Income volatility in small and developing economies: export concentration matters

Marion Jansen, ERSD

World Trade Organization
Geneva, Switzerland

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I. INTRODUCTION

The integration of small economies into the global trading system was one of the issues discussed during the Fourth Ministerial Conference at Doha in 2001. In particular, Members agreed on a WTO work programme, under the auspices of the General Council, to examine issues relating to the trade of small economies. Small country issues have been analysed in the economic literature for several decades now. The reason for the attention devoted to small states is to be found in the general belief that, due to some particular characteristics, small countries are particularly vulnerable and can be more easily hurt in the process of globalization. Yet there is no unanimity of opinion among researchers on this point. Some have argued that being small in a "macro" world is a drawback. Small states for instance cannot enjoy economies of scale both in production and in public administration. They tend to be particularly vulnerable to natural disasters and economic shocks. According to other studies, smallness is an asset in a changing and dynamic world. Small countries can respond quickly and easily to the adjustments required by a changing international economy. The decision-making process can be faster and more flexible when the country's population is less heterogeneous.

Although there seems to be no agreement on whether or not "small is beautiful", there is some agreement in the literature when it comes to common characteristics of small states. For many small states, social and educational indicators are relatively good. Moreover, GDP per capita and GDP growth do not seem to be systematically worse in smaller states than in larger states. In fact, some researchers would argue the opposite.

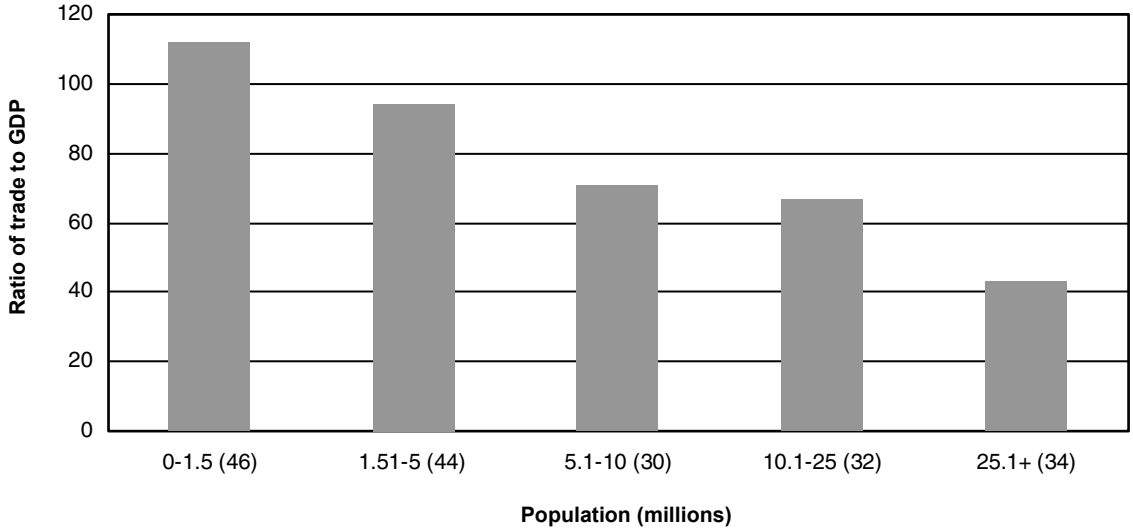
Smaller economies are more open to trade because they have to rely on imports to satisfy their domestic demand. Exports tend to be highly concentrated in a few sectors and small economies tend to be characterized by higher income volatility than their larger counterparts.

Existing literature (Easterly and Kraay, 2000) has argued that high income volatility in small economies is due to their openness and that export concentration plays a minor role. This paper instead argues that export concentration through its effect on terms of trade volatility has a major effect on income volatility. Openness itself has a direct and positive effect on income volatility. If small economies were able to diversify their exports, they could therefore reduce income volatility. This would in turn be likely to have a positive impact on growth, because income volatility has been shown in the economic literature to be bad for growth (e.g. Easterly and Kraay, 2000 and Ramey and Ramey, 1995).

The independent effects of concentration and openness on income volatility can also explain why small economies do not under-perform when it comes to growth (Easterly and Kraay, 2000). While both have an indirect and negative effect on growth through their effect on volatility, openness also has a direct and positive effect on growth. This paper shows that poor economies, in particular LDCs, are like small economies in that they are characterized by high concentration on the export side. Income volatility in LDCs is intriguingly similar to that in small economies. LDCs are on average, however, significantly less open than small economies. Although not directly tested in this paper, this may explain why the growth performance of LDCs is significantly smaller than that of small economies.

II. OPENNESS, GROWTH AND INCOME VOLATILITY IN SMALL ECONOMIES

Chart 1: Small economies' reliance on trade, averages 1980-2000



Note: numbers in brackets indicate the number of observations within each population group. See Appendix for raw data and sources.

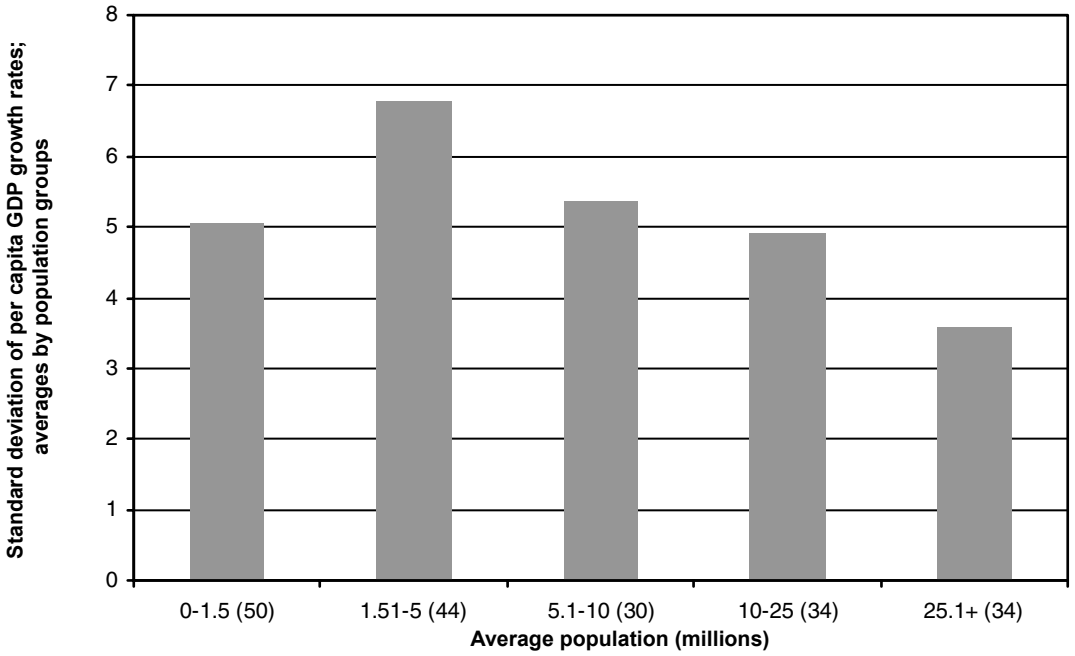
The term "small economies" has been used in different contexts in the literature, and different measures have been used to define "smallness", including population size, land area and GDP. Population size can be considered to be the most popular measure. Population and land area can both be deemed to reflect the size of an economy's factor endowments. GDP is a frequently used measure for market size, as it reflects domestic demand. Throughout this paper the variable population will be used to measure economic size. The term "microstates" will be used to refer to economies with populations smaller than 1.5 million and the term "small states" to refer to economies with populations larger than 1.5 million but smaller than 5 million.[1]

The three measures have in common that smaller values imply stronger limitations to diversify production for the relevant economy. The smaller an economy's factor endowments (labour, land), the more difficult it is to produce a large variety of products. The smaller a country's market (GDP), the lower the probability that it is profitable to produce goods subject to economies of scale. Smaller economies therefore have to rely more heavily on external trade and foreign investment to overcome their inherent scale and resource limitations. Chart 1 shows how openness decreases with economic size.

A high degree of openness brings real benefits that accrue from trade – consumers in small states are able to obtain a greater variety of goods at lower cost than if their choices were confined to domestically produced goods. Additionally, producers in small states can sell on world markets, provided they have effective market access, thus earning more than if they were confined to meeting limited domestic demand. Participation in the world market also helps to channel new ideas and information about opportunities to firms and consumers in small states. However, it has been argued that openness also implies that small

[1]With respect to population size, the literature uses different thresholds when referring to "small economies". Some suggest using a population of 1.5 million as a threshold (Commonwealth Secretariat – World Bank Joint Task Force, 2000), others 5 million or even more (Streeten, 1993, Collier and Dollar, 1999, Brautigam and Woolcock, 2001), and still others something in between (Armstrong et al, 1998). By distinguishing these two groups, microstates and small states, two different definitions are allowed for, although these thresholds will turn out to play only a minor role for the analysis of this paper. Note that in the WTO Membership 30 of 143 Members would be microstates according to the definition used in this paper. Five of them are LDCs. Twenty-seven WTO Members would fall in the group of small states, four of which are LDCs.

Chart 2: Income volatility and population size, 1980-2000



Note: numbers in brackets indicate the number of observations within each population group. See Appendix for raw data and sources.

