When Comparative Advantage Is Not Enough: Business Costs in Small Remote Economies

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The potential difficulties of small and remote economies have long interested economists. Classic references include Robinson (1960) and Srinivasan (1985), a bibliography prepared by the World Bank contains 230 references since 1960,[1] and recently Alesina and Spolaore (2004) have devoted a whole book to the subject. Most previous studies have examined the relationship between size and vulnerability (economic and environmental), and whether smallness is an obstacle to economic growth (see, for example, Kuznets (1960), Briguglio (1995) and Atkins *et al.* (2001)).

The focus of this paper is different. It examines directly the claims that the combination of diseconomies of small scale and high costs of transactions with the rest of the world prevents small remote countries from generating competitive exports or attracting significant amounts of foreign investment. We try to determine whether the private sectors in small countries are fundamentally disadvantaged in a globalised world relative to those in larger countries. Crudely, the hypothesis to be investigated is that very small and remote economies are inherently uncompetitive.

While small and remote economies can, theoretically, overcome the constraints of small internal markets by specialising and trading internationally, the evidence presented here suggests that this may not be enough. The paper does not dismiss comparative advantage as a route to maximising national income and welfare, but observes that there may be some very small economies that face such great absolute disadvantages that exporting at world prices is either impossible or generates factor incomes that are too low to subsist. In the limit free trade could mean no trade for these economies.

To make the issue concrete, table 1 lists the small economies of the world in order of increasing population. It is these territories and their people with whom we are concerned.[2] The cumulated population shows that while there are many small

[1] Downloadable at:
http://wbln0018.worldbank.org/html/smallstates.nsf/(attachmentweb)/WebsiteBibliography/$FILE/WebsiteBibliography.pdf

[2] The definition of small is something we discuss below, but a threshold of 1.5 million is about right and is becoming conventional. Stylistically we shall use the term ‘countries’ in this paper, but we imply no statement or judgement about their actual status.

countries, they account for only a very small proportion of the world's population. For future reference we show countries included in our analytical sample in italics and display in bold typeface three exemplar countries which we use as benchmarks below.

Table 1: Small Economies in the World

Country	Pop. ('000)	Cumul. Pop ('000)	Cumul. Pop (% World Total)		Country	Pop. ('000)	Cumul. Pop ('000)	Cumul. Pop (% World Total)
Niue	*2*	*2*	*0.0000*		Mayotte	171	2,635	0.0423
Saint Helena	7	9	0.0001		*Samoa*	*179*	*2,814*	*0.0452*
Saint Pierre & Miquelon	7	16	0.0003		French Guiana	182	2,996	0.0481
Montserrat	8	24	0.0004		***Vanuatu***	***196***	***3,192***	***0.0512***
Tuvalu	*11*	*35*	*0.0006*		New Caledonia	208	3,400	0.0546
Anguilla	***12***	***47***	***0.0008***		Netherlands Antilles	214	3,614	0.0580
Nauru	*12*	*59*	*0.0009*		Western Sahara	256	3,870	0.0621
Wallis and Futuna	16	75	0.0012		French Polynesia	258	4,128	0.0663
Turks and Caicos Islands	19	94	0.0015		*Belize*	*260*	*4,388*	*0.0705*
Palau	*19*	*113*	*0.0018*		*Barbados*	276	4,664	0.0749
Virgin Islands, British	21	134	0.0022		Iceland	279	4,943	0.0794
Cook Islands	*21*	*155*	*0.0025*		Bahamas, The	295	5,238	0.0841
Gibraltar	28	183	0.0029		Maldives	320	5,558	0.0892
San Marino	28	211	0.0034		Brunei	351	5,909	0.0949
Monaco	32	243	0.0039		Malta	397	6,306	0.1012
Liechtenstein	33	276	0.0044		Cape Verde	409	6,715	0.1078
Saint Kitts and Nevis	*39*	*315*	*0.0051*		Martinique	422	7,137	0.1146
Cayman Islands	41	356	0.0057		*Suriname*	*434*	*7,571*	*0.1216*
Faroe Islands	46	402	0.0065		Guadeloupe	436	8,007	0.1286
Marshall Islands	*55*	*457*	*0.0073*		Djibouti	447	8,454	0.1357
Greenland	56	513	0.0082		Luxembourg	449	8,903	0.1429
Bermuda	64	577	0.0093		Macau S.A.R.	462	9,365	0.1504
Guernsey	65	642	0.0103		*Solomon Islands*	*495*	*9,860*	*0.1583*
Antigua and Barbuda	*67*	*709*	*0.0114*		Equatorial Guinea	498	10,358	0.1663
Andorra	68	777	0.0125		Comoros	614	10,972	0.1762
American Samoa	69	846	0.0136		Bahrain	656	11,628	0.1867
Aruba	70	916	0.0147		*Guyana*	*700*	*12,328*	*0.1979*
Dominica	*70*	*986*	*0.0158*		Reunion	744	13,072	0.2099
Man, Isle of	74	1,060	0.0170		Cyprus	767	13,839	0.2222
Northern Mariana Islands	77	1,137	0.0183		Qatar	793	14,632	0.2349
Seychelles	*80*	*1,217*	*0.0195*		*Fiji*	*856*	*15,488*	*0.2487*
Grenada	*89*	*1,306*	*0.0210*		East Timor	953	16,441	0.2640
Jersey	*90*	*1,396*	*0.0224*		*Trinidad and Tobago*	*1,112*	*17,553*	*0.2818*
Kiribati	*96*	*1,492*	*0.0240*		*Swaziland*	*1,150*	*18,703*	*0.3003*
Tonga	*106*	*1,598*	*0.0257*		*Mauritius*	*1,200*	*19,903*	*0.3196*
St. Vincent & Grenadines	*116*	*1,714*	*0.0275*		Gaza Strip	1,226	21,129	0.3392
Virgin Islands	123	1,837	0.0295		*Gabon*	*1,288*	*22,417*	*0.3599*
Micronesia, F.S.	*136*	*1,973*	*0.0317*		Guinea-Bissau	1,333	23,750	0.3813
St. Lucia	160	2,133	0.0342		Estonia	1,416	25,166	0.4041
Guam	161	2,294	0.0368		Gambia, The	1,456	26,622	0.4274
Sao Tome and Principe	170	2,464	0.0396		***Botswana***	***1,579***	***28,201***	***0.4528***

Source: U.S. Census Bureau, International Programs Center, International Data Base (population estimates for 2002). Populations for Niue and Singapore are from *World Development Indicaors 2002*, one of the sources for our statistical sample.

The countries in italics belong to our analytical sample below.

The rest of the paper is structured as follows[3]: Section 1 provides a simple theoretical background. Section 2 outlines our empirical strategy, and Section 3 briefly describes our data. Section 4 describes a regression model used to estimate the costs of smallness for individual inputs, while Section 5 describes the results. They also consider briefly whether small economies tend to have 'worse' policy stances than larger countries. In Section 6 we estimate the overall competitive disadvantages of smallness in three key sectors, before we conclude with some reflections on the policy dilemmas that our findings pose in Section 7.

1. Theoretical Background

For a small economy in isolation, the most obvious economic constraint is scale. With a small market, small-scale would follow, and with it, almost inevitably, inefficiency in the rate at which inputs can be transformed into outputs. [4] In seeking to identify the disadvantages of smallness empirically one would need to consider minimum efficient scales and look at differences in production functions and overall efficiency across different sized countries.

The problem addressed in this paper is rather different. We consider a trading economy in which, in principle, the scale problem can be obviated by trading with the rest of the world. Imports can be purchased from the world's most efficient producer (or, at least, at prices dictated by that producer), while exporting to a huge world market allows an economy to reap full economies of scale in export sectors, albeit at the cost of undue dependence on a small number of commodities. The potential problem now is that trade with the rest of the world may be more costly for small and

[3] The paper summarises an empirical study of the costs of conducting business in small remote economies, based on original data collected for 92 economies in mid-2002. Full details of the study are given in Winters and Martins (2004) – referred to below as WM.

[4] See, for example, Pryor (1972), Banerji (1978) and Briguglio (1998).

remote countries[5]. Because of factors such as small consignment size, small-scale infrastructure[6] and a lack of competition, small countries' costs of trade may be inflated, and so the physical cost of goods and services in small economies will always exceed world minima. (By physical cost we mean the inputs required to deliver a unit of consumption measured in physical terms.) Either consumers need to pay the costs of importing in addition to the minimum price of the good in world markets, or the trading cost of importing will be so great that local production is preferable, in which case local scale re-emerges as the issue. Moreover, delivering a unit of exports is also more costly for a small country. The small economy has to provide not only the resources necessary for production (even if it is the most efficient of producers), but also those to deliver it to market – i.e. the cost of trading.

In identifying the potential commercial disadvantages of smallness in the global economy one is thus interested in (a) the excess cost of international transactions for small and remote countries and (b) the excess costs of non-traded inputs into efficient industries. This is the agenda of the present study.

Such excess costs imply that *ceteris paribus* incomes will be lower in small economies and that the set of goods that is traded internationally may be different. Nothing in these circumstances suggests that countries will over-trade (and hence benefit from curtailing trade with the rest of the world) or that they will trade in the wrong goods (and hence benefit from policies designed to alter the bundle of traded goods). That is, provided that a country continues to trade internationally, the law of comparative advantage will determine its welfare-maximising trade. But the provision is important: comparative advantage doesn't matter if either you do not trade internationally or if you cannot survive (literally) when you do.

