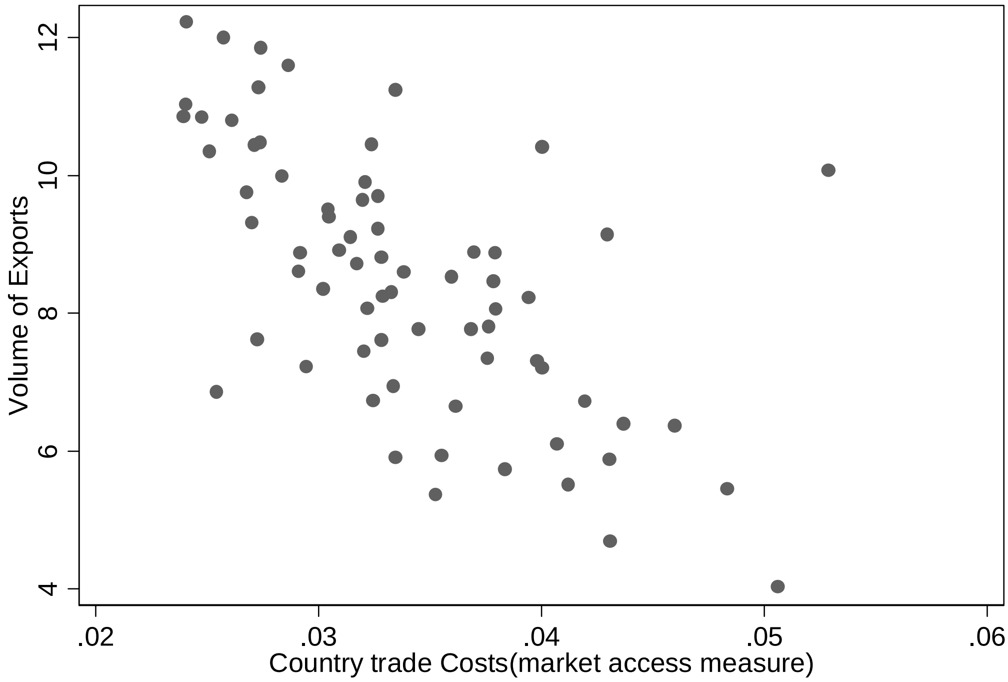
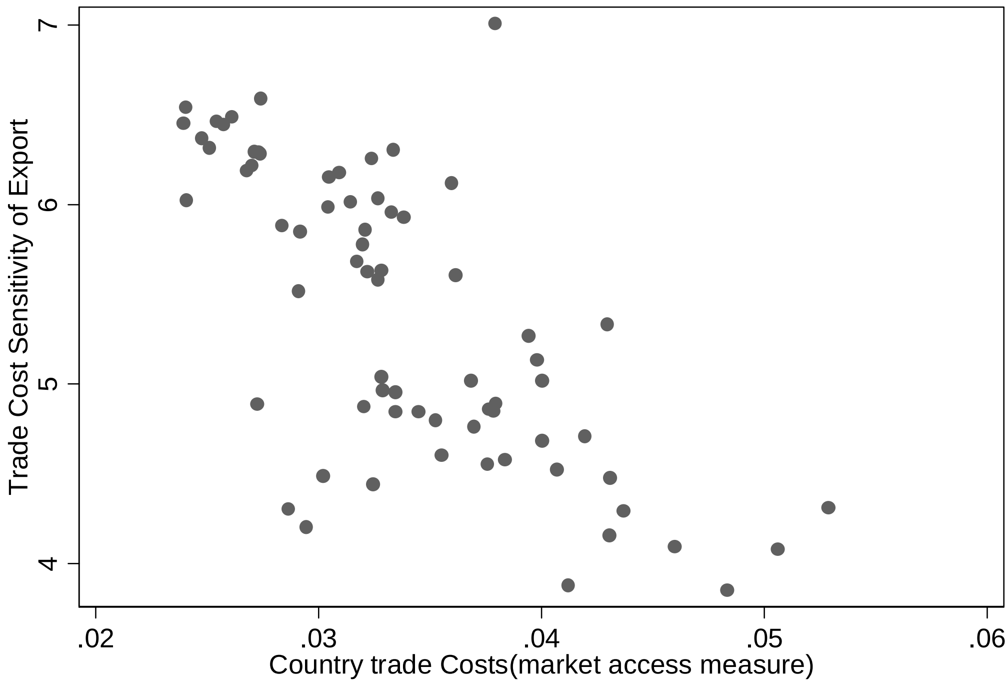


Figure 2: Average Country Trade Costs and Export Composition (1972-92)



3. <u>Trade Costs in Theory</u>

Specific countries can have attributes (e.g. remoteness or not, landlockedness or not, levels of port (in) efficiency or customs clearance procedures) that make them relatively more or less expensive in exporting or importing than other countries. Thus for trade with the same trading partner (and at the same distance and in the same product) there can be trade cost differences across countries. Simultaneously, for each country there are likely to be differences in trade costs, depending on whom it is trading with. An obvious driver of these differences is distance between trading partners. However, there will also be country-specific characteristics of each trading partner (e.g. landlockedness, port efficiency etc) that induce differences in trade costs. These differences in trading partner attributes will affect products differentially, depending on the weight, perishability etc. of products.