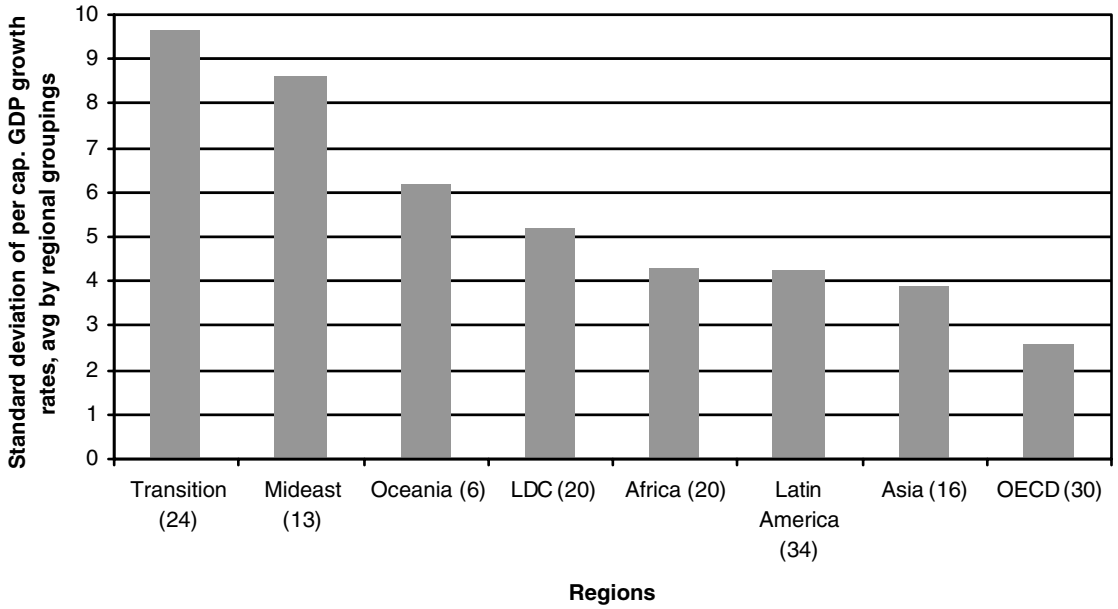
economies are more vulnerable to shocks from outside, which would increase GDP volatility.

Another characteristic unrelated to trade also affects GDP volatility of small economies. According to the Commonwealth Secretariat/World Bank Joint Task Force (2000), many small states are in regions susceptible to natural disasters such as hurricanes, cyclones, drought and volcanic eruptions. Because of the small size of the country, these natural disasters will easily affect the whole population and economy, leading to high fluctuations in GDP. Yet a simple chart, based on the dataset used in this paper, only partly confirms the finding that smaller states are systematically characterized by higher income volatility (see Chart 2).

When countries in our sample are grouped differently, the impression arises that other factors play an important role when it comes to income volatility. Chart 3 shows income volatility for OECD, LDC and transition economies in our sample. All other countries are grouped according to geographical regions. Transition economies are the group with by far the highest income volatility. This is not surprising as the period covered in our data, 1980-2000, is one of major structural changes in that region. On the other extreme, OECD countries are characterized by the lowest income volatility. When moving further left the Chart seems to indicate that poorer economies are prone to higher income volatility. Non-LDC Asian economies are characterized by significantly higher income volatility than OECD countries. Volatility is even higher in Latin America and non-LDC Africa and again makes a jump to a significantly higher value for LDCs. The volatility of the mostly small and remote island economies of Oceania can be related to our discussion of small economies. The economies in our Middle East group are, to a large extent, reliant on petrol volatility and therefore prone to income volatility. These last two groupings indicate that export concentration may have a role in explaining income volatility.

Ramey and Ramey (1995) have shown that income volatility has a strong negative effect on growth. Using a panel of 92 countries, as well as a subset of OECD countries, they show that countries with higher volatility have lower mean growth, even after controlling for other country-specific correlates. Aizenman and Marion (1999) confirm this result for a set of developing countries, for which they find that volatility also affects private investment negatively. This finding can be linked to theoretical models suggesting that, if there are

Chart 3: Income volatility for regional groupings, 1980-2000



Note: numbers in brackets indicate the number of observations within each population group. See Appendix for raw data and sources.

irreversibilities in investment, increased volatility can lead to lower investment.[2]

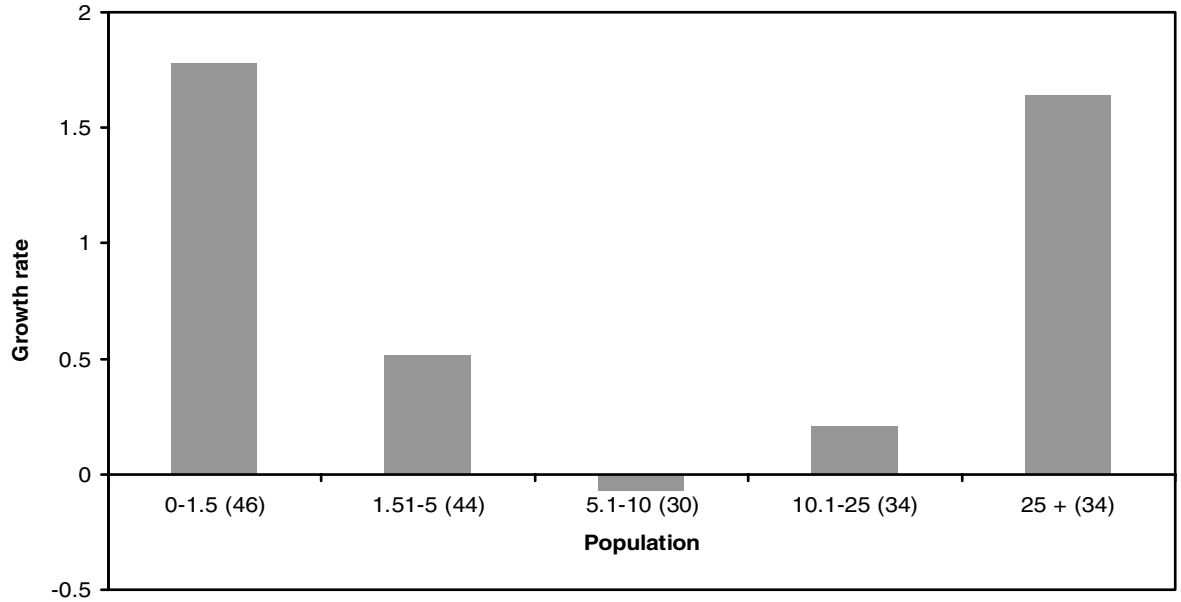
A simple look at our data (Chart 4) does not give the impression that smaller economies grow less. Easterly and Kraay (2000) give an explanation for this weak relationship between economic size and growth. Their analysis shows that openness to trade has a significantly positive effect on GDP growth. They also find that volatility in GDP is bad for GDP growth. Small economies tend to be particularly open and this openness stimulates economic activity and growth. At the same time, however, openness to trade is one of the main reasons for the GDP volatility that characterizes small economies and GDP volatility is bad for economic growth. Easterly and Kraay (2000) argue that the positive and negative effects from openness roughly offset each other in the case of small states. This explains their finding that smallness has no significant effect on economic growth.

However, openness is unlikely to be the only reason for the high income volatility observed in small economies. Charts 2 and 3 show that LDCs and microstates (population smaller than 1.5 million) are characterized by similar levels of income volatility. Yet as a group LDCs are significantly less open to trade than microstates (See Chart 5). According to Easterly and Kraay's argument this would explain why LDCs grow less. Yet at the same time, this indicates that there is a need to have a closer look at the determinants of income volatility.

The present paper will argue that openness alone does not explain the income volatility observed in many small economies. As suggested previously, export concentration also is a part of the story. This is important, as it would not be desirable for small economies to reduce their trade with the outside world. The income volatility caused by openness can therefore not be reduced. But it may be possible to reduce the share of income volatility caused by export concentration through the use of policies of export diversification. This is also true for larger economies that are characterized by high concentration on the export side.

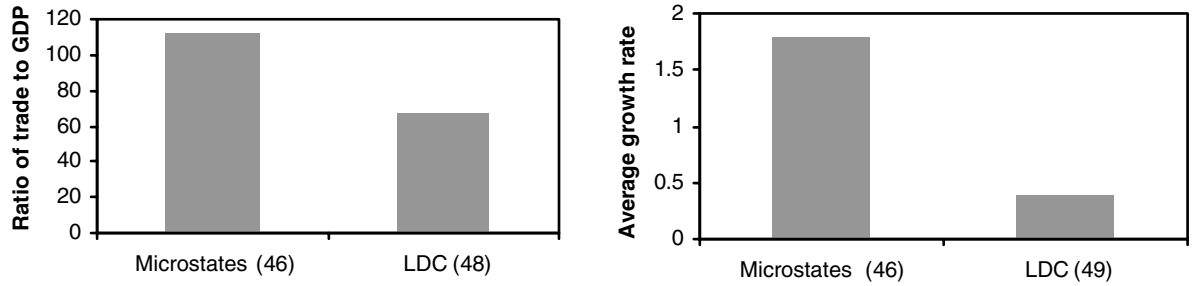
[2] See Ramey and Ramey (1993). Turnovsky and Chattopadhyay (2003) test for the effect of four volatility indicators on income growth in developing countries: GDP volatility, terms of trade volatility, fiscal volatility and monetary volatility. They find that terms of trade, fiscal and monetary volatility have a strongly negative impact on growth. The same is true for GDP volatility if the other measures of volatility are excluded. This finding can to a certain extent be explained by the approach taken in this paper that terms of trade volatility should be considered to be a determinant of income volatility. The two variables are indeed highly correlated.