We do not challenge the proposition that, by definition, there must be some good in which a country is, relatively speaking, least inefficient, but this section does present three cases in which "least inefficient" does not translate into effective trade. None of them is new but the rest of the paper advances the argument by clothing them, for the

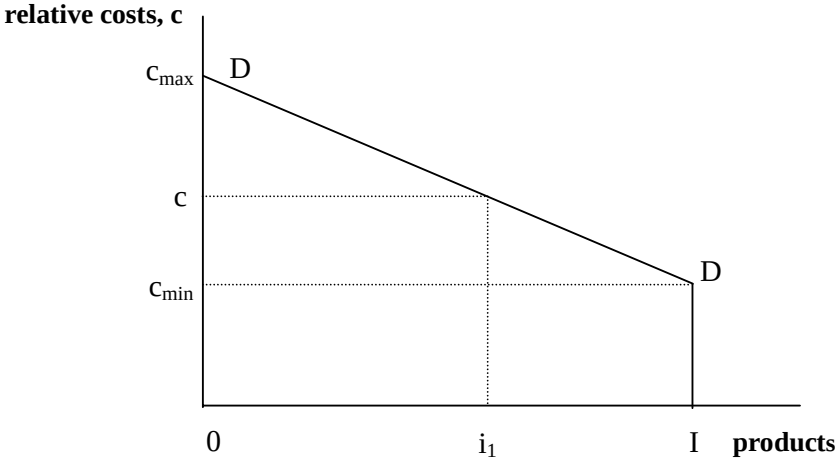
[5] Separating the effects of smallness and remoteness is a serious issue, to which we return below. For now we will be a little vague about which matters.
[6] See Limao and Venables (2001).

first time, we believe, in real data. We examine the hypothesis that very small economies might lack absolute advantage – i.e. have no good or service which they can export – because either their transactions costs or their real production costs are too high to permit any trade on a commercial basis. Taking world prices as given and subtracting the minimum costs of trading and/or of intermediate inputs leaves nothing over for value added, or, perhaps too little for subsistence. Free trade would lead to no trade.

Transactions Costs

Dornbusch, Fisher and Samuelson (1977) show that for a given small country we can rank products (i=0.....I) by the country's costs relative to world prices, which we take as reflecting the costs of the marginal supply. (At this stage we assume that products are produced directly from primary factors of production, entirely ignoring intermediate flows.) Thus in figure 1 DD represents the ranking of relative costs ranging from c_{max}, our country's least efficient sector, to c_{min}, its most efficient.

Figure 1



In the absence of transactions costs there would be a single relative cost threshold (c_1) that would divide imports ($c>c_1$) from exports ($c<c_1$), where c_1 was determined such that the value of imports of goods and services ($i<i_1$) equalled the value of exports ($i>i_1$) at world prices. Adding transactions costs would create a band of non-traded goods about c_1, so that after appropriate re-ordering, imports would occur where

$c>c_1+t_I$ and exports where $c<c_I-t_E$ (where t_I and t_E are the cost of importing and exporting respectively). Clearly the range (t_I - t_E) could be so large as to preclude trade entirely.

In this world our country could remain trading in two ways. It could receive a non-trading flow of foreign exchange – e.g. from accumulated assets, remittances or aid – which permitted some imports in the absence of exports. Alternatively or additionally it could receive prices for its exports above the world level – preferences – which permitted exports despite its fundamental un-competitiveness. Both these cases amount to living on rents. This might not be a problem if the rents were assured and reliable, but if ever they dried up, very serious adjustment strains would be created. In the limit, if local prices did not fall low enough to make c_{min} tradable at world prices plus our economy's transaction costs, life would become unsustainable.

It is sometimes argued that the ability to produce specific varieties of goods for niche markets should allow very small countries to export effectively. While this is true to an extent, it could still be insufficient to overcome the problems of high transactions costs.

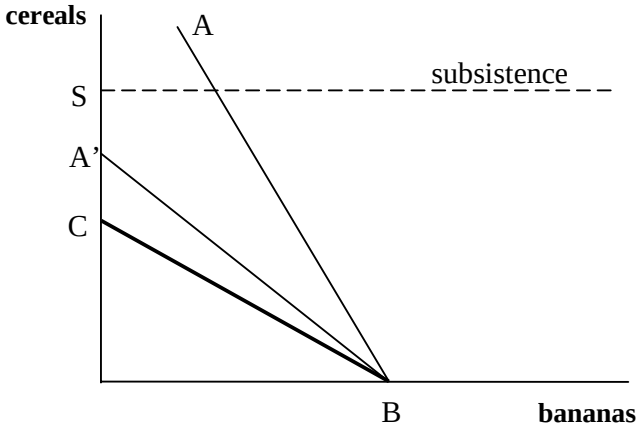
Real Costs of Production

The second example expands on the case that, with high trading costs, life might not be sustainable. We locate it again in a simple Ricardian model of trade with constant costs of production, but for simplicity, now with just two goods – cereals and bananas. Let us assume that survival depends on consuming a given level of cereals but that our country's comparative advantage lies in bananas.

Imagine that the per capita production possibility frontier between cereals and bananas is given by CB in figure 2, and that the minimal consumption of cereals necessary for survival is S. In autarchy, this economy is unviable – its inhabitants would starve - but if we allow international trade at the price ratio implied by AB, the inhabitants can survive by selling bananas and buying cereals. Suppose that AB is the ratio at which a large country can trade, but that a small country, which faces excess trading costs, can realise fewer units of cereal per banana – say A'B. The small

country is now unviable – even with the advantages of trade: incomes are just too low. It does not matter whether the excess costs reside in selling bananas or buying cereal, or both. The important thing is that fewer units of cereal may be consumed per banana produced.

Figure 2



The small country is still better off trading than not, just not sufficiently better off to make life sustainable. Certainly it has no interest in curtailing trade. Note also that if one wished to boost its income, either improving its productivity (i.e. pushing CB out), or its terms of trade (rotating A'B clockwise towards AB) would suffice. Even with given world prices, the latter could be achieved by lowering transactions costs or by offering preferential access to a protected market. Conversely, removing such a preference could push a viable economy below subsistence level.

Input Costs

The third model is grounded in the theories of effective rate of protection (ERP) and domestic resource content (DRC), and takes as given that the production of goods for the international market requires material inputs from that market. Taking all international prices and input-output co-efficients as fixed, the value left over from export sales for value added and non-traded inputs $(\tilde{V}_i)$ is:

$$\tilde{V}_i = \tilde{p}_i - \sum_{j \epsilon T} a_{ij} \tilde{p}_j \qquad (1)$$

$$\tilde{V}_i = p_i(1-t_i) - \sum_{j \varepsilon T} a_{ij} p_j (1+t_j) \qquad (1')$$

where i, j count over products

$\tilde{p}_i$ are local prices

p_i are world prices

t_i are transaction costs

a_{ij} are input-output co-efficients, and

T is the set of traded inputs.[7]

The division between traded and non-traded inputs is very important here. Local supplies will be used where they are cheaper than imported ones. For poor countries the set for which this is true is likely to be small because poor technology and/or scarce management resources frequently rule out local production. Similarly, for small countries, the set will also be small because their scale is so limited. Moreover, some products that have more or less to be non-traded nonetheless have to be produced using traded inputs - e.g. electricity - so that high transactions costs and small-scale compound each other. In short, the genuinely local input into internationally traded goods, and thus the margin that can be squeezed to make exports competitive, is likely to be small for poor and small countries. It is also plain from equation (1'), and from past DRC exercises, that local value added can be negative. In the DRC literature such observations lead to (justifiable) calls to correct the policy distortions that cause this situation. Here, our starting point is the excess costs faced by small and poor countries may be unavoidable and hence that very low or negative value-added is also unavoidable – it reflects an inability to generate acceptable incomes through trade. At best, all that the economies so afflicted might do is generate autarchic subsistence incomes.

Clearly the assumption of fixed input-output co-efficient is too strong, so that equation (1) may over-estimate the costs of smallness and remoteness. However, the example illustrates the possibility that even with the best and most appropriate technologies in the world, value-added could be small or negative.

2. The Approach

This section briefly presents our approach to testing the hypothesis that small economies face serious cost disadvantages. We collect data on a wide range of the costs of doing business across a series of differently sized economies[8] and seek regularities in the relationship between cost and size. Most of the costs are measured in simply monetary terms, but we also collect information on some categorical qualitative variables and on a few policy variables to see if policy varies systematically with size. Since countries' size varies only slowly, we rely on cross-country variance to identify the size effect. Once we have estimated these cost disadvantages, we weight them together, based on the cost structures of three key industries, to create a single cost inflation factor for each product. We also calculate what we refer to as income penalties for each industry. The income penalty reports by how much value added is reduced in a small economy relative to an average sized one if exports fetch only world prices while inputs face excess costs of smallness. The industries selected are electronic assembly, clothing and tourism, as these are believed to be the areas in which small remote economies have stronger competitive advantages[9].

We define size in terms of population – the traditional measure, see for example, Kuznets (1960), Armstrong *et al.* (1998) and Easterly and Kraay (2000) – although for some costs we also include GDP per capita (GDPpc) among our explanatory variables so that there may be aggregate income effects too[10].

Size is not the only feature of an economy that potentially affects its performance and business costs. however. There are strong reasons for believing that location also matters in terms of both who are your neighbours (e.g. Vamvakidis, 1998) and how

[7] Note that the local returns for exportable production are world prices *less* the transactions cost, not the world price plus the tariff as we are used to from ERP analysis.
[8] The sample of countries is given in annex 1.
[9] Some studies (e.g. Armstrong *et al.*, 1998) point to the positive correlation between services (e.g. tourism) and growth. Agriculture, however, is found to have a negative impact on growth.
[10] Population is also better measured and more likely to be exogenous than GDP.

isolated you are from the main centres of economic activity (Redding and Venables, 2002a)[11].

Unfortunately, size, region and insularity are highly collinear. As we can see in table 2, the Pacific and Caribbean regions are almost wholly comprised of small countries and together comprise nearly the whole of our sample of small countries. Similarly, these two regions provide practically all our island economies and contain very few continental countries. Thus, smallness and insularity go very closely together.

Table 2: Sample Countries Cross-classified by Size, Region and Insularity

	Population in Millions				
Region	≤0.4	0.4< ≤ 2	2 ≤<10	10< ≤50	>50
Pacific	11	2	1	-	-
Caribbean	8	3	1	-	-
Sub-Saharan Africa	1	5	2	10	1
Latin America	-	-	1	6	1
South Asia	-	-	-	1	3
Rest Asia	-	-	2	2	5
OECD	-	-	7	11	8
Geographical Status					
Continental	1	6	13	30	18
Island	19	4	1		

We try several different techniques to try to disentangle the locational effects (remoteness and insularity) from the size effect. For example, we include a distance variable for the cases where the data refer to links with specific main centres (e.g. London or Tokyo), which is the case of transportation and communications (telephone calls). Moreover, for sea transportation we include land distances to the port of entry/exit and seek qualitative differences for cases where this exceeds a threshold or where it involves crossing an international border. Isolation effects are explored by the use of an island dummy in some relationships[12].