Trade cost differences by country

Trade theory does not typically model all the above aspects of trade costs. Markusen and Venables (2007) for instance incorporate trade costs into an endowments model of trade, but allow trade costs only to vary across countries (trade costs being the same for goods to/from a particular country and a particular country having the same trade costs with all its trading partners).[3] This specification allows for a clearly defined 'world price' for each good (X_i). They develop a model of three goods (produced under constant returns and competitive conditions), using two factors (capital, K, and labour, L). With zero (country) trade costs the pattern of production across countries would be indeterminate, though with full employment we can make predictions about the overall or average factor content of trade. The addition of trade costs (here country-specific trade costs, t) makes the commodity structure of production determinate. Each good X_i is produced in a country only if its unit cost is no greater than the import price; with the equilibrium location of production satisfying the following conditions:

$$p_i t \geq b_i(w,r) \geq p_i / t \qquad [i = 1,2,3] \qquad (3)$$

where $b_i(\cdot\cdot)$ is the unit cost function

and w and r are the factor prices of L and K respectively.

If the unit cost for a particular good is (strictly) within the inequality in (3) the country is self-sufficient and the good is non-traded, while it may export the good if the unit cost is at the lower end (p_i/t) and import it at the upper end ($p_i t$).

Markusen and Venables (2007) report numerical simulations for countries assumed to be uniformly distributed over trade costs space [from $t=1$ (zero trade costs) → $t=1.37$ (high

[3] Iceberg trade costs $t>1$, where the domestic price (p) of imports of good X_i is t_{pi} and producers receive $p_{i/t}$ if the good is exported.

trade costs)][4] and scaled endowments space (from L=0.1 → L=0.9, where K=1-L), where X_1 is the least labour-intensive in production and X_3 the most. A key message from their modelling for the present purpose is that lower trade cost countries are characterised by partial or complete specialisation in production, while higher trade cost countries tend to become less specialised in production. Low trade cost countries trade all goods, while the incidence of autarky or non-tradability increases with trade costs. Indeed reduced tradability starts to be a feature of increasing trade costs for countries close to the world average endowments. Further, at higher trade costs more extreme endowments are required to maintain a country as an exporter of the good intensively using the country's abundant factor.

In the above formulation national trade costs are a modifier of comparative advantage and the pattern of trade, through their influence on the tradability of goods. In order to capture national trade costs role as a source of comparative advantage we need to represent national trade costs as analogous to a traditional endowment. In a strand of the literature this has been done in effect by representing national trade costs as the country-specific, fixed cost or additional investment associated with the trade impediments that agents in that country need to overcome in order to transact internationally. This an extension of Levchenko's representation (Levchenko, 2007) of national institutional differences which induce differences in international transaction impediments across countries. In a world of trade cost barriers or frictions a fraction (f) of the investment of factor resources (capital and/or labour) required to produce certain units of a tradable good become specific to the particular activity. In a frictionless world (f=0) agents do not need to invest specific resources (ex ante) to acquire information about how the infrastructure and institutional characteristics of the economy affect their ability to recoup their investment. Where f>0 it is harder to induce resources to enter sectors in general (harder relative to countries where trade costs are lower), and the more so in sectors that are more transactions-intensive; the ex post returns to factors being driven down relative to the frictionless case.

Analogous to Levchenko (2007), we can view trade in a two country or bloc ('North'–N and 'South'-S) case as involving differences in national trade costs such that $f^N > f^S$; a lower fraction of factors being specific to transactions-sensitive activities in the North than the South.[5] In this set-up national trade cost differences act much like a normal endowment difference source of comparative advantage in an H-O framework; the North is able to produce transaction-intensive goods, ceteris paribus, at relatively lower cost than the South.

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[4] Strictly marginally greater than $t=1$ to allow production determinacy.

[5] We rule out here other possible sources of difference across countries, such as technological differences.