Chart 4: Average growth rate and population, 1980-2000



Note: numbers in brackets indicate the number of observations within each population group. See Appendix for raw data and sources.

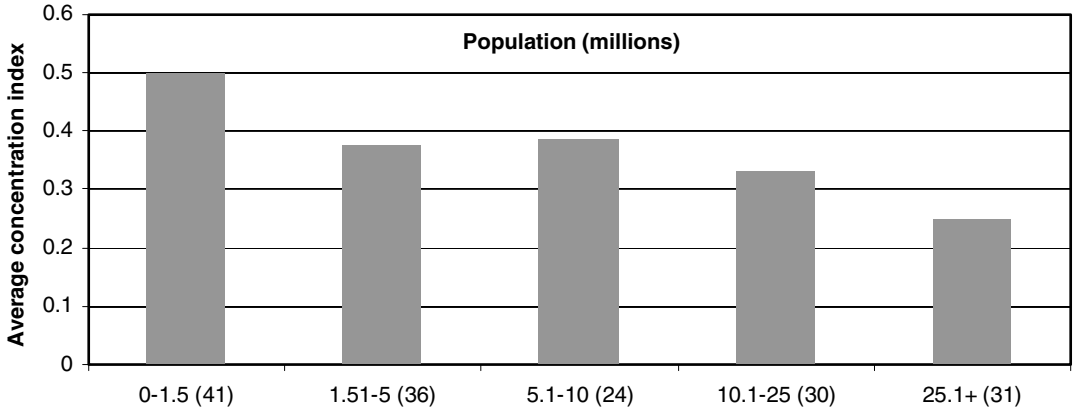
Chart 5: Openness to trade and growth in LDCs and microstates, averages 1980-2000



Note: numbers in brackets indicate the number of observations within each population group. See Appendix for raw data and sources.

III. POSSIBLE DETERMINANTS OF INCOME VOLATILITY: TERMS OF TRADE VOLATILITY AND EXPORT CONCENTRATION

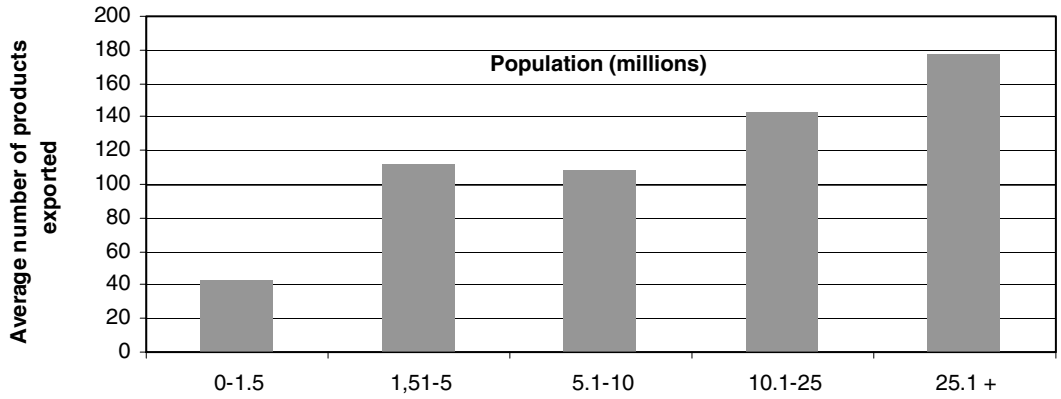
Chart 6: Average export concentration index and population[a], 1980-2000



Note: numbers in brackets indicate the number of observations within each population group. See Appendix for raw data and sources. The Concentration Index is based on merchandise trade only. See Appendix Tables.

[a] Note that this chart is based on the UNCTAD's concentration index, which is computed using data for merchandise trade only. Exports of services are thus not included in this index. The Appendix presents the raw data used to generate the chart and also shows Tables presenting the first and second export commodity or service of WTO Members (Table IV). Those Tables show that many microstates are exporters of commodities and/or services.

Chart 7: Number of products exported and population, 1980-2000



Note: see Appendix for raw data and sources. The number of products exported (only merchandise trade) at the three-digit SITC, Revision 2 level.

It has been mentioned before that smallness limits an economy's opportunities to diversify. Smaller economies therefore have to rely on imports in order to increase the choice of goods and services supplied to their population. At the same time their exports will tend to be less diversified than those of larger countries. It has been argued in the literature that a lack in export diversification is likely to make economies more vulnerable to changes in prices or demand for the few commodities or services they export. Given that trade represents a large share of the economic activity in small economies, fluctuations on the export side are likely to have a negative impact on the stability of the overall economy.

Chart 6 shows that export concentration tends to increase the smaller an economy. Due to resource limitations, small economies in general face limitations to diversify production and thus exports. This problem is compounded by the fact that due to their small size they are unlikely to ever gain competitiveness in certain types of products. Small economies may, for instance, face difficulties in exporting products that are subject to large economies of scale [3], such as motor vehicles or certain chemicals. This is the case because serving the home market will not allow producers to exploit

[3] That is, products for which unit costs fall when they are produced on a larger scale.

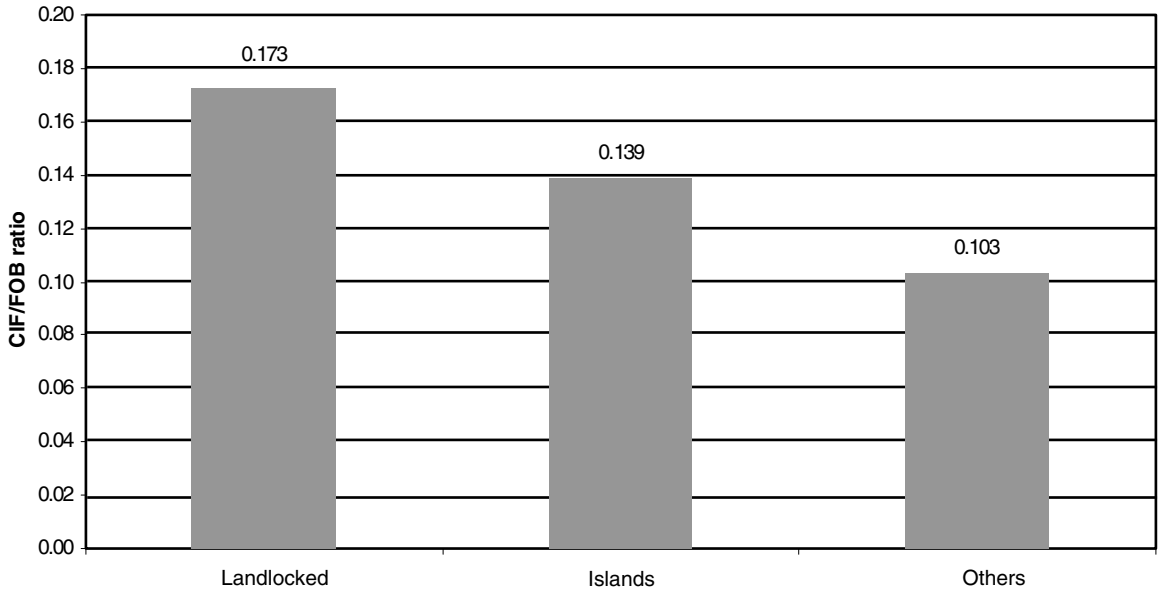
economies of scale and they will produce at high unit costs.[4]

The tendency for export concentration to increase when economic size decreases is confirmed when choosing an alternative measure for export concentration: the number of products exported. Chart 7 shows that the bigger a country, the larger the variety of products it exports.