Ultimately, however, we cannot clearly separate these two sets of effects, so we are not able to assert with confidence which factor is responsible for the phenomena we observe. The collinearities reflect a fundamental lack of information. Future

[11] See Redding and Venables (2002b) for an overview.
[12] See WM for a discussion of the definition of an island.

researchers might try to solve the problem by enlarging the sample (e.g. to collect data for more islands and small economies outside the Pacific or Caribbean, to consider more continental small countries such as Luxembourg, and to study islands within countries to ascertain the costs of physical separation). For the present, however, our only palliatives are theory and parsimony: exploiting theory to try to separate the different effects and recognising the fundamental problem by not seeking too fine a degree of explanation. Moreover, we would also plead that the policy problem is essentially collinear: the main policy concerns are about what to do for economies that are both small and remote.

3. The Business Cost Data

This paper is based on original business cost data for 92 economies, which were assembled from four distinct sources. The largest contribution comes from the Economist Intelligence Unit (EIU) which surveys 54 medium-sized and large countries twice a year. The remaining surveys were commissioned by the Commonwealth Secretariat for this study from regional organisations in various (mostly small) economies: Imani Capricorn in Africa, The Caribbean Community in the Caribbean and The Pacific Islands Forum in the Pacific. All these surveys date from mid-2002. The survey instrument is given in WM[13].

All survey data are subject to error and ours are no exception. Considerable effort was required to interpret and clean them and in order to increase the value of the data we have corrected the most obvious of the errors – for example, re-scaling prices that have been reported in cents rather than dollars. See WM for details. Nonetheless a number of difficulties remain, which we note very briefly as we come to them below.

We have two illustrations of the noisiness of the data. First, two African countries – covered by Kenya and Zimbabwe – were both the EIU and the Imani samples. Comparing the two sets of answers is salutary. For the questions requesting cardinal answers the mean absolute proportionate difference between the two sources was

29.4% for Kenya (45 variables) and 56.8% for Zimbabwe (44 variables).[14] Among the categorical questions the corresponding statistic was 38.3% for Kenya and 10.0% for Zimbabwe (10 variables each).[15] In the areas of dispute, we have used the EIU data, because we found them, on the whole, more plausible. The second area in which we have two estimates of the same phenomenon concerns air freight costs from 5 Caribbean countries. The mean absolute difference of these data, is 69.8%!

Even after the first round of cleansing the data still contain a number of obvious surprises and outliers. Where possible we confirmed unusual values from secondary sources, but have over-ridden the reported values only in the most egregious of cases. During the regression analysis outliers were sometimes identified in the form of absolutely large residuals from our estimated relationships. Since our aim is to test the relationship between the various business costs and size, we have in general eliminated these from the regressions in order to preserve the normality of the residuals and hence the legitimacy of the statistical inference. In all cases, however, we report the direction in which the observation is outlying, and check that the nature of the estimated relationship is not greatly changed by its elimination. If it is, we – and our readers – should exercise great caution in drawing conclusions.

The variables used in the empirical study are given in annex 2 (continuous variables) and annex 3 (categorical variables). The continuous variables are analysed by regressing costs (in dollars) on the country's size and other variables which we believe might affect it and are reasonably readily available. All values are reported in or converted to current US dollars and all refer to mid-2002. Regarding the categorical variables, we estimate ordered logit equations for ranked data and binary logits for the dichotomous data (more information is provided in the following section). Although these categorical variables cannot be easily converted into dollars

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[13] It had been our intention to make these data available publicly, but the requisite permissions have not yet been received.

[14] The statistic is the mean of $|z_1 - z_2| / 0.5 * (|z_1| + |z_2|)$ where z_1 and z_2 are the two replies to the same question from the two sources.

[15] If the categories chosen by the two surveys for categorical variables were i_1 and i_2, we calculate the average of $|(i_1 - i_2)|/(n-1)$, where n is the number of categories, so that (n-1) is the maximum difference.

and cents to compare with the monetary information, they help to inform us about the qualitative advantages or disadvantages of size.

Complementary macroeconomic data were also necessary. The main source for GDP, GDP PPP (Power Purchasing Parity) and Population was the World Development Indicators 2002, although other sources were also used to complement this information where necessary (Global Business Cost Survey and Asian Development Bank). So too was information on air and sea distances. These came from http://www.wcrl.ars.usda.gov/cec/java/lat-long.htm for great circle air distances and SUDist (http://www.shipanalysis.com) for sea distances along recognised routes. See WM for details.

4. The Regressions Models

This section describes our efforts to identify country-size effects in our costs data. The main results are summarised in section 5 and further details can be found in WM. The general approach was to fit log-linear models by Ordinary Least Squares between the business cost variables and our measure of size (population), including also other relevant regressors such as distance in the transportation cost equations. Where appropriate we made allowances for insularity and for likely differences between high and low-income countries. All equations were subject to a number of standard diagnostics tests. Amongst others, we tested the normality of the residuals (Bera and Jarque, 1981), functional form (RESET - including the squared prediction in the equation – Ramsey, 1969) and heteroscedasticity (calculated from the regression of the squared residuals on squared fitted values - Breusch and Pagan, 1981). We responded to failures by trying a variety of different specifications (as long as these made economic sense) and although we achieved improvements in some cases, there were a few in which problems remained. For failures of normality, we simply excluded the offending observations from the regression in order to render our inferences more reliable (since most of them are valid only under the normal distribution of residuals). We did check and report below, however, whether this had material effects on the parameter estimates. Where heteroscedasticity persisted we used White adjusted standard errors, in order to make out inferences more reliable and

in the few cases where we were able to remove functional from errors by re-specifying the equation, we merely note the fact and pass on.

Our basic estimating equation for the continuous variables was

$$\text{Ln (costs)} = \alpha_0 + \alpha_1 \text{ Ln (Popn)} + \alpha_2 [\text{Ln(Popn)}]^2 + \text{other variables}$$

In the absence of any other theoretical guidance, our main motivations for using log-linear models were the high dispersion of size (population and GDP) across our sample, and the belief that size effects act roughly proportionally.

Turning to the other variables, for **air freight costs** we add distance measured by great circle distances and in logarithmic form following Hummels (1999).

For **sea freight costs** we add the variable sea distances calculated from nautical tables available from SUDist (http://www.shipanalysis.com). Where the principal economic centre of a country is not the port we add in the internal land distances converted to nautical miles. This procedure implies that land transportation costs are equal to shipping costs (per mile), which is obviously not precisely true. Therefore, we also include a dummy variable for all countries where the inland distances are greater than a certain threshold. Amongst the different thresholds tested, 500 km seemed to give the best results (L500). We also experimented with a dummy reporting the need to cross an international land border, but it was never significant.

We excluded Australia (+) and Finland (-) from the sea-freight equations since, based on their studentised residuals**,** they were huge outliers in all equations. And we also added in an OECD dummy to solve persistent functional form problems: OECD countries are arguably different from the rest of the sample in terms of infrastructure and trading institutions (e.g., security), and therefore need to be isolated. The OECD dummy is obviously a very crude indicator of such things but, here and elsewhere, attempts to improve on it by using other variables to model infra-structure and institutions directly are thwarted by the absence of such data for our very small countries. Given that they are the focus of our study it seemed inappropriate to exclude them wholesale from our estimation.

For each of the eleven **wage variables** the only additional variable is Ln(GDPpc), which measures the living standards of the country, an obvious correlate of wages. We also tried to include non-monetary benefits as stated in the Global Business Cost Surveys, but these performed very poorly (perhaps because benefits can be either complements or substitutes for money wages and the different effects cancel each other out). We also observed that rich countries (OECD and the three Asian high-income economies) have unusually high incomes compared with the rest of the sample even after allowing for GDPpc. This may be due to their very different skills levels, institutions and technologies. Thus, based on powerful graphical evidence – see WM - we restricted the wages exercise just to developing countries.

We also tested for island effects in the wage equations since insularity can be an obstacle to labour mobility. We define insularity as having fewer than 10 million inhabitants and no significant land mass within a certain range, experimenting with setting the range at 50, 500 and 1500 km. (The one exception was New Zealand due to its degree of development.) However, since insularity and size are highly correlated in our sample and insularity may have positive or negative effects on wages according to whether it blocks inward or outward flows more effectively, we did not find these variables useful.

The general specification used for **utilities** (telephone - except international calls - water, electricity and fuel) included Ln(GDPpc), while for international telephone calls we used the same specification as for air freight. For all utilities we test both marginal costs (or something quite like it) and fixed costs (e.g. connection fees, etc). Unfortunately we do not know the proportions of total cost that these two elements account for and hence can not calculate the trade-off between them for a typical firm. For the passenger travel costs we added Ln(GDPpc) to the airfreight specification to account for different living standards (i.e., we would expect that people living in England to travel more by plane than people in Zambia).

For the **policy variables** - various tax, subsidy and interest rates - we use a linear-log specification since the policy variables are expressed as percentages, which are,

broadly speaking, scale free. In effect we are applying a log-log model to (1+x) where x is the tax rate in question. These equations also include Ln(GDPpc).

For the **categorical information** on the frequency of disruptions, length of waits for connection or repair we estimate size effects from Ordered Logit equations, since the data can be ordered (i.e. it is better to have fewer disruptions than more). We thus calculate the probability of a country falling into a particular class of disruption according to its individual characteristics (e.g. income and size) as:

$$\text{Prob(country i is in class j)} = \frac{\exp(\mu_j + \beta' x_i)}{\sum_{\lambda} \exp(\mu_\lambda + \beta' x_i)}$$

where $\beta' x_i = \alpha_1 \text{Ln(GDPpc)}_i + \alpha_2 * \text{Ln(Pop)}_i$

The inclusion of GDPpc captures the different living standards, and given that higher numbered classes entail worse service (more disruptions, longer waits) we expect it to have a negative sign.