Trade costs by trading partner

Implicit in the discussion so far has been the idea that each country has the same trade costs when trading with all other countries. The basis for identifying comparative advantage is global, in just the same way it is when there are no trade costs. In the traditional Ricardian model context, a country (c) has a global comparative advantage in producing a good (g_1), relative to another good (g_2), compared to some other country (o) if:

$$\frac{a_{cg1}}{a_{cg2}} < \frac{a_{og1}}{a_{og2}} \qquad (4)$$

If, as Deardorff (2004) does, trade costs are represented as the unit labour requirement ($t_{cgc'}$) of country c serving a particular market (c'), then we can amend (4) for trade costs as follows:

Country (c) has a comparative advantage in producing g_1 and delivering it to country c', relative to another good and compared to another country o if:

$$\frac{a_{cg1} + t_{cg1c'}}{a_{cg2} + t_{cg2c'}} < \frac{a_{og1} + t_{ogc'}}{a_{og2} + t_{og2c'}} \qquad (5)$$

It follows from (5) that comparative advantage depends now on both production and trade costs. Comparative advantage is possible when there is comparative disadvantage in production costs, if there is a sufficient relative advantage in trade costs.[6] Indeed, if relative trade costs are sufficiently high, comparative advantage may not exist in some (or all) markets in spite of relatively low production costs. The implication of this latter proposition is that comparative advantage may only be defined locally if relative trade costs are sufficiently high; comparative advantage being specific to the countries from which markets can be served.[7]

[6] In a multilaterally setting one would want to compare a country's cost of serving an export market (from production and delivery) compared to an index of all countries costs of serving that market.

[7] The term 'local' implies relative distance is the only determinant of relative trade cost differences, but this may not be the case. Deardorff (2004) suggests use of the term 'locational comparative advantage' rather than 'local comparative advantage' to recognise other influences on relative trade costs.

4. Empirical Approach

In order to test the hypothesis that trade costs are a source of comparative advantage, namely that low trade cost countries have a (global or local) comparative advantage in producing goods for which trade costs are important in either their production or distribution, we estimate an enhanced endowments model of export shares as follows:

$$X_{ic} = \alpha_i + \alpha_c + \alpha_t + \beta_1 t_i T_c + \beta_2 h_i H_c + \beta_3 k_i K_c + \varepsilon_{ic} \qquad (6)$$

where X_{ic} is the share of exports of industry *i* by country *c* (globally or locally)

T_c is a measure of trade costs of country *c*

H_c and K_c are country *c*'s endowments of human and physical capital respectively

t_i, h_i and k_i are measures of the importance or intensity of trade costs, human and physical capital of production in industry *i*

and α_i, α_c and α_t denote industry, country and time fixed effects.

If comparative advantage is determined globally equation 6 can be estimated for a full sample of countries, i.e. irrespective of the geographic or economic distance of a country from other countries. We explore whether low trade cost countries export a greater share of those goods that are sensitive or intensive in trade costs through the sign on β_1; a negative sign being consistent with trade costs being a source of comparative advantage. To explore the possibility of comparative advantage being determined locally, equation 6 can be estimated only for sub-sets of countries clustered according geographic (regions or continents) or economic (developed, developing and least developed) proximity.

Data and estimation

A host of sources were used to construct the dataset. The data used in the trade cost regressions, and in the gravity model from which the market access and supplier access variables are constructed, were obtained from the NBER's World Import and Export dataset. The dataset is available from http://www.nber.org/data. A description of the dataset may be found in Feenstra et al. (2005). Data on exports between 201 countries at the SITC (rev. 2) 4-digit industry level are provided for the years 1972, 1977, 1982, 1987 and 1992.

Country capital and skill endowment data are from Antweiler and Trefler (2002). Capital endowments are measured by the ratio of capital/labour and skill endowments by the ratio of the number of workers completing high school to the number not completers. The capital and skill intensity variables come from the NBER-CES Manufacturing Industry Database which covers the years 1958-1996 and is described in Bartelsman and Gray (1996). Information is provided for 1972, 1977, 1982, 1987 and 1992 according to the 1997 NAICS industry classification. Capital intensity is measured as capital per worker in each industry, while skill intensity is measured as the percentage of non-production workers for each US industry. It is recognised that the assumption of common and constant factor intensities is a strong assumption, and although in line with standard H-O theory can be relaxed in subsequent work.

We use the Bureau of Economic Analysis's (BEA) 2002 Input-Output table to calculate intermediate input intensity as the percentage of inputs in an industry's output. As with the capital and skill intensity variables this too is assumed to be constant across countries but does not vary over time. Import demand elasticities of substitution are taken from Hummels (1999). This information is provided at the SITC 2-digit industry level.