Small island economies tend to suffer from an additional disadvantage due to the transport costs involved in importing and exporting. Transport costs reduce their possibilities to compete in certain types of products. This is for instance the case for products with a high import content, such as electronics.[5] It is also the case for products facing high transport and/or insurance costs when exported. Products like crude materials (including cork and wood) and food and live animals (including fruits, nuts and sugar) turn out to have among the highest transport costs when measured in CIF/FOB ratios.[6]

Chart 8: Transport costs for WTO Members, 1990

Average CIF/FOB ratios for landlocked Members, islands and other Members



Note: data have been taken from the IFS Yearbook, 1995, published by the IMF. [a]

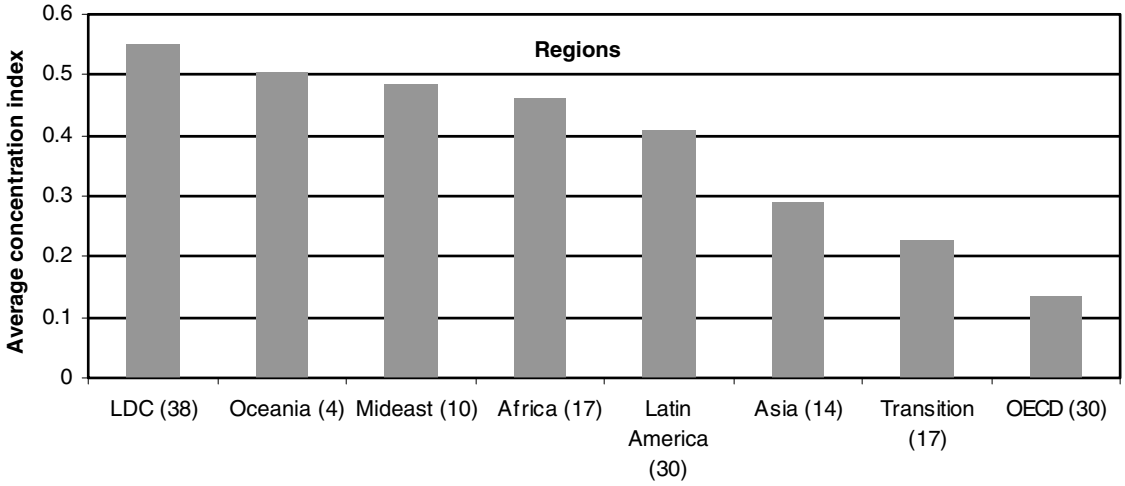
[a] These figures are not a perfectly accurate measure of actual CIF/FOB ratios, since they are in many cases estimated by IMF staff based on incomplete information. For most countries, they show little variance over time, indicating that IMF staff retain a constant CIF/FOB conversion factor once it is established for a country, and revise it only infrequently. Indeed for many countries the ratios have not been updated after 1990 and the IMF has by now stopped publishing IMF ratios. This is why data for 1990 have been used in the calculations, as has been done in Radelet and Sachs (1998) and Limão and Venables (1999).

[4] It has been argued, however, that the home market is not the relevant market for open economies. Their relevant market would also be determined by the market size of foreign partners (Alesina and Spolaore, 1997). In theory, at least, trade may allow small economies to exploit economies of scale. Non-traded goods and services, particularly infrastructure, are not subject to this rule and should they represent an important share of inputs in traded good production, small state competitiveness in international markets might be affected (Srinavasan, 1986).

[5] See Radelet and Sachs (1998).

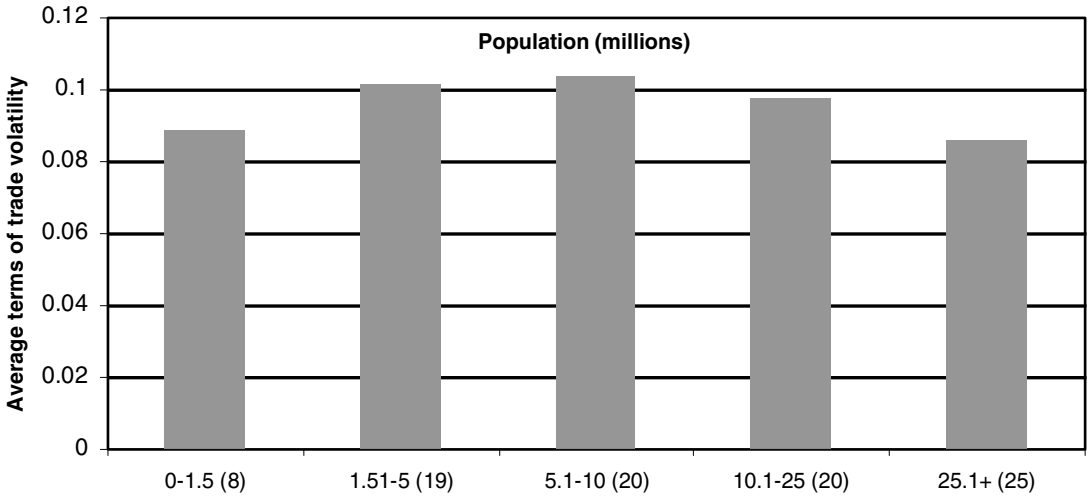
[6] Data on transport costs are not readily available. The most frequently used measure is the so-called "CIF/FOB ratio". The FOB (free on board) price measures the cost of an imported item at the point of shipment by the exporter as it is loaded on to a carrier for transport. The CIF (cost-insurance-freight) price measures the cost of the imported item at the point of entry into the importing country, inclusive of the costs of transport, including insurance, handling, and shipment costs, but not including customs charges. The higher the value of the ratio, the higher the share of transport cost in the value of traded goods.

Chart 9: Average concentration index per region, 1980-2000



Note: numbers in brackets indicate the number of observations within each population group. See Appendix for raw data and sources.

Chart 10: Terms of trade volatility and population, 1980-2000, average values



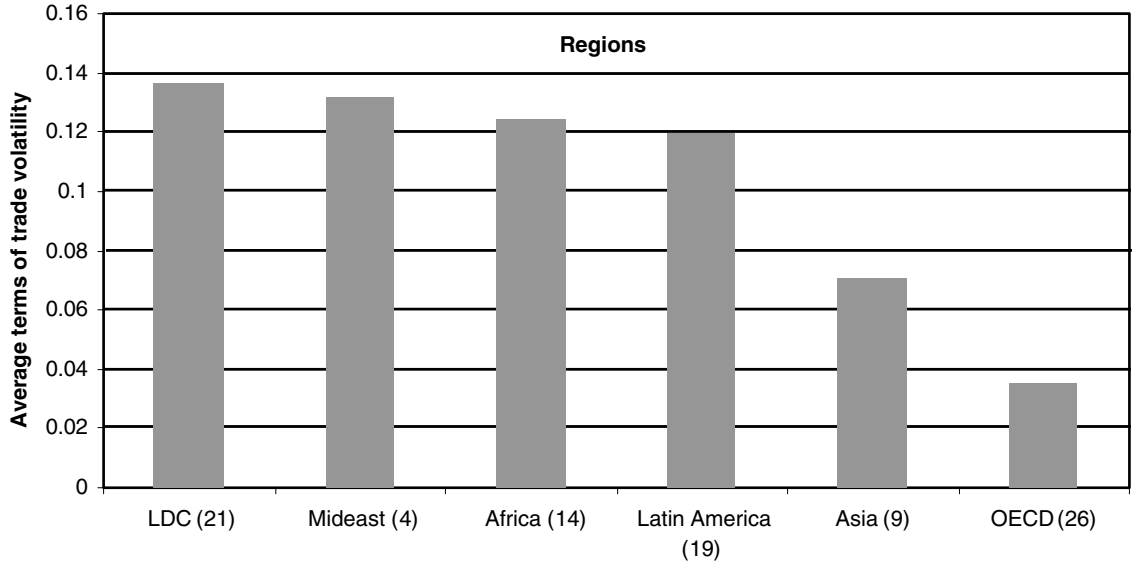
Note: numbers in brackets indicate the number of observations within each population group. See Appendix for raw data and sources.

However, small island economies are not the only type of economies suffering from a disadvantage linked to transportation costs. Chart 8 represents the CIF/FOB ratio for WTO Members divided into three groups: landlocked Members, island Members and other Members. The Chart shows that landlocked Members tend to face the most significant disadvantages when it comes to transport costs. This is because they must pay the high costs of overland transport from neighbouring ports. These costs are increased by the costs of crossing at least one additional border. The finding that landlocked economies face a particular transport cost disadvantage is confirmed by the empirical literature on the subject. Limão and Venables (1999) and Radelet and Sachs (1998) emphasise this phenomenon. Landlocked economies tend not to be characterized by their smallness and this already gives us one reason to believe that economic size is not the only variable that explains the lack of export diversification. In fact, as in the case of economic volatility, economic development also seems to play a role. When looking at the average concentration index per region, the poorest economies, LDCs, turn out to be characterized by the highest export concentration, and the richest countries (OECD) by the lowest concentration. The LDCs are followed by the small island economies of Oceania, the petrol exporting countries in the Middle East and then by non-LDC Africa, Latin America and Asia.

High export concentration is expected to lead to high terms of trade volatility. This is because a change in the price of just one product can have an important impact on the overall terms of trade, when this product is a major export product for the relevant economy. Terms of trade volatility will also depend on the types of products an economy is exporting. Commodities and petrol are products that tend to be characterized by high price volatility. One would thus expect terms of trade volatility to be higher in countries specializing in the exports of these goods. Many small economies are commodity exporters. Petrol exporters instead differ in size. This may be one reason why terms of trade volatility does not decline with economic size as is illustrated in Chart 10. Another reason is that export concentration also depends on an economy's level of development and some of the poorest countries in the world are actually quite large. Another factor that needs to be taken into account when looking at Chart 10 is that reliable terms of trade data are available for only very few economies with less than 1.5 million inhabitants[7]: eight instead of the 41 countries for which data on export concentration are available.

When looking at terms of trade volatility by region[8], instead, a picture arises that looks intriguingly similar to the one for export concentration and income volatility. Transition economies and Oceania are excluded from the chart because of the lack of data. LDCs are characterized by the most volatile environment and OECD countries by the most stable environment. Also the ranking between the other groups: Middle East, Africa, Latin America and Asia, by now looks familiar. The next section shows that these regularities encountered in the charts reflect a statistically significant relationship between income, export concentration, terms of trade volatility and income volatility.