5. The Regression Results

The main results are summarised in table 3. This reports, in column order: the regression co-efficients on population and population squared, the joint test of their significance, the co-efficients on distance, GDPpc, an inland transportation dummy, and the OECD dummy, R^2 and the number of observations. Following these are the statistical tests: for heteroscedasticity (Het - where x denotes failure – i.e. the presence of heteroscedasticity); for functional form (FF - x denotes failure); the number of observations dropped to achieve normality, distinguishing those for which size and the target variable are both above or below their respective means (+) from those with one above and one below (-)[16]; and the number of zeros in the dependent variable. Finally come the cost disadvantages implied by the equations for four example

[16] This distinction is between omissions that will tend to increase the slope of the cost-size relationship (+) and those that will reduce it.

countries (those in italics are based on statistically insignificant estimates, while where we think there is no evidence of size effects we write 0).

The cost disadvantage ratios summarise the costs of smallness by presenting, for four representative countries, the percentage excess costs of their inputs relative to those of the median country. The exemplar countries are located 4th, 18th , 29th and 36th in our ranking by size, expressing their percentage disadvantage relative to our median country, ranked 46th. To make the examples concrete, they correspond to our populations of

Micro economies	Anguilla	12.13 thousand
Very small	Vanuatu	197 thousand
Threshold	Botswana	1,602 thousand
Small	Singapore	4,018 thousand
Median	Hungary	10,022 thousand

The so-called 'threshold' corresponds roughly to the population threshold of 1.5 million used in the report *Small States: Meeting Challenges In The Global Economy* (April 2000) prepared by the Commonwealth Secretariat / World Bank Joint Task Force on Small States and subsequently elsewhere (e.g., Jansen, 2004). We include it and one larger exemplar in the table to test whether the disadvantages of small scale really have become negligible by this size.

The estimates for **airfreight costs** suggest that there are significant size effects for outward transportation (as shown by the joint significance F-tests in column 3). The negative sign on population and positive sign on the squared term implies a u-shaped relationship between population and costs. The turning points vary between 1.5 million inhabitants and 3.5 million inhabitants (for the outward regressions), which leaves at least 30 small economies on the downward part of the curve. These estimates are robust to the exclusion of certain observations (to solve normality problems) and also to tests of asymmetries between the two arms of the 'U' and the omission of very large countries. Distance is always significant at 1%, with coefficients varying from 0.248 to 0.533, but the R-squares are relatively low (0.09 to 0.36).

Table 3: Summary of the Size Regressions for Continuous Variables

Regression		Ln(Pop)	$[Ln(Pop)]^2$	F-test (Pop)	Ln(Distance)	Ln(GDPpc)	L500	OECD	R-Sq.	Obs.	Het.	F.F.	Norm.		Log	Cost disadvantages			
													-	+	Zeros	Micro	V. Small	Threshold	Small
Airfreight	To London	-0.281**	0.018**	2.565*	0.248***	-	-	-	0.19	91						60.3	8.2	-3.2	-3.1
	From London	-0.189	0.010	0.770	0.369***	-	-	-	0.23	83						*62.1*	*18.9*	*4.3*	*1.3*
	To Tokyo	-0.326***	0.020***	4.007**	0.336***	-	-	-	0.14	84				3		85.3	15.2	-1.1	-2.2
	From Tokyo	-0.057	0.004	0.469	0.372***	-	-	-	0.09	80	x		3			*7.1*	*-0.4*	*-1.7*	*-1.2*
	To NY	-0.278***	0.019***	5.179***	0.499***	-	-	-	0.36	84			1	3		45.2	1.0	-6.6	-4.9
	From NY	-0.211	0.014	0.886	0.533***	-	-	-	0.17	82						*37.2*	*3.2*	*-3.8*	*-3.1*
Seafreight	To Rotterd.	-0.290***	0.011*	16.601***	0.218***	-	0.419**	-0.355**	0.61	70						195.3	67.0	21.8	9.3
	From Rotterd.	-0.307**	0.009	29.268***	0.135*	-	0.727***	-0.416**	0.70	62						287.4	100.1	33.5	14.6
	To Yokoh.	-0.406***	0.017**	29.450***	0.548***	-	0.310**	-0.291**	0.60	78						301.5	87.2	25.5	10.4
	From Yokoh.	-0.316**	0.011	24.973***	0.678***	-	0.126	-0.357***	0.64	75						251.6	85.0	27.7	11.9
	To NY	-0.311**	0.015**	5.819***	0.202**	-	-0.131	-0.177	0.29	75		x				148.3	44.4	4.5	4.5
	From NY	-0.302**	0.015**	11.303***	0.048	-	0.111	-0.378*	0.22	75	x					133.7	39.4	10.2	3.7
Wages	CW	-0.075***	-	-	-	0.525***	-	-	0.67	*63*						65.5	34.3	14.7	7.1
	CO	-0.054***	-	-	-	0.489***	-	-	0.67	*63*	x					43.7	23.6	10.4	5.1
	KP	-0.080***	-	-	-	0.452***	-	-	0.76	*63*						71.1	36.9	15.8	7.6
	BCL	-0.050*	-	-	-	0.257***	-	-	0.39	*58*						39.9	21.7	9.6	4.7
	BCF	-0.040	-	-	-	0.229***	-	-	0.29	*59*						*30.8*	*17.0*	*7.6*	*3.7*
	GM	-0.060**	-	-	-	0.461***	-	-	0.63	*63*						49.6	26.6	11.6	5.6
	PC	-0.012	-	-	-	0.543***	-	-	0.60	*63*						*8.4*	*4.8*	*2.2*	*1.1*
	QT	-0.047**	-	-	-	0.532***	-	-	0.73	*63*						37.1	20.3	9.0	4.4
	BML	-0.064**	-	-	-	0.298***	-	-	0.35	*58*	x					53.7	28.6	12.5	6.0
	BMF	-0.046	-	-	-	0.291***	-	-	0.26	*58*						*36.2*	*19.8*	*8.8*	*4.3*
	GRN	-0.071***	-	-	-	0.515***	-	-	0.73	*61*			1	1		61.1	32.2	13.9	6.7
Telephone	London	-0.101***	-	-	0.418***	-0.227***	-	-	0.61	89				1		97.1	48.7	20.3	9.7
	Tokyo	-0.117***	-	-	0.001	-0.196***	-	-	0.36	89						119.4	58.4	23.9	11.3
	NY	-0.152***	-	-	0.169	-0.393***	-	-	0.61	90		x				177.6	81.7	32.1	14.9
	Local	-0.073*	-	-	-	-0.074	-	-	0.05	81					*5*	0.0	0.0	0.0	0.0
	Inst. Fee	0.058*	-	-	-	0.106	-	-	0.06	90					1	-32.3	-20.4	-10.1	-5.2
	Line Rent.	-0.026	-	-	-	0.364***	-	-	0.42	88					2	*19.1*	*10.8*	*4.9*	*2.4*
Electricity	Usage	-0.098***	-	-	-	-0.021	-	-	0.19	84			1	2	1	93.1	47.0	19.7	9.4
	Connect.	0.103	-	-	-	-0.223	-	-	0.07	67					9	0.0	0.0	0.0	0.0
Water	Usage	-0.184***	-	-	-	0.024	-	-	0.14	82				2	*4*	0.0	0.0	0.0	0.0
	Connect.	0.219***	-	-	-	0.409***	-	-	0.35	63			2	1	11	-77.0	-57.7	-33.1	-18.1
Fuel	Diesel	-0.084***	-	-	-	-0.110**	-	-	0.32	*62*			1			75.8	39.1	16.7	8.0
	Petrol	-0.041**	-	-	-	-0.025	-	-	0.11	*61*			1	1		31.7	17.5	7.8	3.8
P. Travel	London	-0.116***	-	-	0.641***	-0.160***	-	-	0.93	86		x	3			118.0	57.7	23.7	11.2
	Tokyo	-0.106***	-	-	0.455***	-0.285***	-	-	0.58	88						103.8	51.7	21.5	10.2
	NY	-0.121***	-	-	0.871***	-0.213***	-	-	0.76	87		x		1		125.4	60.9	24.8	11.7
Land	Office	-0.399	0.035**	16.349***	-	0.729***	-	-	0.51	86	x			2		-7.0	-34.4	-28.3	-17.8
	Factory	0.040	-	-	-	0.256***	-	-	0.29	73	x		8	8		0.0	0.0	0.0	0.0
Bank	Lending	1.561**	-0.107**	5.812*	-	-2.630***	-	-	0.50	82	x		1	7		-2.1	0.0	0.4	0.3
	Deposit	0.322***	-	-	-	-1.078***	-	-	0.29	83	x		1	5		-2.2	-1.3	-0.6	-0.3
Corp. Tax	Residents	0.373	-	-	-	-0.091	-	-	0.03	84			1	6		*-2.5*	*-1.5*	*-0.7*	*-0.3*
	Non-Residents	0.113	-	-	-	-0.767*	-	-	0.04	84				6		*-0.8*	*-0.4*	*-0.2*	*-0.1*
Imp. Duties	Weighted	-0.193	-	-	-	-3.492***	-	-	0.47	51	x		3	2		*1.3*	*0.8*	*0.4*	*0.2*
	Un-Weighted	-0.057	-	-	-	-3.623***	-	-	0.58	47	x			3		*0.4*	*0.2*	*0.1*	*0.1*
	% Revenue	-6.051***	-	-	-	-7.028***	-	-	0.55	65	x					40.6	23.8	11.1	5.5

Legend to Table 3

Obs. - Refers to the number of observations used in the final regressions. In italic are the regressions where OECD and the 3 high-income Asian countries were excluded.

F-test - Joint significance test on the coefficients of Ln(Pop) and $[Ln(Pop)]_2$. In the regressions with heteroscedasticity this is actually a Wald-test (with White-adjusted errors).