Intermediate input intensity is calculated following the BEA's system of industrial classification. Using a concordance provided by the BEA the industries are matched to the 1997 NAICS industry classification. This can then be matched with the capital and skill intensity variables which are provided at the 1997 NAICS level. A concordance between the SITC (rev. 2) 4-digit industry classification system and the 1997 NAICS system is provided by the NBER which may be found at http://www.nber.org/lipsey/sitc22naics97/. This enables us to match the export data to the industry-level information on intermediate input intensity, capital intensity and skill intensity. The Herfindahl index of intermediate input use is taken from Nunn (2007).

In the regressions an industry is defined according to the SITC (rev. 2) system of classification. We do not aggregate exports up to the 1997 NAICS classification system. This provides a greater number of industries. We end up with up to 158 manufacturing industries and 71 countries (for which all the right side variables are available) – see Appendix 3 for details of countries covered. (Not all industries are observed in each country and year.)

Equation 6 was estimated in double log form for all instances of positive exports at the industry level. All of the models were estimated using Stata 10.0.

5. Results

The results of the estimated enhanced endowments model of exports (eq. 1) are reported in table 3 for the whole sample of countries; alternative combinations of proxies of country trade costs and trade cost intensity by industry being reported in specifications (columns) 1-4. There is a consistent pattern of signs and significance across all specifications; with positive and generally significant traditional endowment influences (β_2>0; β_3>0) and a negative trade cost 'endowment' influence (β_1<0) with significance at the 1% level throughout. The trade cost 'endowment' influence is in general separable from other country fixed effects, with the β_1 coefficient remaining relatively stable to whether or not country fixed effects are included. Table 3 reports for convenience the preferred specification with fixed effects included, but the pattern of signs and significance is not sensitive to the inclusion of fixed effects. (Note also that the magnitudes of the coefficient on the term t_iT_c are not comparable for alternative combinations of proxies because of scaling differences.)

Table 3: Global Comparative Advantage

Variable	Regression (1)	(2)	(3)	(4)
t_iT_c	-.05***	-.02***	-.28***	-.02***
	(-3.97)	(-4.76)	(-14.69)	(-3.95)
h_iH_c	.13***	.13***	.14***	.13***
	(8.99)	(8.96)	(9.19)	(8.96)
k_iK_c	.10***	.10***	.04	.10***
	(3.83)	(3.82)	(1.44)	(3.82)
Country Fixed Effects	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
t_i	es	input int	input int	herfindahl
T_c	MA	SA	ICY	SA
Number of Observations	21201	21201	18533	21201
R^2	.46	.46	.46	.46

Notes: The dependent variable is the log of the share of industry *i* of country *j* at time *t* in world exports. Standardised coefficients are reported with robust t-statistics in parentheses. 53 countries are present in the regression when ICY is used as the proxy for trade costs. When market access and supplier access are used there are 70 countries present. ***, ** and * indicate significance at 1 percent, 5 percent and 10 percent, respectively.

The results in table 3 provide support therefore for a trade cost-enhanced, endowments explanation of global comparative advantage. To explore whether comparative advantage is better defined 'locally', we re-estimate specification 1 from table 3 for the sub-samples of countries in each of eight continents – Africa, Asia excluding East Asia, East Asia, Europe, the Middle East, North America, Oceania and South America. Note now that the dependent variable is exports to the specific region and not globally. These estimated models are reported in table 4.

Table 4: Local/Regional Comparative Advantage

	Regression							
Variable	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
t_iT_c	-.01	-.15	.01	-.02***	.32**	-.06***	-.09*	.01***
	(-.47)	(-.78)	(1.10)	(-2.75)	(2.17)	(-5.16)	(-1.85)	(2.75)
h_iH_c	.02	-.17**	-.08**	.11***	.37***	.10***	.32***	.13**
	(.24)	(-2.12)	(-2.11)	(4.27)	(4.50)	(2.87)	(4.41)	(2.03)
k_iK_c	-.15	.63***	.21***	.10**	-.09	.09	.34**	.03
	(-1.56)	(4.79)	(3.30)	(2.27)	(-.44)	(1.34)	(2.43)	(.26)
Country Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
t_i	input int	input int	input int	input int	input int	input int	input int	input int
T_c	SA	SA	SA	SA	SA	SA	SA	SA
Region	Africa	Asia	East Asia	Europe	Mid East	Nth. Am	Oceania	Sth. Am
Number of Observations	1952	1041	3714	8128	517	2751	1095	2003
R^2	.43	.54	.51	.53	.75	.65	.62	.46

Notes: The dependent variable is the log of the share of industry *i* of country *j* at time *t* in regional exports. Standardised coefficients with robust t-statistics reported in parentheses. ***, ** and * indicate significance at 1 percent, 5 percent and 10 percent, respectively.