Chart 11: Terms of trade volatility per region, 1980-2000, average values



Note: numbers in brackets indicate the number of observations within each population group. See Appendix for raw data and sources.

[7] See the Appendix for an explanation of how terms of trade volatility has been computed. The eight small economies included in Chart 10 are: Gabon, the Gambia, Guyana, Iceland, Luxemburg, Mauritius, Swaziland and Trinidad and Tobago.

[8] The terms of trade is the ratio of a country's export price index and its import price index.

IV. INCOME VOLATILITY REVISITED

The previous sections have shown that smaller economies tend to be characterized by both higher openness and higher export concentration. These findings are not surprising as smaller economies are limited in their possibilities to diversify production. Therefore they have to rely more on imports than their larger counterparts in order to satisfy domestic demand. They will also experience more difficulties in diversifying their export structure. Smaller economies are also characterized by larger income volatility. This raises therefore the question whether the three variables – income volatility, openness and export concentration are linked.

Charts as the ones shown in the previous sections only show correlations between two variables. They do not say whether the depicted relationships are based on pure coincidence or are statistically significant. They also do not show whether these correlations continue to exist if more than two variables are interacting. In order to analyse multiple linkages one needs to have recourse to econometric analysis. This is done by running regressions: statistical procedures used to estimate the value of a dependent variable based on the value of one or more independent variables. This section will test whether the dependent variable terms of trade volatility can be explained by independent variables measuring export concentration and taking into account whether countries are microstates and/or exporters of commodities or oil. This section also tries to explain income volatility and tests whether it is determined by terms of trade volatility, countries' openness and their GDP per capita.

Rodrik (1997) presents similar regressions, the results of which show that "exposure to external risk" affects GDP volatility positively. In his paper exposure to external risk is measured by terms of trade volatility weighted by the relevant country's openness. In other words, the more volatile terms of trade and the more open an economy, the higher its income volatility. Rodrik's regression takes into account that income volatility may be region specific. This is done by including so-called dummies for OECD countries, East Asia, Latin America and Sub-Saharan Africa. Only the first two are significant and they have a negative effect on GDP volatility. In other words, income volatility in OECD and East Asian economies is lower than in other economies with similar levels of exposure to external risk. This confirms the finding in previous sections of this paper that more developed countries suffer less from economic volatility.

Easterly and Kraay (2000) also show that weighted terms of trade volatility has a significant effect on income volatility. They include in their regressions dummies for commodity exporters and oil exporters, in order to take into account that they are more likely to suffer extreme fluctuations in their terms of trade, due to the higher price fluctuations in these products. Both dummies are indeed significant and have the expected positive sign. In addition, the regression includes a small state dummy for states with a population smaller than one million. This dummy is also significant and positive, indicating that even after controlling for terms of trade volatility, income volatility in small states is significantly higher than in non-small states.

Easterly and Kraay (2000) argue that this is due to the inherent openness of small states. To make this point, the authors perform two regressions. In the first one, they use the weighted terms of trade as the dependent variable, and in the second one the so-called "un-weighted" terms of trade. The difference between the two measures is that in the latter case, the difference between growth in export prices and growth in import prices is not weighted by the share of exports/imports in GDP. The "un-weighted" terms of trade variable thus fails to capture a country's openness to trade. The authors regress each dependent variable on dummies for commodity exporters, oil exporters and small states. The result is that it is only in the case of weighted terms of trade that the small state dummy is significant and has the expected positive sign. The authors interpret this result as casting "doubt on the notion that small states are especially vulnerable to external shocks because their international trade is more specialized". Instead they argue that this vulnerability is due to the inherent openness of small economies. But they also admit that their evidence on this issue cannot be considered to be conclusive.[9]

[9] Love (1986) discusses the results of a number of cross country empirical studies that attempt to measure the impact of export concentration on export earnings. He acknowledges that there is indeed little evidence for concentration leading to higher export instability. He suggests using time series instead of cross country analysis and performing regressions for a number of developing countries. His results are, in general, satisfactory, in the sense that he finds in many cases a positive and statistically significant relationship between export concentration and export instability.

Box 1: Determinants of terms of trade volatility - regression results

Regression I in Table 1 regresses (un-weighted) terms of trade volatility on dummies for commodity exporters, oil exporters and microstates, defined as states with a population smaller than 1.5 million. The measures used are slightly different from the ones used in Easterly and Kraay but the results of the regression are similar in that only the dummies for commodity exporters and oil exporters are statistically significant.[a] Regression II adds UNCTAD's index for export concentration to the regression. Larger values for this index reflect a higher concentration in the exports of the relevant country. Unfortunately, this index only refers to merchandise trade and therefore does not capture concentration in specific services, like the tourism industry. The fit of the regression improves significantly with the R^2 increasing from 0.47 to 0.63 and the concentration index has a highly significant and positive sign.[b] The microstate dummy now also becomes significant, although it remains negative. The basic results don't change when using an alternative variable to measure export concentration: the number of products exported (Regression III).[c] The sign of this variable is negative as a lower number of products reflects higher export concentration. Regression IV includes an index for political stability. This index is highly significant with the expected negative sign, while the microstate dummy becomes insignificant.[d] All other variables, in particular the concentration index, remain significant at the 1 or 5 per cent level.

Table 1: Terms of trade volatility

Dependent variable	Standard deviation of log differences in terms of trade: 1980-2000			
	Regression I	Regression II	Regression III	Regression IV
Constant	0.056	0.027	0.126	0.044
	(7.188)***	(3.243)***	(7.766)***	(4.854)***
Oil exporter	0.155	0.094	0.127	0.077
	(8.150)***	(4.815)***	(7.495)***	(4.235)***
Commodity exporter	0.067	0.031	0.027	0.021
	(5.896)***	(2.860)***	(2.188)**	(2.121)**
Microstate	-0.031	-0.034)	-0.049	-0.017
	(-1.604)	(-2.058)**	(-2.760)***	(-1.090)
Export concentration		0.138		0.107
		(4.962)***		(3.783)***
Number of products exported			-0.00038	
			(-4.789)***	
Political stability				-0.020
				(-3.499)***
R-squared	0.479	0.631	0.615	0.695
number of observation	92	88	88	86

Figures in brackets indicate t-statistics

*** refers to significance at the 1 per cent level; ** refers to significance at the 5 per cent level.

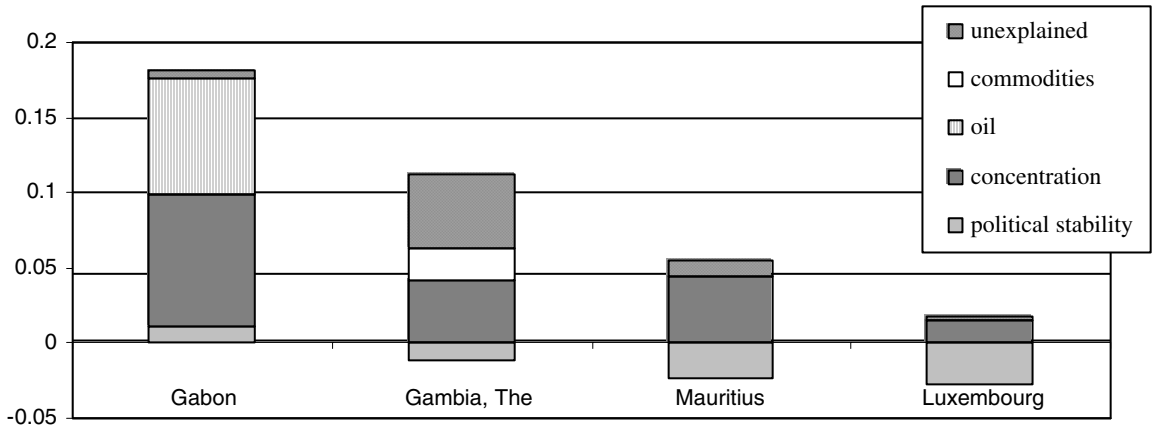
[a] Statistical significance in Table I is reflected in the so-called t-statistics, which indicate the significance of the relevant parameters. If, for instance, the parameter belonging to the variable export concentration is significant at the 1 per cent level, this indicates that the probability of export concentration having no impact on terms of trade volatility is less or equal to 1 per cent.

[b] The fit of the regression is given by the R-square in Table I. For Regression I the R-square is equal to 0.479 which indicates that 47.9 per cent of the cross-country variation in terms of trade volatility is explained by the variation in the independent variables used in the regression.

[c] Also obtained from UNCTAD statistics.

[d] Including GDP per capita has a similar effect. GDP per capita has the expected negative sign and is significant at the 5 per cent level. The microstate dummy remains negative and insignificant. The R-square in this regression is 0.654 and thus lower than the R-square of Regression IV.

Chart 12: Terms of trade volatility explained - the example of four microstates



Note: the area "unexplained" is the sum of the constant and the error value of the regression. From this value the political stability effect is deduced whenever it is negative in order to allow for the visualization of its negative impact in the graph.

When approaching the relationship between terms of trade volatility in a different way, it becomes clear that the conclusion in the Easterly and Kraay (2000) paper does indeed not seem to be justified. In order to show this a regression is run that is similar to the one in their paper (Regression I). The results of this regression are compared with those of a regression that includes a measure for export concentration as an independent variable (Regression II and III).