Het. - x denotes regressions which have White-adjusted standard errors to overcome the remaining Heteroscedasticity

F. F. - x denotes regressions which fail the Functional Form test (RESET)

Norm. - States the number of observations excluded due to normality problems. '+' represents the number of observations that would have a positive effect on the slope and '-' the opposite. I.e. the '+' refers to cases where $(x-\mu)(s-\sigma) > 0$, where x is the LHS variable, s Size and μ and σ their respective means. We did not recalculate the mean size for every different sub-sample, but used the mean of the whole sample and the mean excluding the high income counties as appropriate.

Geometric mean (all sample) - 4563.1 thousand inhabitants
Geometric mean (63 Obs.) - 2342.8 thousand inhabitants

Log Zeros - Indicates the number of observations that stated '0'. These were excluded since zeros cannot be logged. In italics we put the cases where these exclusions may affect our general conclusion about the results.

Cost disadvantages - These are based on the ratio between the costs of each of the 4 exemplar countries (chosen to represent different population categories) and the median country. For the cost regressions these represent % deviations from a fictional median country with around 10 million inhabitants. For the policy variables, these disadvantages are actually expressed in percent points. The cases where the evidence of a population effect is insignificant by different from zero are in italics. The zeros are cases where there is no convincing case for cost disadvantages (based on the significance of the population effects and sensitivity tests undertaken to assess the impact of the exclusions of the '0' observations).

***** Significance at 10%
****** Significance at 5%
******* Significance at 1%

Wages

CW - Construction Worker
CO - Checkout Operator
KP - Kitchen Porter
BCL - Bank Clerk/Teller in Local Bank
BCF- Bank Clerk/Teller in Foreign Bank
GM - Garage Mechanic
PC - Payroll Clerk
QT - Qualified Teacher
BML - Bank Manager in Local Bank
BMF- Bank Manager in Foreign Bank
GRN - General Registered Nurse

A surprise is the apparent absence of significant size effects in the inbound freight rates (from London etc). Inbound rates are generally significantly higher than outbound ones, and we speculate that the difference arises because of different practices in consolidating consignments. Outbound, export agents seek to consolidate and so are able to do something to overcome the disadvantages of small size. This is feasible for outbound journeys because exports are not highly diversified and stem from a small number of economic entities. Inbound, on the other hand, the co-ordination problems are greater, with greater diversity of goods, entities and origins and also great distance between national agents at home and the place where consolidation must be done (i.e. in the partner country).

Turning to **sea freight costs**, we can see that there are strong size effects for all regressions: the coefficients on population are always significantly negative and the joint significance of the population variables very high. In this case the 'U' is much steeper and the turning points much higher: in two cases they are far beyond any existing country's size. That is, sea freight shows much higher minimum efficient scale than airfreight. (We decided to keep the two insignificant squared terms to maintain the same functional form for all sea freight regressions.)

As expected, the land transportation dummy, L500, takes a positive sign (except 'to NY' where it is not significant) and is significant in three cases. One would expect that the magnitudes of the inland dummy would not change greatly over the three partner ports since the cost of transporting a FCL from, say, Kampala to Mombassa would be the same irrespective the final destination, and also the same as Mombassa to Kampala. The difference in samples across partners may explain why this is not apparent in our results. The OECD dummy always assumes a negative sign and is significant in five of the six cases. As explained above, we see it as reflecting different infrastructures and institutions in these countries. Distance is almost always significant (the exception is 'from NY'). The R-squares are much higher than for airfreight for Rotterdam and Yokohama, although not for NY[17]. Only one of the regressions presented functional form problems – see column headed FF in table 3.

[17] The New York regressions are altogether less convincing. But we do not know why.

The samples for the **nominal wage** regressions exclude the OECD and the three high-income Asian countries. This decision followed a careful examination of data plots that displayed very great differences between the rich and poor sub-samples. Among developing countries the relationship between size and wages is log linear (since none of the squared terms for population was statistically significant). GDPpc is always positive and significant at 1%, with coefficients varying from 0.229 and 0.298 for bank related jobs and from 0.452 and 0.543 for the rest. Coincidently, the regressions for bank clerks and bank managers had significantly lower R-squares than the rest, a fact which we attribute to the multinationality of the sector. Inter-country comparisons are much easier within a company than between companies, and so the relationship of the wage with national variables is more readily 'contaminated' by spillovers between branches. Population is significant in 8 of the 11 wage regressions (7 at 5%) with the elasticities ranging from -0.047 to -0.080; all eleven regressions suggest a negative relationship between size and wages. The fact that two out of the three non-significant size effects refer to foreign banks (bank clerk and bank manager) again, we believe, reflects multinationality. There is no suggestion of functional form problems, and we had to deal with outliers in only one of the regressions.

Nominal wages may be higher in small countries because the cost of living is higher for precisely the sort of reasons we are discussing in this paper. To explore this we also included the PPP adjustment factor in the equation to capture 'real' price differences. This is strongly correlated with size and absorbed some of the size effects. However, all the population effects remained negative and three remained significantly different from zero. Once we allow for the negative relationship between population and the PPP factor, the net effect of population on wages is almost identical whether we break out the 'real' price effects or not.

For **utilities** we ran regressions for both fixed and variable costs. The main problem faced with the utilities was the high number of zeros reported. Since our log-linear regressions are potentially highly sensitive to these, we must be very careful with the interpretation of the results, and apply sensitivity tests to assess the importance of dropping these observations.

For international telephone costs, population is always significantly negative at 1% (from -0.101 to -0.152). But distance does not seem to be an important determinant of costs, except 'to London'. As for virtually all utilities' marginal costs, the coefficients on GDPpc are robustly negative, indicating that people in richer countries pay less than those in poorer countries. The estimates for local telephone costs are much weaker. Although in table 3 the population effect is significant (at 10%) and negative, our sensitivity tests suggest that if we had included the five recorded zeros, this would not persist[18]. Thus we decided that we could not identify convincing cost disadvantages for this variable and record O in the cost disadvantage column. In addition, GDPpc was not significant and the R-squared very low (0.05).

Turning to the fixed costs of telephones, installation fees proved to have a weak but positive relationship with size (at 10%), although GDPpc was not significant and the R-squared was low. In this case the 'zeros' would reinforce this result, so we conclude that installation fees do tend to be higher in larger countries. Finally, for line rental fees, we found that GDPpc has a strong impact, but that population is not a significant determinant (although the estimate suggests a negative relationship between size and line rental costs).

The results for electricity marginal costs seem pretty robust even though we had to exclude three anomalous observations and one 'zero'[19]. The population coefficient is significantly negative at 1% and the R-square equals 0.19. We cannot prove the existence of a relationship between size and electricity connection costs however, although the co-efficient suggests a positive relationship. There were nine zeros (for countries ranging from Nauru and Senegal to Sweden and Australia), and different ways of treating them gave different results.

Turning to water, we find a negative relationship between size and usage costs (significant at 1%), while GDPpc was not significant and the R-squared was 0.14. However, again the zeros look influential so we decided not to include these results in

[18] We conclude this first, by observing whether the zeros refer to large or small countries and thus whether, ceteris paribus, they reinforce or undermine the reported signs. Second, we re-estimate the equation replacing the zeros by a fraction of the smallest non-zero value in the sample.

[19] Czech Rep. ($1.4 per kilowatt) Mauritius ($2.08) and Nigeria ($2.70), compared with $0.22 in the most expensive OECD countries – Poland/Mexico

the cost disadvantage exercise. For water connection fees, we found a positive size effect on the regression. GDPpc was also significant at 1%. The 11 zeros would probably attenuate this result since most of these are for large countries. Nevertheless, to be conservative we do carry these estimates forward.

In the fuel regressions, we again had to exclude the OECD and 3 high-income Asian countries based on various data plots. The results illustrate a negative significant relationship between size and the cost of fuel (-0.084 for diesel and -0.041 for petrol). However, GDPpc is significant only for the diesel regression, where the R-squared is substantially higher compared to the other.

The exercise on passenger travel used data provided by the Commonwealth Secretariat's travel agents. The results are pretty much consistent across the three different destinations. The elasticity with respect to the population varies from -0.106 to -0.121, while that on GDPpc negative (varying from -0.160 and -0.284) and that on distance positive. All coefficients are significant at 1% and the R-squares are high. Two regressions seem to fail the functional form test (RESET), however, and since the inclusion of a squared term (either on population or distance) proved to be insufficient to cure the problem, we have had to live with it.

The last of the standard regressions was on land rents. Here we had severe problems with missing observations and outliers. We managed to estimate a relationship for the costs of office space, but the same was not possible for factory space. For office space, the population variables are jointly significant, but since the coefficient on population is small (and insignificant) the turning point occurs very early. Hence the predominant relationship between size and office costs is positive. For factory rentals, we were unable to find a significant relationship with size, especially given the numerous outliers in the sample. The estimates, however, suggest again a positive relationship. At first sight these results might look as if they show advantages to being small. However, the Ricardian theory of rents suggests that land rents reflect the surplus between earnings and costs, and hence that low rents merely serve to confirm the disadvantages of small size seen above.

Table 4: Estimates for the Ordered Logit Equations on Categorical Variables

Regression		Ln(Pop)	Ln(GDPpc)	Cat=1/2 pop ('000)	Cat=2/3 pop ('000)	McFadden's Pseudo-R^2	Obs.
Workers' Availability	Un-Skilled	-0.169*	1.0***	340.8078	0.7730	0.2	92
	Semi-Skilled	-0.361***	0.4**	1892.8546	3.7076	0.1	92
	Skilled	-0.392***	-0.3**	15803.2397	55.1362	0.1	92
Telephone	Connection	-0.064	-0.6***	-	-	0.1	92
	Disruption	-0.176**	-0.8***	9169.5955	0.0003	0.2	92
	Repair	-0.098	-0.4**	-	-	0.1	92
Electricity	Connection	-0.021	-0.5***	-	-	0.0	91
	Disruption	-0.242***	-1.1***	56832.1320	1.4408	0.2	92
Water	Connection	0.055	-0.4***	-	-	0.0	90
	Disruption	-0.271***	-1.0***	3205.8005	0.3942	0.2	91

Obs: Cat = 1 and Cat = 2 are based on a GDPpc = $10,000

For the categorical variables we estimate ordered logit equations to explore the relationships between size (population) and the different categories of disruption or waiting time. Table 4 reports the results. For each issue it reports the co-efficients on population and GDPpc, the population thresholds between categories 1 and 2 and between categories 2 and 3 assuming a GDPpc of $10,000, McFadden's Pseudo-R^2 as a measure of fit and the number of observations used[20].