For some regions (e.g. Europe, Oceania and North America) there is little difference between the 'global' and 'local' results; the pattern of signs, coefficient magnitudes and significance is similar in columns (4) (6) and (7) of table 4 to that in column (2) of table 3 (i.e. for the same proxies for t_i and T_c), though the coefficient on the physical capital term is not significant in all cases. For the Middle East and South America, however, we find an unexpected, even perverse, positive trade cost effect. This may in part be due to the small sample sizes involved, but it may also reflect the effect of the industrial countries' preferential trade policies in deterring intra-regional trade among developing countries. Overall, however, the local comparative advantage model does not perform well. Indeed for Africa we find no significant sign on any endowment term. The limited importance of manufactured exports and high intra-regional relative to extra-regional trade costs may be important in this case. It is difficult to conclude, however, on the basis of these results that the 'global' explanation of comparative advantage is dominated by the 'local' comparative advantage model.

Robustness testing

To check that we are picking up a genuine national trade cost effect on the composition of global trade we conduct a number of robustness checks. In table 5 we explore a specification which interacts national trade costs with the traditional endowment influences. This allows us to explore a weaker hypothesis that trade costs modify, rather than determine, comparative advantage.

Table 5: Alternative Model Specifications

Variable	Regression (1)	(2)	(3)
T_c	-.02	-.04***	-.22***
	(-1.35)	(-4.26)	(-10.54)
h_iH_c	.07***	.13***	-.34***
	(3.34)	(8.92)	(-6.18)
k_iK_c	.17***	.10***	.33***
	(5.44)	(3.83)	(5.33)
$T_c{*}h_iH_c$	.08***	-.01	.51***
	(3.72)	(-1.57)	(8.94)
$T_c{*}k_iK_c$	-.07***	-.01	-.21***
	(-3.92)	(-1.21)	(-5.31)
Country Fixed Effects	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes
T_c	MA	SA	ICY
Number of Observations	21201	21201	18533
R^2	.46	.29	.46

Notes: The dependent variable is the log of the share of industry *i* of country *j* at time *t* in world exports. Standardised coefficients are reported with robust t-statistics in parentheses. 53 countries are present in the regression when ICY is used as the proxy for trade costs. When market access and supplier access are used there are 70 countries present. ***, ** and * indicate significance at 1 percent, 5 percent and 10 percent, respectively.

We find a negative direct effect on export volumes at the industry level for all three proxies of national trade costs, albeit an insignificant effect where the market access (MA) measure is used. More importantly there is less robust support for the comparative advantage-modifying hypothesis than we found for the comparative advantage-determining hypothesis. The estimation using the ICY proxy for country trade costs is problematic, with the sign on the direct human capital endowments effect being negative. Even if concentrating the assessment of the alternative model on specifications (1) and (2) in table 5, we find mixed and inconsistent interaction effects between endowments and trade costs. In (1), with the market access proxy for trade costs, we find increases in k_iK_c (physical capital) have a decreasing influence on export performance as country trade costs increase, while for human capital we find increases in h_iH_c have a increasing influence on export performance as country trade costs increase. In (2) there are no significant interaction effects. It is difficult therefore to view these mixed results as giving support for an alternative model of trade costs as only modifying comparative advantage.

In table 2 we showed that the lower trade cost countries tend to be developed countries. It might be that factors relating to the level of development, other than trade costs, affect the pattern of international specialisation. To explore this possibility we also ran regressions (available from the authors on request) in which we added variables to our base specification (eq. 5) which control for these development effects. Interaction terms between log GDP and a range of measures of industrial complexity (value-added, degree of fragmentation of production, technological upgrading, contract intensity) were added jointly and separately. In all these estimations the coefficient on the term t_iT_c remained negative and significant, even if these additional influences (captured in the earlier regressions through the fixed effects terms) were also significant.

We also explore the possible endogeneity issue. We have assumed so far that trade costs are exogenous and that causality runs only from national trade costs to trade specialisation. But reverse causality is also possible, with countries that specialise in trade cost-intensive or sensitive products having a greater incentive than other countries to develop and maintain a low trade cost environment. A similar logic must apply also to the other endowment terms in our model, with greater or lesser incentives to accumulate physical and human capital depending on initial endowments. The present focus is, however, on national trade costs. Finding suitable instruments – correlated with the endogenous variable and uncorrelated with the error term – is problematic, as found also by others on this topic (Nunn, 2007; Levchenko, 2007). We explored first using the Gneralised Method of Moments (GMM) estimator of Arrelano and Bond (1991), where lagged levels of the variables are instruments for the endogenous (differenced) variables. These results are reported in Appendix 5. The coefficients on the term t_iT_c reassuringly remain negative (for all the proxies), though those on the human capital term are now consistently also negative. However the robustness of this finding is questioned by the rejection (by the Sargen identification test) of the validity of the instruments in this GMM estimator. We prefer instead to report estimates in table 6 which use freedom to trade and legal quality indices from the Heritage Foundation economic freedom index (Heritage Foundation, 2002) as instruments.