The results are reported in Box 1 and indicate that un-weighted terms of trade volatility is higher in countries characterized by higher export concentration.[10] This relationship is stronger if exports are concentrated in products that suffer from high price volatility, like commodities and oil. Being a microstate has an attenuating effect on terms of trade instability, but only after having controlled for export concentration and the role of oil and commodities in exports. Given that many microstates have highly concentrated exports and that those exports are often concentrated in commodities, their concern about a lack of diversification is entirely justified.

Two other aspects should be taken into account when evaluating the result on microstates. First of all in Regression II only seven observations refer to states with a population smaller than 1.5 million. This is because reliable terms of trade data are available for very few microstates. The seven relevant observations include two OECD countries: Iceland and Luxembourg.[11] This may be one of the reasons why the microstate variable turns insignificant if other variables, like a measure for political stability, are included.

The following Chart depicts the implications of the regression results for four microstates in the relevant sample[12]: Gabon, the Gambia, Mauritius and Luxembourg. It shows to what extent each country's terms of trade volatility can be explained by the different variables included in the regression. Clearly the three variables referring to the concentration of exports (concentration index, commodity exporter and oil exporter) explain an important part of terms of trade volatility. The one microstate that is neither an oil exporter nor a commodity exporter and has a rather low level of export concentration, has also by far the lowest terms of trade volatility. Not surprisingly this country is Luxembourg.

The next step will be to explain countries' income volatility. Terms of trade volatility is expected to be one of the determinants of income volatility, in accordance with the results of Rodrik (1997) and Easterly and Kraay (2000). As discussed before, richer countries are also expected to be less volatile and more open economies to be more volatile. Instead of including regional dummies as in Rodrik (1997) and Easterly and Kraay (2000), the variable GDP per capita is included in the regression. The regression results presented in Box 2 confirm that higher terms of trade volatility leads to higher income volatility. Besides, more open and poorer economies are characterized by higher income volatility.

[10] See Parris (2003) for similar results.

[11] The other countries are: Gabon, the Gambia, Guyana, Mauritius and Trinidad and Tobago.

[12] The parameters that have been used to generate the Chart are the ones of regression IV.

Box 2: Determinants of income volatility - regression results

Regression V regresses income volatility on openness, GDP per capita and (un-weighted) terms of trade volatility. All three independent variables have the expected sign and are highly significant. In Regression VI the microstate dummy is added. This dummy has the expected positive sign, but is not significant.

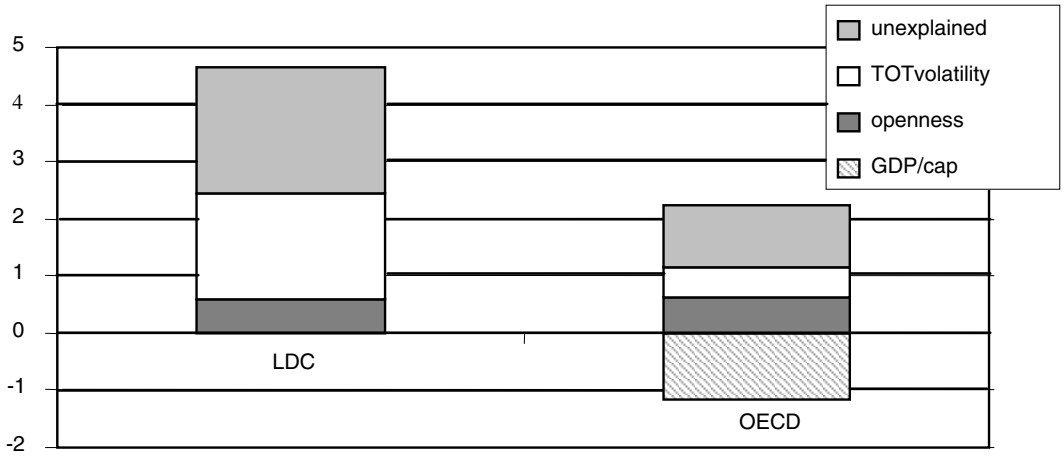
Table 2: Income volatility

Dependent variable	Regression V Standard deviation of growth rates of real GDP	Regression VI Standard deviation of growth rates of real GDP
Constant	2.323 (4.512)***	2.364 (4.435)**
Average openness, 1980-2000	0.0092 (2.166)**	0.0085 (1.752)
Average GDP per capita, 1980-2000	-0.000053 (-2.932)***	-0.000053 (-2.927)***
Terms of trade volatility	14.222 (5.035)***	14.131 (4.953)***
Microstates		0.217 (0.326)
R-squared	0.431	0.432
Number of observations	91	91

Figures in brackets indicate t-statistics

*** refers to significance at the 1 per cent level, ** refers to significance at the 5 per cent level, * refers to significance at the 10 per cent level.

Chart 13: Income volatility and its determinants - LDCs and OECD countries



Note: the area "unexplained" is the sum of the constant and the error value of the regression. To this value the (negative) GDP per capita effect is added in order to allow for the visualization of its negative impact graphically

Chart 13 shows what the regression results imply for the average LDC country and the average OECD country.[13] Income volatility in LDCs is on average more than twice as large as in OECD countries. This is mainly due to the difference in terms of trade volatility, but also to a large extent to lower GDP per capita in LDCs.

[13] The parameters that have been used to generate the Chart are the ones of regression V.

V. CONCLUSIONS

This paper has shown that smaller economies tend to be characterized by both higher openness and higher export concentration. These findings have previously been pointed out in the literature and reflect that smaller economies are limited in their possibilities to diversify production. Therefore they have to rely more on imports than their larger counterparts in order to satisfy domestic demand and they experience more difficulties in diversifying their export structure. Smaller economies are also characterized by larger income volatility. The paper has also shown that poor economies, in particular LDCs, are like small economies in that they are characterized by high concentration on the export side. Income volatility in LDCs is intriguingly similar to that in small economies. LDCs are on average, however, significantly less open than small economies. This raises the question whether and to which extent the three variables – income volatility, openness and export concentration are linked.

The econometric analysis presented in this paper has shown that export concentration has a positive and significant effect on terms of trade volatility. This effect is increased if exports are concentrated in commodities, including oil, that are characterized by high price volatility. In other words, the more concentrated are the exports, the more volatile a country's terms of trade are likely to be, in particular if exports are concentrated in commodities.

Terms of trade volatility, in turn, affects income volatility positively and so does openness. High income volatility in small economies can thus be explained by their high level of openness and their lack of export diversification. GDP per capita has a significantly negative effect on income volatility. This may explain why particularly poor economies, like LDCs, are also characterized by high income volatility, even though they do not tend to be characterized by particularly high levels of openness. Empirical growth literature has shown that income volatility is bad for economic growth. Small economies and LDCs would therefore both benefit from further diversification of their exports. The latter may not be straightforward in certain microstates, where the possibilities to diversify production are limited by their smallness.

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VII. APPENDIX TABLES

Table I: Export concentration, number of products exported and terms of trade volatility
A. countries of population <1.5 million

Rank	Country name	Export concentration	Number of products exported	Terms of trade volatility
1	Palau	--	--	--
2	Marshall Islands	--	--	--
3	Cayman Islands*	0.380	13	--
4	St. Kitts and Nevis*	0.504	15	--
5	Faeroe Islands*	0.578	12	--
6	Greenland*	0.500	19	--
7	Bermuda	0.985	2	--
8	Antigua and Barbuda	--	--	--
9	Andorra	--	58	--
10	Seychelles*	0.693	7	--
11	Kiribati*	0.691	5	--
12	Dominica*	0.611	16	--
13	Aruba	0.303	29	--
14	Grenada	0.447	15	--
15	Micronesia, Fed. Sts.	--	--	--
16	Tonga*	--	11	--
17	St. Vincent and the Grenad.	0.463	23	--
18	Virgin Islands (U.S.)	--	--	--
19	Sao Tome and Principe	--	--	--
20	St. Lucia*	0.584	23	--
21	Vanuatu*	0.592	13	--
22	Channel Islands	--	--	--
23	Mayotte	--	--	--
24	Samoa*	0.440	12	--
25	New Caledonia	0.573	37	--
26	Belize*	0.431	17	--
27	Netherlands Antilles	--	59	--
28	French Polynesia	0.392	39	--
29	Maldives*	0.433	10	--
30	Iceland*	0.432	66	0.028
31	Bahamas, The	0.620	11	--
32	Barbados	0.285	66	--
33	Brunei**	0.645	24	--
34	Solomon Islands*	0.434	12	--
35	Cape Verde*	0.438	11	--
36	Equatorial Guinea*	--	--	--
37	Macao, China	0.312	106	--
38	Malta	0.500	95	--
39	Luxembourg	0.140	192	0.018
40	Surinam	0.665	21	--
41	Qatar**	0.690	32	--
42	Comoros*	--	8	--
43	Djibouti	0.507	19	--
44	Bahrain**	0.540	91	--
45	Bhutan	0.328	24	--
46	Cyprus	0.171	107	--
47	Fiji*	0.545	54	--
48	Guyana	0.540	31	0.093
49	Swaziland	--	--	0.036
50	Gambia, The*	0.388	27	0.112
51	Gabon**	0.820	33	0.181
52	Guinea-Bissau*	0.880	6	--
53	Mauritius	0.414	76	0.055
54	Trinidad and Tobago**	0.453	115	0.188
55	Botswana	--	129	--
57	Estonia	0.115	204	--