We start with availability of workers. We ran regressions relating the availability of each of three types of workers (unskilled, semiskilled and skilled) to size (logged population) and (logged) GDPpc. Although, as we would expect, we do not have strong evidence for unskilled workers, for semiskilled and skilled workers there are obvious reported shortages in small countries. The minus sign attached to the population coefficient represents the greater dependence of small economies on the import of semiskilled and skilled labour (lower categories mean less need to import workers from abroad). It is comforting to note the GDPpc effects suggest that richer countries lack unskilled workers, and semiskilled workers to a lesser extent (evidenced by a positive sign in GDPpc), but relatively speaking, have an abundance of skilled workers. The thresholds between categories 1 and 2 are 1.8 and 15.8 million respectively for semi skilled and skilled workers, which suggests that a large range of countries are small enough to face shortages of skills, especially since the thresholds are evaluated at $10,000pc and the skills shortages will be greater at lower incomes.

[20] The population thresholds report the sizes at which a country with GDPpc of $10,000 would be predicted from category 1 (no problems) to category 2 and from 2 to 3.

For telephone, while there were no significant size effects for connection and repair times, there was evidence that disruptions tend to occur more frequently in small countries. This conclusion is repeated precisely for water and electricity. For quite understandable reasons, small countries are more vulnerable to utilities disruptions than are larger countries[21].

The second substantive question to address is whether policy varies with the size of countries. This might occur, for example, because small societies are easier or harder to govern, or if the costs of implementing particular policies are not proportional to size. We used linear-log regressions for the policy variables, since the policy variables are measured in percentages. There were severe problems with outliers in almost all of these regressions, but some tentative conclusions can be drawn. There appear to be significant relationships between country size and bank lending and bank deposit rates, linear for the latter and non-linear for the former (table 3). Thus, small countries appear to have lower deposit rates than the median country, but for lending rates we can say that only for very small countries[22]. The effect of GDPpc is significantly negative in both equations, meaning that high per capita income countries have lower interest rates.

With reference to corporate tax, we could not establish a convincing relationship between either size or GDPpc and the tax rate. Thus, although we are clearly not capturing much of the explanation of tax rates (see the very low R-squares), the results certainly do not suggest that small countries tax more[23].

The final block on table 3 concerns import duties. Although we find strongly significant coefficients for GDPpc, we were unable to establish a convincing relationship between size and import duty rates (weighted and un-weighted): the negative sign suggests that small countries tend to have higher import duties, but with t-statistics well below unity, this is not at all significant statistically. On the other

[21] In WM we also present cross tabulations of disruption and waiting times by size class. They confirm these results.
[22] Because the relationships are linear-log the disadvantage ratios are expressed in percentage points not percentage terms.
[23] For an in depth study of size and taxation see Codrington (1989).

hand, receipts from import duties as a percentage of tax revenue did prove to be robustly and significantly higher in small countries. GDPpc was also negative and significant at 1%, confirming that in richer countries import duties provide a smaller share of total tax revenue. The relationship with size seems intuitively plausible, for in small economies very large shares of consumption are imported (increasing the numerator and reducing the denominator of the fraction to be explained). Indeed, in the limit, if imported inputs into industry are exempted, as they frequently are, import duties become very similar to consumption taxes and thus probably rather efficient sources of revenue.

Finally, we have dichotomous data on three policy variables – the existence of special interest rates or tax incentives for exporters, and the existence of export duties. Testing (through binary logits) for differences in the sizes of the economies that display these features and those that do not, we find that small economies are less likely to give tax incentives or have special interest rates for exports.

We did also collect information on general indirect tax rates and budget deficits, but, unfortunately, neither set was usable – the former because the quoted ranges were too large (e.g. 0-350% for Brazil) and the latter because the survey did not specify whether to include a minus sign on the deficit, and practice evidently varied across correspondents.

6. The Disadvantages of Smallness: Cost Inflation Factors and Income Penalties

Tables 3 and 4 leave a strong impression of the excess input costs arising from small size, especially for micro and very small economies. However, we still need to confirm that these excess costs add up to a material competitive disadvantage on the world market. To do this we estimate the cost structures of three export industries typical of developing countries – electronic assembly, clothing manufacture and hotels and tourism – and use them to weight together the cost disadvantages above to create a single cost inflation factor for each product.

The cost structures are based on the input-output tables from the GTAP consortium. For each industry we collapsed the input structure into three primary factors – skilled and unskilled labour and capital – and about a dozen intermediates. We then arrayed the (value) input shares across the sixty-five countries for which data were provided (there is considerable variance) and tried to infer the likely shares for the median sized developing country. The valuation is at producer prices – i.e. essentially the same basis as our collected cost data – and so the shares provide the weights required for creating base weighted indices of the cost disadvantages relative to the median in the exemplar economies.

That is, writing C_{ij} for the percentage cost disadvantage factor for input *i* in exemplar country *j*, measured relative to the median, we seek to infer the weights W_i of each input in total inputs in the median country. Thus the cost inflation factor for exemplar country j, C_j,

$$C_j = \sum_i W_i \; C_{ij}$$

is a base-weighted index of excess costs. If the weights can be systematically varied across countries to reduce the (value) shares of relatively expensive inputs, the C_j will exaggerate the cost disadvantages. But given the relatively broad classes of inputs we deal with, this does not seem likely to be a major problem.

To create the indices we need to distil the results in the last four columns of table 3 into a single figure for each identified input. In general we use the averages of the figures in that table and further weight them together using crude a priori weights. Whenever a cost disadvantage is not statistically significant in the table, we assume the value to be zero here. We took averages of outbound and inbound transport costs separately for exports and imports respectively (weighting airfreight one-third and sea-freight two-thirds). For skilled labour we used the cost disadvantage for skilled labour above, and for 'Unskilled Labour' the weighted average of our original results for unskilled and semi-skilled (one-third for semi-skilled and two-thirds for unskilled). This fits reasonably well with the GTAP definitions of skills. Finally, for the cost of utilities we consider the averages only for the marginal cost component,

ignoring the connection fee (which means that we over-state the costs of smallness) and the costs of disruption (which means that we understate them).

Second, we need to determine what proportion of the cost of each input is exposed to the disadvantage factors. We distinguish five different treatments:

- Internationally traded intermediates are assumed to be available at the price of the median country plus the excess transport costs identified above assuming that 8% of the gross value of these goods is accounted for by international transport. Thus for the smallest countries, for example, inputs of textiles into clothing account for 37.5% of cost, and face a premium of 150% on 8% of their value. This adds 4.5% to the cost of clothing exports. We apply the same disadvantage factors to the full value of small economies' exports of electronics and clothing.
- Inputs of labour bear their own cost disadvantage factors and we assume that the same factors apply to inputs of essentially non-tradable services. (We make no allowances for other inefficiencies deriving from small size in these sectors.) For the tradable component of services categories we assume that foreign competition imposes some discipline (or displacement), and hence we halve the labour disadvantage factors when applying them to each service in aggregate. We make no further allowances for the labour availability disadvantages identified above.
- For capital our measured cost disadvantage factors – bank lending rates - are not very appropriate. We assume conservatively that capital costs are 15%, 10%, 5% and 5% above median values for our four exemplar small economies respectively. These excesses essentially reflect investors' ignorance of small economies and the greater variability that the latter, almost inevitably, face. These factors are not large: if the cost of capital is 10% in the median country we make it 11.5%, 11%, 10.5 and 10.5% for four exemplar countries respectively.
- For utilities we use the cost disadvantage factors from the table directly. As we noted above, we ignore both the connection fees and the excess disruptions that small economies face.
- Finally, for exports of tourism we assume that visitors have to pay the excess costs of personal travel identified in the table and that these account for 25% of the

costs of a visit. Hence for recreation we have an exposure factor of 25% and a cost disadvantage factor of 116% for the smallest economies[24].

Table 5 summarises the cost disadvantage information that we use in our subsequent calculations on clothing. It reports our estimates of (a) the cost shares of each input, (b) the assumed exposure to the disadvantage factors, and (c) the summary disadvantage factors for each input for each of our four exemplar small countries.

Table 5: Cost structures for Clothing and Cost Disadvantage Ratios

	Central Estimate (%)	Share subject to inflation	Cost Disadvantage Factors (%)				Comment
			Micro	V. Small	Thresh.	Small	
Unskilled Labour	15	1	47.5	25.1	10.9	5.3	UnSkilled & SemiSkilled
Skilled Labour	2.5	1	38.0	20.3	8.9	4.3	Skilled
Capital	13	1	15.0	10.0	5.0	5.0	
Textiles	37.5	0.08	149.5	49.9	15.9	6.7	Av. Import - Transport
WearingApp	4	0.08	149.5	49.9	15.9	6.7	Av. Import - Transport
LeatherProd	1.25	0.08	149.5	49.9	15.9	6.7	Av. Import - Transport
Energy	1.25	1	73.4	37.7	16.0	7.7	Electricity and Fuel
MachEquip	1.75	0.08	149.5	49.9	15.9	6.7	Av. Import - Transport
ChemRubPlast	3.25	0.08	149.5	49.9	15.9	6.7	Av. Import - Transport
Trade	7	1	22.2	11.7	5.1	2.5	Labour*0.5
Transport	2	1	157.0	48.4	13.1	5.5	Airfreight & Seafreight
Communication	0.5	1	98.5	47.2	19.1	9.0	Telephone
FinBusServ	4.5	0.5	22.2	11.7	5.1	2.5	Labour*0.5
OtherGoods	4	0.08	149.5	49.9	15.9	6.7	Av. Import - Transport
OtherServics	2.5	0.5	22.2	11.7	5.1	2.5	Labour*0.5
export transport factor		0.08	164.6	46.8	10.3	4.2	Av. Export - Transport

The next step is to calculate the income penalties that these costs disadvantage factors generate. Supposing that exports must be delivered at the same price as the median country would charge, the excess costs will decrease the returns of economic activity in small countries. The degree by which these will be reduced will depend on which costs are unavoidably inflated and which returns can be squeezed to restore competitiveness. Dividing inputs into endogenously and exogenously priced sets, and using T for the latter, we calculate

[24] In retrospect we accept that these factors may be a bit large, given that most tourists travel on package holidays, which helps agents avoid the costs of small consignments.

$$(\tilde{V}_i - V^*_i)/V^*_i = (-t_i - \sum_{j \epsilon T} a_{ij} t_j)/(1 - \sum_{j \epsilon T} a_{ij}) \qquad (2)$$

where, using the notation of equation (1) above, *V* denotes the value accruing to the endogenously priced activities, ~ refers to the target small economy, * to the median country, t represents the cost proportionate disadvantage ratios, a_{ij} the median country's input-output co-efficients, and where, by choice of units, median country prices have been set to unity.