In table 6 we report the results of the first stage regression of the instruments on trade costs and the second stage results for the instrumented regression. Regressions 1 and 2 show that in the first stage regressions the instruments are correctly signed (when separately included) and significant: countries with superior legal institutions and more freedom to trade having lower trade costs. When both of the co-linear instruments are simultaneously included the instruments are not correctly signed in the first stage regression, but in the second stage regression the estimated coefficient on the instrumented trade cost interaction term is -0.68 (which is significant at the 1% level) and the null of over-identification of the instruments is not rejected. We retain support, therefore, for our hypothesis of country trade costs having an influence, along with physical and human capital, in being a source of comparative advantage and driving the composition of countries' exports at the industry level.

Table 6: Estimates using Instrumental Variables

Variable	Regression (1)	(2)	(3)
Second stage IV estimates			
tiTc	-.69*	.60***	-.68***
	(-1.84)	-3.95	(-5.50)
hiHc	.15***	.13***	.11***
	-7.93	-7.95	-4.64
kiKc	.10***	.12***	.08**
	-3.61	-4.3	-2.56
Country Fixed Effects	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes
ti	es	es	es
Tc	MA	MA	MA
Number of Observations	20505	19011	10824
R2	0.4	0.41	0.36
First stage IV estimates			
ti * Freedom to Tradec	-.06***		.21***
	(-5.74)		-9.51
ti * Legal Qualityc		-.11***	.14***
		(-14.62)	-12.2
F-test	349.31	548.86	10824
Overidentification test (p-value)	-	-	0.26

Notes: The dependent variable in the second stage regressions is the log of the share of industry *i* of country *j* at time *t* in world exports. In the first stage regressions the dependent variable is the interaction between trade cost intensity and the freedom to trade or legal quality variables. Standardised coefficients are reported with robust t-statistics in parentheses. ***, ** and * indicate significance at 1 percent, 5 percent and 10 percent, respectively.

6. Conclusions

A number of papers have explored the effect of inter-country differences in specific types of trade costs (e.g. contract enforcement as in the case of Nunn (2007) or institutional quality as in Levchenko (2007)) on the pattern or composition of international trade. Building on that work, this paper explores whether inter-country differences in overall trade costs can be viewed as another type of national endowment and source of comparative advantage. We view these differences in country trade costs as reflecting sustained (at least over the medium time period) and systematic features of geography and stage of development. These cross country differences are capturing differences in the overall quality of countries' infrastructure and institutions, and in the competitiveness or effectiveness of their business and policy environments.

In fact, we find support for country trade costs being an 'endowment' which affects the pattern of comparative advantage and export composition. This is revealed in export performance at the industry level for a sample of up to 71 countries and 158 industries for 5 year periods over the period 1972 to 1992. Countries with lower trade costs are found to export more of those products for which trade costs are more important, having controlled for traditional (physical and human capital) endowment influences on export performance in manufacturing products and for other industry, country and time specific effects. These findings are robust to a range of alternative proxies of country trade costs and trade cost intensity or sensitivity measures at the industry level. Further, we find stronger support for trade costs being a source of global rather than 'local' comparative advantage. They are also robust to the specification chosen and to allowance for the possible endogeneity of country trade costs.

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Appendix 1: Constructing the Market Access and Supplier Access Variables

Redding and Venables (2004) outline a theoretical model which they use to construct measures of market access (MA) and supplier access (SA) that capture geographic sources of trade costs. Estimation of the MA and SA variables necessitates the use of a gravity model. The model used is:

$$\ln x_{ij} = \alpha_i + \gamma_i + \delta_1 \ln dist_{ij} + \delta_2 bord_{ij} + \beta_1 \ln gdp_i + \beta_2 \ln gdp_j + \varepsilon_{ij}$$

where $\ln x_{ij}$ is the natural logarithm of country-level bilateral exports[8], $\ln dist_{ij}$ represents the great circle distance between countries *i* and *j*, $bord_{ij}$ is a dummy variable equal to 1 where trading partners share a common border and zero otherwise and $\ln gdp_i$ and $\ln gdp_j$ are the natural logarithm of country *i* and *j*'s respective real GDPs. Specifying the model in this way allows us to calculate MA and SA while abstracting from the effects of distance, proximity and GDP. Results from the gravity model are reported in Table 1.