* Commodity exporters; ** Oil exporters; "--": data not available

Table I: Export concentration, number of products exported and terms of trade volatility
B. countries of population 1.51- 5 million

Rank	Country name	Export concentration	Number of products exported	Terms of trade volatility
58	Lesotho	0.616	--	0.081
59	Kuwait**	0.648	141	--
60	Oman**	0.701	119	--
61	United Arab Emirates**	0.397	79	--
62	Macedonia, FYR	0.135	154	--
63	Slovenia	0.096	209	--
64	Mauritania*	0.535	13	0.079
65	Mongolia*	0.530	42	--
66	Congo, Rep.**	0.865	30	0.232
67	Panama	0.363	78	--
68	Jamaica	0.577	77	0.110
69	West Bank and Gaza	--	--	--
70	Liberia*	0.847	23	--
71	Latvia	0.164	189	--
72	Central African Republic*	0.475	20	--
73	Costa Rica*	0.301	145	0.084
74	Uruguay*	0.194	144	0.066
75	Albania	0.200	81	--
76	Singapore	0.213	228	--
77	Eritrea	--	--	--
78	Jordan*	0.326	104	0.107
79	New Zealand*	0.190	198	0.040
80	Togo*	0.488	42	0.100
81	Armenia	0.295	82	--
82	Puerto Rico	--	--	--
83	Ireland	0.143	221	0.026
84	Lithuania	--	209	--
85	Lebanon	--	167	--
86	Turkmenistan	--	52	--
87	Nicaragua*	0.310	75	0.271
88	Papua New Guinea*	0.474	57	0.089
89	Sierra Leone*	0.415	17	0.158
90	Bosnia and Herzegovina	--	--	--
91	Lao PDR*	--	--	--
92	Paraguay*	0.419	60	0.144
93	Moldova*	0.263	119	--
94	Libya**	0.117	18	--
95	Norway	0.330	214	0.065
96	Kyrgyz Republic	0.215	128	--
97	Croatia	0.119	206	--
98	Benin*	0.770	23	0.141
99	Israel	0.256	193	0.028
100	Honduras*	0.428	91	0.082
101	Finland	0.210	213	0.030

* Commodity exporters

** Oil exporters

--: data not available

Table I: Export concentration, number of products exported and terms of trade volatility
C. countries of population 5.1-10 million

Rank	Country name	Export concentration	Number of products exported	Terms of trade volatility
102	Denmark	0.079	227	0.023
103	Tajikistan	--	46	--
104	El Salvador*	0.383	120	0.111
105	Slovak Republic	0.110	217	--
106	Georgia	--	105	--
107	Burundi*	--	13	0.242
108	Guinea*	0.687	27	--
109	Hong Kong, China	0.158	170	0.015
110	Chad	--	--	0.119
111	Haiti	0.265	34	0.187
112	Bolivia*	0.361	68	0.107
113	Rwanda	--	--	0.317
114	Switzerland	0.101	219	0.036
115	Dominican Republic	0.380	104	0.000
116	Azerbaijan	0.475	97	--
117	Somalia*	0.900	12	--
118	Senegal*	0.269	106	0.071
119	Austria	0.060	226	0.014
120	Zambia*	0.840	73	0.250
121	Niger*	0.743	20	0.143
122	Tunisia	0.279	157	0.032
123	Malawi*	0.595	37	0.116
124	Mali*	0.697	20	0.074
125	Sweden	0.116	230	0.022
126	Bulgaria	0.150	209	--
127	Guatemala*	0.274	146	0.077
128	Burkina	0.473	30	0.084
129	Cambodia	--	--	--
130	Angola**	0.820	13	--
131	Portugal	0.103	214	0.035

* Commodity exporters

** Oil exporters

--: data not available

Table I: Export concentration, number of products exported and terms of trade volatility
D. countries of population 10.1-25 million

Rank	Country name	Export concentration	Number of products exported	Terms of trade volatility
132	Belgium	0.100	234	0.018
133	Zimbabwe*	0.282	167	0.090
134	Belarus	0.105	207	
135	Greece	0.120	202	0.030
136	Ecuador	0.471	98	0.126
137	Czech Republic	0.061	227	--
138	Yugoslavia, Fed. Rep.	0.105	196	--
139	Hungary	0.224	121	0.022
140	Cuba	--	--	--
141	Cameroon*	0.367	90	0.217
142	Madagascar*	0.346	60	0.078
143	Cote d'Ivoire*	0.378	144	0.150
144	Syrian Arab Republic**	0.508	87	0.149
145	Iraq	--	--	--
146	Yemen, Rep.**	0.797	31	--
147	Chile*	0.333	179	0.083
148	Mozambique*	0.423	63	--
149	Netherlands	0.087	233	0.010
150	Ghana	0.420	95	0.156
151	Saudi Arabia**	0.775	149	--
152	Kazakhstan	0.266	178	--
153	Uganda*	0.610	72	--
154	Australia*	0.177	230	0.051
155	Sri Lanka	0.301	115	--
156	Malaysia	0.220	219	0.052
157	Afghanistan	--	--	--
158	Nepal	0.395	38	0.002
159	Venezuela, RB**	0.595	166	0.230
160	Uzbekistan	--	--	--
161	Peru	0.253	157	0.113
162	Romania*	0.132	190	--
163	Kenya*	0.312	136	0.096
164	Morocco	0.211	137	0.064
165	Algeria**	0.580	70	0.225

* Commodity exporters

** Oil exporters

--: data not available

Table I: Export concentration, number of products exported and terms of trade volatility
E. countries of population >25 million

Rank	Country name	Export concentration	Number of products exported	Terms of trade volatility
166	Sudan*	0.328	22	--
167	Tanzania*	0.243	109	--
168	Canada	0.130	228	0.028
169	Argentina	0.157	208	0.087
170	Colombia	0.359	174	0.079
171	South Africa	0.347	228	0.056
172	Poland	0.095	208	--
173	Congo, Dem. Rep.	--	--	--
174	Spain	0.112	232	0.055
175	Myanmar*	0.370	40	0.144
176	Korea, Rep.	0.122	213	0.043
177	Ethiopia*	0.650	25	--
178	Ukraine	--	--	--
179	Egypt, Arab Rep.	0.367	130	0.109
180	Iran, Islamic Rep.**	0.813	166	0.243
181	Thailand	0.128	202	0.062
182	Turkey	0.109	208	--
183	France	0.059	237	0.031
184	Italy	0.059	234	0.037
185	United Kingdom	0.085	236	0.018
186	Philippines	0.295	179	0.070
187	Vietnam	--	--	--
188	Germany	0.089	236	0.032
189	Mexico	0.199	222	0.090
190	Nigeria**	0.962	71	0.272
191	Bangladesh	0.295	60	0.129
192	Pakistan	0.226	133	0.132
193	Japan	0.134	222	0.082
194	Russian Federation	0.262	225	--
195	Brazil	0.102	218	0.095
196	Indonesia**	0.303	184	0.115
197	United States	0.078	235	0.035
198	India	0.144	211	0.064
199	China	0.097	213	0.038

* Commodities exporters

** Oil exporters

--: data not available

Notes for Table I:

Oil exporters are the 20 major petroleum exporters as defined in UNCTAD Handbook of Statistics, 2002.

Commodity exporters are countries for which commodities represent more than 50% of total exports. Average exports for 1980-2000 from WDI have been used to determine relevant countries.

The number of products exported and the concentration index have been taken from the UNCTAD Handbook of Statistics, 2002.

Terms of trade volatility has been defined as the standard deviation of the log differences in terms of trade over the period 1980-2000. Terms of trade have been constructed by dividing each year's export deflator by the import deflator, each of them being measured as the ratio of current to constant local currency exports or imports. Data for current and constant currency exports and imports have been taken from the WDI database.