We define five concepts of the income penalty, progressively enlarging the set of inputs with exogenous unavoidable cost disadvantages and correspondingly shrinking the set which has to accommodate the excess costs if exports are to be competitive:

Concept	Inputs bearing the costs of inefficiency	Inputs assumed to have unavoidable cost disadvantages
1	all domestic supplies – primary factors, services and non-traded intermediates	internationally traded intermediate inputs
2	primary factors and services	traded intermediate inputs and utilities
3	primary factors	all intermediate inputs including services
4	capital	all intermediate inputs and labour
5	labour	all intermediate inputs and capital

If all domestically supplied factors, utilities and services (i.e. everything except those goods that are directly traded internationally) can be squeezed to absorb the excess transactions costs of smallness, the relatively small cost disadvantages on intermediate inputs are spread over relatively large flows of income (revenue), and so the proportionate penalty is relatively small. Concept 2 accepts that utilities' costs in small countries are not reducable. Hence it implies larger cost disadvantages loaded onto a smaller base than does concept 1. Concept 3 follows the effective protection literature and takes all intermediates' prices as fixed (by trade or the limits of small-scale technology) and takes value added (primary factors of production) as the residual claimants. Concepts 4 and 5 are arguably the most significant. An individual investor in a small economy will consider the "excess costs" of workers as given, and that she herself is the residual claimant on income. Concept 5 asks essentially a public policy question. If small economies cannot force down the prices of intermediate inputs and if they have to pay a premium to borrow on international capital markets (for example, to compensate for their greater vulnerability or investors' lack of

knowledge about them), how much income can they generate for the local population qua workers?

Table 6 presents the core results of our study in the first row: the cost inflation factors. Subject to inevitably wide margins of error, micro economies face very large competitive challenges indeed. For both clothing and electronic assembly our central estimates suggest that micro-economies have cost inflation factors of 36%, and that for tourism the factor is 58%! The last is driven substantially by our high cost disadvantage estimates for personal travel (and the high share of such travel in overall packages), but even if we set the personal transportation factor to zero, tourism in micro economies would be some 29% more expensive than in an equivalent median-sized economy (not shown in table). For very small economies the cost inflation factors are still a significant 14% and 29% for manufacturing and tourism respectively. For the threshold economies they have fallen to the range 5%-12% and for the small economies they are a mere 3%-6%, well within the range of estimation error and small enough to be overcome by good management. These ranges lend some support to the semi-official practice of placing the threshold for small economies at around 1.5 million inhabitants.

Table 6: Central Case Cost Inflation Factors and Income Penalties

	Electronic Assembly				Clothing				Hotels and Tourism			
	micro	v small	thres	small	micro	v small	thres	Small	micro	v small	thres	small
Cost inflation factor	36.4	14.3	5.0	2.7	36.3	14.3	5.1	2.7	57.5	28.5	11.9	6.2
income penalty (% of median country's income flow)												
1. all domestic supplies	-38.8	-11.6	-3.0	-1.2	-40.1	-12.0	-3.1	-1.3	-36.2	-17.4	-7.1	-3.3
2. factors and services	-42.6	-13.3	-3.6	-1.5	-44.7	-14.0	-3.8	-1.6	-46.3	-22.3	-9.1	-4.3
3. value added	-88.0	-29.2	-8.6	-3.8	-86.0	-28.6	-8.4	-3.7	-71.9	-34.0	-13.7	-6.5
4. capital	-245.1	-91.8	-30.9	-14.1	-263.9	-99.9	-34.0	-15.6	-202.1	-98.4	-40.5	-19.2
5. labour	-175.5	-62.5	-20.1	-11.2	-161.0	-57.3	-18.4	-10.2	-116.5	-56.6	-23.4	-12.4

The ‘income penalties’ in the remaining rows report the extent to which particular elements of the cost structure would have to accept *below* median prices or returns if the target economies were to supply exports at median-country prices. Consider clothing in a micro-economy. If every element of cost were “squeezable”, except for internationally traded intermediates and export freight costs, all those elements would have to accept 40% lower returns then in the median country. If we next assume that

utilities' prices cannot be squeezed either, the remaining elements (factors and service suppliers) would need to take a 45% cut.[25]

The big step occurs if we take services as unavoidably more expensive in small countries. Now the primary factors of production in electronics would earn 86% less than in the median country – that is only 14% of what median factors owners earn. Specialising the burden further to fall only on labour or capital, the other receiving its excess returns indicated by our cost disadvantage estimates, generates income penalties exceeding 100%. That is, if all inputs except capital received the predicted excess prices (returns), capital owners would make losses larger than the gains the median-country capitalists received. If all inputs except labour received the excess prices/costs, there would be nothing to pay the labour with and prices would still exceed median-country levels!

The last two statistics are striking. No one is going to invest capital in a sector that pays negative returns, and while, with fixed weight indices and no allowance for niche marketing, we may have exaggerated the losses, it is difficult to believe that we have the sign wrong. Similarly, suppose that, for public policy purposes, micro-economy governments decided to create a clothing industry. If they had to pay the estimated excess costs for inputs, there would be nothing left over to pay the workers. That is, taking our excess costs as given, micro-economies just could not support a clothing industry. The same applies for electronic assembly and tourism unless they had specific advantages (to which we return below).

Of course, at present small economies manifestly do not suffer these huge income penalties. One possible reason is presumably that they do not undertake these activities, but rather produce and export other goods or services. There is some truth in this – e.g. the small island economies specialising in fishing – but these alternatives also face excess costs of similar magnitudes and so this can not be the whole answer. Another reason is that the economies produce virtually no exports, but rather depend

[25] As we move down the column the figures increase because we are both adding further cost disadvantages to the numerator of equation (2) and removing flows from the denominator, so that the penalties have to be borne on a smaller and smaller base.

on remittances, aid or asset returns to fund essential imports[26]. The third possibility is that preferences on their exports or product differentiation into niche markers allow them to earn prices above those of the median country, or that they have benefactors who will accept below market rates of return on their capital, or labour in return for various non-pecuniary benefits of living in a small economy. Finally, regulation may be more flexible and more cheaply achieved in small economies than in large ones leaving more surplus for real incomes. This continuing advantage is independent of the trading regime they face and so is not vulnerable to removal. Equally, however, it can not be expanded to compensate for any loss of trading advantages as, say, preferences are eroded.

The calculation of these income penalties is apparently an exercise in absolute advantage – we are calculating whether the illustrative activities are viable at existing exchange rates and factor rewards. Thus, the question arises of whether, if the advantages that sustain current activities were eliminated, wages would fall far enough to render them or some other activity viable. We have argued above that all significant alternative activities face these sorts of excess costs, so comparative advantage is not really the critical concept. Rather we should think about the question in terms of the current illustrative activities. But even allowing wages and the prices of services to fall to median-country levels and so treating traded goods and utilities as the only things subject to the disadvantage of smallness, incomes would still need to be 42-46% below those in the median country (income penalty concept 2 from table 6). In fact, even with lower wages the quality-adjusted prices of services would not fall that far, so the cut in incomes would need to be larger. Thus even allowing for general equilibrium effects and for any benefits that comparative advantage could bring, the fundamental issue is the absolute one: facing unavoidable excess real costs of smallness, very small economies would be able to generate only very low real incomes.

In WM we conduct extensive sensitivity tests on these results and find them robust with respect to changes in weights. Clearly they are linear in the cost disadvantage ratios. The most sensitive issue is the transportation cost factor because it is applied to

[26] It is well-known, for example, that aid per head is much higher for small economies than for large

the full value of the export and, for tourism, to 25% of the value of a package. This is clearly an area towards which both future research and policy consideration should be directed.

7. Policy Implications

The message of this paper is robust and stark. While circumstances vary by economy and class of economy it is clear that, on average, micro and very small economies face huge competitive challenges. These economies will not be suitable locations for industry or even tourism unless they have very specific advantages that allow them to charge substantially higher prices than the median country. For hotels and tourism the attractions of small tropical islands are plausible and we do, indeed, see viable tourist industries on them[27] Our results merely indicate that they will need to manage costs carefully and will never achieve mass market penetration.

For manufacturing, on the other hand, the barriers look very high indeed, and if we wish such industries to develop, the leverage of any corrective policies will need to be correspondingly high. One common response is that since the costs of trading are so high, small countries need the right to protect their industries. This is completely mis-guided. The problem is not that that imports can get in too easily but the very opposite. Adding barriers to trade will exacerbate not relieve problems of smallness. Even where local industries could be successfully established behind tariff walls there is nothing in the foregoing analysis to suggest that such an approach would be economically beneficial. The theoretical discussion above showed that following comparative advantage maximised real income: only not sufficiently to provide an adequate income.

A related response has been to suggest subsidising business investment in order to overcome the cost disadvantages of smallness. There are many arguments in the policy-making literature for subsidising business in any economy. We do not accept them, but, even if we did, the point to make here is that smallness adds nothing to

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ones.

them. If you would not subsidise business in a large economy, neither should you do so in an equivalent small one, for precisely the reasons outlined in the previous paragraph. Smallness does not introduce marginal distortions that need to be countervailed, but an overall feasibility constraint. If income is insufficient when you maximise it, it will certainly be insufficient if you do not; and in the absence of the market failures usually adduced to justify subsidies offering support to manufacturing puts you in the latter category.