Table A1: Gravity Model Results

Variable	1972	1977	1982	1987	1992
$\ln dist_{ij}$	-3.66***	-3.51***	-2.54***	-2.10***	-2.05***
	(-28.21)	(-27.65)	(-20.11)	(-16.63)	(-16.33)
$border_{ij}$	1.21*	-2.71***	-2.33***	-1.82***	-1.51***
	(1.80)	(-4.11)	(-3.93)	(-2.95)	(-2.61)
$\ln gdp_i$	-.96***	3.14***	2.90***	-1.33***	3.21***
	(-5.35)	(22.68)	(23.22)	(-10.57)	(27.05)
$\ln gdp_j$	2.44***	-1.26***	-1.02***	3.23***	-1.36***
	(12.31)	(-9.38)	(-8.46)	(23.36)	(-11.96)
Number of Observations	16274	16274	16274	16274	16274
R^2	.52	.57	.62	.60	.60

Notes: Robust t-statistics reported in parentheses. ***, ** and * indicate significance at 1 percent, 5 percent and 10 percent, respectively.

[8] Since export data tends to be left-censored we impute values close to zero for all missing values.

Appendix 2: Average Trade Costs By Country (1972-1992)

Table A2: Average Trade Costs by Country (1972-1992)

Country	ICY	MA	SA
Argentina	56.07	30.47	2.34
Australia	32.72	32.33	2.69
Austria	26.33	37.02	4.77
Bangladesh		27.03	5.07
Barbados		21.74	8.08
Belgium-Lux	5.29	39.82	6.27
Bolivia	39.71	23.23	2.74
Brazil	55.11	32.87	2.24
Cameroon	37.36	24.97	3.25
Canada	25.19	36.63	4.59
Chile	36.97	26.35	2.34
Hong Kong		33.1	3.71
Colombia	55.15	29.98	4.86
Costa Rica	32.54	23.27	4.73
Denmark	19.71	36.72	5.28
Ecuador	41.95	27.8	3.83
Egypt	53.55	30.81	3.15
El Salvador	47.94	25.13	5.21
Ethiopia	55.4	28.36	0.61
Fiji		18.91	3.75
Finland	26.09	34.92	4.5
Fm German FR	12.85	41.52	4.13
France	13.18	41.78	5.88
Germany	17.94	39.3	9.51
Ghana	43.1	26.37	2.36
Greece	31.87	33.96	4.19
Guatemala	47.23	27.66	3.92
Honduras	40.95	24.98	4.49
Iceland	29.84	28.15	4.59
India	63.07	32.84	3.1
Indonesia	46.01	31.27	4
Ireland	30.61		
Israel	36.06	31.07	3.99
Italy	17.99	38.27	4.8
Jamaica		26.6	5.21
Japan	14.97	36.48	3.05
Korea	38.94	36.86	4.81
Madagascar	50.93	23.83	0.9
Malawi		20.69	1.96
Malaysia		30.61	3.8
Malta		29.89	3.8
Mauritius		22.89	2.03
Mexico	54.23	31.14	3.41
Morocco	40.46	30.48	6.36

Table A2.1: Average Trade Costs by Country (1972-1992)

Country	ICY	MA	SA
Netherlands	10.12	40.36	6.21
New Zealand	27.17	29.56	2.37
Nigeria	43.16	29	4.53
Norway	27.08	35.24	5.5
Pakistan	56.2	30.6	2.55
Panama		25.36	4.84
Papua New Guinea		24.26	2.99
Peru	45.25	27.15	3.33
Philippines	48.64	31.53	5.04
Portugal	21.84	34.28	5.67
Singapore		30.89	3.86
South Africa	60.48	30.05	2.44
Spain	19.11	37.34	5.46
Sri Lanka	44.24	26.43	2.91
Suriname		19.76	5.36
Sweden	24.14	36.51	4.81
Syria		30.41	3.93
Tanzania		24.58	0.21
Thailand	38.93	31.81	3.64
Tunisia	50.55	31.2	5.67
Turkey	53.73	34.36	3.69
United Kingdom	19.28	41.6	6.25
United States	18.1	38.83	3.92
Uruguay	37.35	26.57	2.26
Venezuela	39.51	29.9	6.79
Zambia		23.22	1.36
Zimbabwe		26.07	0.69