The conclusion must be that if unviable economies are to be made viable, an additional source of income must be found and, presuming the absence of free technological or organisational lunches, that means from abroad[28]. One source internal to the set of small economies themselves is to economise on the costs of economic management or even of statehood. Andriamananjara and Schiff (2001) and Schiff and Winters (2003) argue strongly that by combining various functions of government small states can both economise on costs and, possibly, exert a greater influence on their environments. Whether such efficiencies are sufficient to overcome the disadvantages we have noted here, we rather doubt, but there is undoubtedly a case for seeking such efficiency gains in any case. We also note that in the cases where smallness appears not to matter – e.g. Luxembourg, Liechtenstein, Andorra – the secret appears to be to integrate extremely closely with the neighbouring large countries.

In the end, however, we suspect that the sources of income to keep large small economies going must be external – that ultimately the international community will have to provide the compensating flows. Merely subsidising capital costs will not generally be sufficient – there are too many other continuing disadvantages. Thus, while international capital transfers – either bilateral or via international financial institutions and development banks – will clearly help to reduce costs by improving infrastructure and perhaps utilities, most of the disadvantages we see above are on the current account – e.g. shipping costs, thin markets for skills etc. The most favourable case for infra-structured salvation is probably communications links. If these are

[27] See Briguglio *et al*. (1996)
[28] Our brief discussion of policy certainly did not suggest that the disadvantages of smallness stemmed from policy inadequacy.

excellent and cheap, services relying on electronic interchange may become competitive. But even so, the costs of importing goods will still be high and even in 'electronic services' personal contacts are important so small remote economies will be disadvantaged to the high travel costs and long travel times. Thus, we believe that one needs continuing current transfer to confer lasting viability.

One superficially promising route is via some sort of preferences for small countries' exports, allowing them to sell at tariff-inclusive prices in industrial country markets rather than world prices. This source of rent has historically been very important – as, for example, with banana or tuna exports to the EU or clothing exports from the Caribbean to the USA. The problems are first that other developing countries have become more hostile to these preferences, as with Latin American challenges to banana preferences and East Asian challenges to those on tuna, and that the more legalistic regime of the WTO makes them far harder to defend than they were under the GATT. Second, that as donors discover new favourites the preferences of the old are eroded: consider Pakistan's recent advantages under the textile quotas and the way in which NAFTA and now AGOA reduced the advantages of the CBI. Third, industrial countries wish, or perhaps are under pressure, to liberalise their trade regimes anyway, so that the benefits of preferences are gradually declining and highly insecure. In all these cases, as rents are reduced, very small economies face large income penalties. A salutary thought is that if very small economies are dependent on rents, the erosion of legal rents could presage a search for less social sources. Very small countries are inherently difficult to police if their governments are not sympathetic to global objectives.

An alternative route could be for industrial countries to subsidise small country trade explicitly – either their exports or their imports or both. This would require conscious policy-shifts in the major capitals and also derogations from WTO agreements. A similar route would be straight income transfers (de Vries, 1975). In either case the issue for the recipients would be the security of such transfers. As we noted above, we believe that they would need to be permanent and so could not be dressed up merely as transitional financing to encourage structural adjustment.

Explicit subsidies to micro and very small economies raise their own very particular political challenges. Specifically, many of the cost disadvantages we have identified must also apply to insular or isolated parts of larger countries. These disadvantaged regions are often subsidised via regional policies, as for example, in the UK, Europe more generally and China. But if small economies were permitted to have export subsidies, one would need to argue why this privilege should not be extended to parts of larger economies, for if it were it would probably fatally undermine subsidies discipline in the WTO. The reason is not hard to formulate, but it may be uncomfortable: within a country, people can move out of uneconomic locations. Ultimately we must face the possibility that if the current preferences that small countries receive are eroded and we do not somehow support their incomes in other ways, many of their inhabitants will seek to work abroad. We have argued elsewhere that liberalising the temporary movements of labour within the world economy – mode 4 of the GATS – promises huge economic gains - Winters *et al*. (2003a, b). This could be a key factor for very small economies, essentially allowing residents to earn abroad but live and consume at home. Temporary workers from small countries would still be at a disadvantage relative to those from larger ones: they would face higher transport costs, less effective networks for finding jobs and easing migratory strains, and higher consumption costs at home. However, particularly if they had preferential access – e.g. guaranteed quotas – the benefits would be large enough to cover the disadvantages. But again the sustainability of preferences would fall under question.

The alternative to temporary mobility would be permanent migration. In the current political climate this touches raw nerves on of both sides: of immigration in most developed countries and of depopulation, and maybe eventual cultural extinction, in the very small economies[29].

The title of Easterly and Kraay's (2000) important paper 'Small countries, small problems' upset many commentators on the problems of small size: the problems, they say, are very large if you face them. But the title contains a silver lining: 'small problems, small solutions'. Particularly if we limit transfers to the micro and very small economies they will need to be only very small in aggregate – small amounts of

money, small flows of people etc. If there is a political will to offer them – not only in the developed, donor, countries but also among developing countries, especially those just too big to receive them – they would be perfectly manageable. Around 3.12 million people (0.05% of the world's population) live in countries of below 200 thousand population, 6.31 million (0.10%) in those below 400 thousand and 28.20 million (0.45%) in those below 1.5 million population. These are not insurmountable by any yardstick.

Annexes

Annex 1: Sample of Countries

Anguilla	Gabon	Netherlands	Sweden
Antigua &Barbuda	Germany	New Zealand	Taiwan
Argentina	Greece	Nigeria	Tanzania
Australia	Grenada	Niue	Thailand
Austria	Guyana	Norway	Tonga
Bangladesh	Hong Kong	Pakistan	Trinidad & Tobago
Barbados	Hungary	Palau	Turkey
Belgium	India	Papua New Guinea	Tuvalu
Belize	Indonesia	Peru	Uganda
Botswana	Ireland	Philippines	United Kingdom
Brazil	Italy	Poland	United States
Cameroon	Jamaica	Portugal	Uruguay
Canada	Japan	Samoa	Vanuatu
Chile	Kenya	Senegal	Venezuela
China	Kiribati	Seychelles	Vietnam
Colombia	Lesotho	Singapore	Zambia
Cook Islands	Malawi	Solomon Islands	Zimbabwe
Cote d'Ivoire	Malaysia	South Africa	
Czech Republic	Marshall Islands	South Korea	
Denmark	Mauritius	Spain	
Dominica	Mexico	Sri Lanka	
Ecuador	Micronesia	St Kitts and Nevis	
Fiji	Mozambique	St. Vincent & The Grenadines	
Finland	Namibia	Suriname	
France	Nauru	Swaziland	

Annex 2: The Continuous Variables from the Survey

Airfreight	▪ Airfreight costs of transporting 100 kilograms of general cargo "to" and "from" London, Tokyo and New York.
Sea freight	▪ Shipping costs of transporting a standard 20ft Full Container Load (FCL)

[29] This scenario also shows why subsidising human capital formation is at best a very partial answer for very small economies: the highly skilled will leave, returning the small economy to square one.

	of general cargo "to" and "from" Rotterdam, Yokohama and New York.
Wages	▪ Average hourly wage for unskilled jobs (3) and annual salary for the rest (8).
Telephone	▪ Rate per minute of local calls during peak hour ▪ Rate per minute of international calls during peak hour ▪ Installation fee for a standard commercial line ▪ Line rental fee for a standard commercial line
Electricity	▪ Costs of electricity for a standard commercial line (KWh) ▪ Connection fee for a standard commercial line
Water	▪ Costs of water for standard commercial rate (per 1000 litres) ▪ Standard commercial connection fees
Fuel	▪ Retail price of diesel per litre ▪ Retail price of petrol per litre
Land	▪ Average annual cost of per square metre of industrial (factory) space (average industrial estate) ▪ Average annual rent of per square metre of office space in the prime location
Bank	▪ Prime commercial bank lending interest rate ▪ Prime commercial bank deposit interest rate
Corporate Tax	▪ Corporate tax rate for residents ▪ Corporate tax rate for non-residents
Import Duties	▪ Un-weighted average (nominal) tariff rate ▪ Import weighted (nominal) tariff rate ▪ Receipts from import duties and taxes (including custom duties, VAT, sales taxes, supplementary duties, etc) as percentage of total government tax revenues as available for the latest year
Personal Air Travel	▪ Cost of economy return from London, Tokyo or New York (separate source)

Note: The data on passenger travel costs were obtained from the Commonwealth Secretariat's travel agents. They represent the cost of an economy return ticket from each capital to the respective destination.

Annex 3: The Categorical Variables from the Survey

Are unskilled/semi-skilled/skilled workers domestically available or do they have to be hired from abroad?	**(1)** Domestically available and there is no need to import them from abroad. **(2)** There are enough workers domestically available to satisfy most of the demand; however occasionally workers need to be imported from abroad. **(3)** Workers are available domestically, but many need to be imported from abroad to satisfy demand **(4)** Some workers are domestically available, but most need to be imported from abroad **(5)** Few workers are available domestically. The vast majority of workers are imported from abroad
How long does it take to get a new connection?	**(1)** <72 hours, **(2)** < 1 week, **(3)** 1 week - 1 month, **(4)** >1 month, **(5)** Not available (i.e., indefinite delays)
How frequently does one experience disruptions?	**(1)** No disruption, **(2)** Very rare, **(3)** Rare, **(4)** Quite frequently **(5)** Most frequently
How long does it take, in general, to have a broken line repaired?	**(1)** 48 hours, **(2)** 5 working days, **(3)** 2 weeks, **(4)** > 2 weeks

(Telephone only)	
Are tax incentives available for exporters and other businesses?	YES/NO
Export duty rate (duties from exports as percentage of total government tax revenues)	Converted into YES/NO since there were too few values (different from 0) to run a regression.
Is there a special exchange rate for exports?	YES/NO

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