Appendix 3: Country Coverage

Table A3: Country Coverage

Country	ICY	MA	SA
Argentina	yes	yes	yes
Australia	yes	yes	yes
Austria	yes	yes	yes
Bangladesh	no	yes	yes
Barbados	no	yes	yes
Belgium-Lux	yes	yes	yes
Bolivia	yes	yes	yes
Brazil	yes	yes	yes
Cameroon	yes	yes	yes
Canada	yes	yes	yes
Chile	yes	yes	yes
Hong Kong	no	yes	yes
Colombia	yes	yes	yes
Costa Rica	yes	yes	yes
Denmark	yes	yes	yes
Ecuador	yes	yes	yes
Egypt	yes	yes	yes
El Salvador	yes	yes	yes
Ethiopia	yes	yes	yes
Fiji	no	yes	yes
Finland	yes	yes	yes
Fm German FR	yes	yes	yes
France	yes	yes	yes
Germany	yes	yes	yes
Ghana	yes	yes	yes
Greece	yes	yes	yes
Guatemala	yes	yes	yes
Honduras	yes	yes	yes
Iceland	yes	yes	yes
India	yes	yes	yes
Indonesia	yes	yes	yes
Ireland	yes	no	no
Israel	yes	yes	yes
Italy	yes	yes	yes
Jamaica	no	yes	yes
Japan	yes	yes	yes
Korea	yes	yes	yes
Madagascar	yes	yes	yes
Malawi	no	yes	yes
Malaysia	no	yes	yes
Malta	no	yes	yes
Mauritius	no	yes	yes
Mexico	yes	yes	yes
Morocco	yes	yes	yes

Table A3.1: Country Coverage

Country	ICY	MA	SA
Netherlands	yes	yes	yes
New Zealand	yes	yes	yes
Nigeria	yes	yes	yes
Norway	yes	yes	yes
Pakistan	yes	yes	yes
Panama	no	yes	yes
Papua New Guinea	no	yes	yes
Peru	yes	yes	yes
Philippines	yes	yes	yes
Portugal	yes	yes	yes
Singapore	no	yes	yes
South Africa	yes	yes	yes
Spain	yes	yes	yes
Sri Lanka	yes	yes	yes
Suriname	no	yes	yes
Sweden	yes	yes	yes
Syria	no	yes	yes
Tanzania	no	yes	yes
Thailand	yes	yes	yes
Tunisia	yes	yes	yes
Turkey	yes	yes	yes
United Kingdom	yes	yes	yes
United States	yes	yes	yes
Uruguay	yes	yes	yes
Venezuela	yes	yes	yes
Zambia	no	yes	yes
Zimbabwe	no	yes	yes

Appendix 4: Summary Statistics

Table A4.1: Summary Statistics

	Obs	Mean	Std. Dev.	Min	Max
Capital intensity (k)	26157	.13	.20	.01	1.34
Skill intensity (h)	26157	.23	.09	.07	.54
Input intensity (input int)	26157	.69	.09	.53	.90
Elaticity of substitution (es)	26157	5.89	2.25	-1.64	9.44
Capital endowment (K)	26157	.02	.01	.00	.05
Skill endowment (H)	26157	.34	.44	.01	2.91
ICY	22743	32.52	16.41	1.50	80.28
Market access (MA)	23880	33.71	9.51	7.30	53.16
Supplier access (SA)	23880	4.29	4.87	-8.50	15.85

Notes: Higher values of MA and SA indicate lower trade costs while higher values of ICY are indicative of higher trade costs. In the econometric analysis inverse measures of MA and SA are used to give consistent direct measures of trade costs for all three measures.

Table A4.2: Correlation Matrix

	k	h	input int	es	K	H	ICY	MA	SA
k	1.00								
h	.31	1.00							
input int	.41	.10	1.00						
es	-.08	-.03	.22	1.00					
K	.04	-.10	-.02	.10	1.00				
H	.02	.06	-.01	.06	.47	1.00			
ICY	-.01	-.04	.01	-.06	-.68	-.32	1.00		
MA	-.00	.01	-.01	.06	.32	.12	-.31	1.00	
SA	.02	.04	-.01	.02	.18	.04	-.23	-.61	1.00

Notes: Higher values of MA and SA indicate lower trade costs while higher values of ICY are indicative of higher trade costs. In the econometric analysis inverse measures of MA and SA are used to give consistent direct measures of trade costs for all three measures.

Appendix 5: GMM Estimates

Table A5: GMM Estimates

Dependent variable: log Exports	(1)	(2)	(3)
log $Exports_{t-1}$	.15***	.31***	.14***
	(5.70)	(10.27)	(5.39)
t_iT_c	-1.43***	-6.74***	-.01***
	(-11.94)	(-14.91)	(-5.39)
h_iH_c	-2.44***	-3.15***	-3.57***
	(-5.33)	(-7.37)	(-8.68)
k_iK_c	1.21***	1.37***	1.63***
	(7.43)	(8.61)	(10.71)
t_i	input int	es	input int
T_c	ICY	MA	SA
$chi^2(5)$	1223.50	1019.63	1310.88
Prob>chi^2	.00	.00	.00
Number of Observations	6752	7482	7482

Notes: Coefficients are GMM estimates computed using a one step Arellano and Bond estimator. Dependent variable is the log of the share of exports. T-statistics reported in parentheses. ***, ** and * indicate significance at 1 percent, 5 percent and 10 percent, respectively.