Table II: GDP volatility and openness by country
A. countries of population <1.5million

Rank	Country name	GDP volatility	openness
1	Palau	9.0	68
2	Cayman Islands	--	--
3	St. Kitts and Nevis	3.8	135
4	Faeroe Islands	--	--
5	Marshall Islands	8.7	79
6	Greenland	--	--
7	Bermuda	3.3	--
8	Antigua and Barbuda	3.6	167
9	Andorra	--	--
10	Seychelles	5.0	129
11	Kiribati	12.8	130
12	Dominica	3.9	115
13	Aruba	5.0	--
14	Grenada	3.5	115
15	Micronesia, Fed. Sts.	3.9	110
16	Tonga	2.6	90
17	St. Vincent and the Grenadines	3.4	137
18	Virgin Islands (U.S.)	4.5	--
19	Sao Tome and Principe	0.6	94
20	St. Lucia	8.3	143
21	Channel Islands	--	--
22	Mayotte	--	--
23	Vanuatu	4.9	105
24	Samoa	4.7	95
25	New Caledonia	8.1	45
26	Belize	4.7	118
27	Netherlands Antilles	1.4	--
28	French Polynesia	3.0	29
29	Maldives	3.8	116
30	Iceland	3.0	69
31	Bahamas, The	4.4	125
32	Barbados	4.0	114
33	Brunei	5.5	--
34	Solomon Islands	7.1	133
35	Cape Verde	2.8	68
36	Equatorial Guinea	19.9	137
37	Macao, China	5.2	157
38	Malta	2.2	179
39	Luxembourg	3.1	206
40	Suriname	8.0	61
41	Qatar	--	80
42	Comoros	3.8	61
43	Djibouti	1.9	104
44	Bahrain	5.4	180
45	Bhutan	3.5	71
46	Cyprus	2.5	104
47	Fiji	5.6	109
48	Guyana	5.8	177
49	Swaziland	5.9	160
50	Gambia, The	2.7	114
51	Gabon	6.3	91
52	Guinea-Bissau	9.5	54
53	Mauritius	4.0	121
54	Trinidad and Tobago	4.5	83
55	Botswana	3.6	95
56	Namibia	2.9	108
57	Estonia	7.0	155

--: data not available

Table II: GDP volatility and openness by country
B. countries of population 1. 51-5 million

Rank	Country name	GDP volatility	openness
58	Lesotho	4.3	137
59	Kuwait	13.7	99
60	Oman	5.9	89
61	United Arab Emirates	10.1	105
62	Macedonia, FYR	4.6	85
63	Slovenia	4.9	120
64	Mauritania	2.6	108
65	Mongolia	5.2	117
66	Congo, Rep.	7.9	110
67	Panama	5.0	76
68	Jamaica	3.5	103
69	West Bank and Gaza	5.6	86
70	Liberia	1.0	92
71	Latvia	9.7	106
72	Central African Republic	4.9	46
73	Costa Rica	3.9	78
74	Uruguay	5.2	41
75	Albania	9.2	47
76	Singapore	3.6	360
77	Eritrea	5.9	107
78	Jordan	6.5	121
79	New Zealand	2.1	59
80	Togo	6.9	86
81	Armenia	15.4	88
82	Puerto Rico	2.6	136
83	Ireland	3.5	121
84	Lithuania	10.0	104
85	Lebanon	18.8	77
86	Turkmenistan	11.0	104
87	Nicaragua	4.4	75
88	Papua New Guinea	5.8	94
89	Sierra Leone	6.9	42
90	Bosnia and Herzegovina	30.4	96
91	Lao PDR	3.7	31
92	Paraguay	4.0	61
93	Moldova	10.9	120
94	Libya	6.2	89
95	Norway	1.8	74
96	Kyrgyz Republic	10.1	83
97	Croatia	9.5	103
98	Benin	3.4	48
99	Israel	2.2	86
100	Honduras	2.6	74
101	Finland	3.1	59

Table II: GDP volatility and openness by country
C. countries of population 5.1-10 million

Rank	Country name	GDP volatility	Openness
102	Denmark	1.8	68
103	Tajikistan	12.1	107
104	El Salvador	5.2	54
105	Slovak Republic	5.6	108
106	Georgia	16.6	84
107	Burundi	5.3	34
108	Guinea	1.5	51
109	Hong Kong, China	4.2	245
110	Chad	8.3	44
111	Haiti	4.4	39
112	Bolivia	3.1	48
113	Rwanda	14.9	31
114	Switzerland	1.7	71
115	Dominican Republic	3.6	62
116	Azerbaijan	12.9	95
117	Somalia	4.9	64
118	Senegal	4.2	68
119	Austria	1.2	77
120	Zambia	3.8	72
121	Niger	5.7	44
122	Tunisia	2.7	85
123	Malawi	5.8	59
124	Mali	4.6	53
125	Sweden	1.9	67
126	Bulgaria	5.9	89
127	Guatemala	2.5	39
128	Burkina Faso	3.7	41
129	Cambodia	3.1	52
130	Angola	7.4	106
131	Portugal	2.2	67

Table II: GDP volatility and openness by country
D. countries of population 10.1-25 million

Rank	Country name	GDP volatility	openness
132	Belgium	1.6	139
133	Zimbabwe	5.6	58
134	Belarus	7.8	117
135	Greece	2.1	47
136	Ecuador	3.8	54
137	Czech Republic	4.8	113
138	Yugoslavia, Fed. Rep.	10.3	82
139	Hungary	3.8	80
140	Cuba	2.6	33
141	Cameroon	6.0	48
142	Madagascar	3.5	42
143	Cote d'Ivoire	4.2	72
144	Syrian Arab Republic	5.9	55
145	Yemen, Rep.	2.8	63
146	Chile	5.1	56
147	Mozambique	7.7	42
148	Netherlands	1.5	114
149	Ghana	3.7	48
150	Saudi Arabia	4.8	82
151	Kazakhstan	6.7	89
152	Uganda	3.6	31
153	Australia	2.0	36
154	Sri Lanka	1.4	73
155	Iraq	23.8	--
156	Malaysia	4.3	149
157	Nepal	3.1	42
158	Afghanistan	3.0	--
159	Venezuela, RB	4.8	48
160	Uzbekistan	5.1	69
161	Peru	6.7	32
162	Romania	5.4	54
163	Kenya	2.2	59
164	Morocco	5.4	56
165	Algeria	2.5	51

--: data not available

Table II: GDP volatility and openness by country
E. countries of population > 25 million

Rank	Country name	GDP volatility	openness
166	Sudan	6.1	26
167	Tanzania	1.8	50
168	Canada	2.3	60
169	Argentina	6.0	17
170	Colombia	2.2	32
171	South Africa	3.5	48
172	Poland	4.0	52
173	Congo, Dem. Rep.	5.3	44
174	Spain	1.7	42
175	Myanmar	5.1	9
176	Korea, Rep.	4.3	68
177	Ethiopia	7.6	29
178	Ukraine	8.2	77
179	Egypt, Arab Rep.	2.2	54
180	Iran, Islamic Rep.	6.7	32
181	Thailand	5.1	73
182	Turkey	4.3	37
183	France	1.2	45
184	Italy	1.1	44
185	United Kingdom	2.0	53
186	Philippines	3.8	69
187	Vietnam	2.2	61
188	Germany	1.2	54
189	Mexico	4.0	40
190	Nigeria	5.3	62
191	Bangladesh	1.7	26
192	Pakistan	2.2	36
193	Japan	1.8	21
194	Russian Federation	6.0	56
195	Brazil	3.8	18
196	Indonesia	4.9	53
197	United States	2.0	21
198	India	2.0	20
199	China	3.1	31

Notes for Table II:

Volatility of GDP is computed as the standard deviation of per capita growth rates 1980-2000.

Openness is computed as the sum of imports and exports of goods and services divided by GDP.

The average of the years 1980-2000 is taken and constant 1995 US$ have been used.

All data have been taken from the WDI data base.

Table III: GDP per capita and average growth rate
A. countries of population < 1.5 million

Rank	Country name	GDP per capita	growth rates
1	Palau	6726	--
2	Cayman Islands	--	--
3	St. Kitts and Nevis	4489	5.2
4	Faeroe Islands	--	--
5	Marshall Islands	1602	--
6	Greenland	--	--
7	Bermuda	--	--
8	Antigua and Barbuda	6637	4.4
9	Andorra	--	--
10	Seychelles	5925	1.6
11	Kiribati	590	-2.4
12	Dominica	3371	--
13	Aruba	--	5.0
14	Grenada	2639	4.0
15	Micronesia, Fed. Sts.	1816	0.2
16	Tonga	1444	2.2
17	St. Vincent and the Grenadines	2057	3.7
18	Virgin Islands (U.S.)	--	2.6
19	Sao Tome and Principe	354	-0.8
20	St. Lucia	3086	3.6
21	Channel Islands	--	--
22	Mayotte	--	--
23	Vanuatu	1245	-0.3
24	Samoa	1213	0.4
25	New Caledonia	16169	1.3
26	Belize	2435	2.7
27	Netherlands Antilles	--	-1.9
28	French Polynesia	18000	1.6
29	Maldives	1318	6.0
30	Iceland	26153	1.8
31	Bahamas, The	13064	0.8
32	Barbados	7051	1.2
33	Brunei	20065	-3.0
34	Solomon Islands	754	0.3
35	Cape Verde	1144	3.5
36	Equatorial Guinea	576	11.9
37	Macao, China	14075	2.3
38	Malta	7035	4.1
39	Luxembourg	37256	4.0
40	Suriname	911	0.1
41	Qatar	--	--
42	Comoros	528	-1.0
43	Djibouti	1005	-4.6
44	Bahrain	9278	-0.1
45	Bhutan	377	4.3
46	Cyprus	9974	4.2
47	Fiji	2346	0.1
48	Guyana	758	0.9
49	Swaziland	1297	2.0
50	Gambia, The	366	0.1
51	Gabon	4684	-0.6
52	Guinea-Bissau	218	0.4
53	Mauritius	2943	3.9
54	Trinidad and Tobago	4483	0.8
55	Botswana	2893	4.6
56	Namibia	2231	-0.1
57	Estonia	4070	0.7

Table III: GDP per capita and average growth rate
B. countries of population 1. 51 -5million

Rank	Country name	GDP per capita	growth rates
58	Lesotho	447	1.8
59	Kuwait	13117	-2.3
60	Oman	5123	3.2
61	United Arab Emirates	22550	-3.1
62	Macedonia, FYR	2465	-1.5
63	Slovenia	9758	2.0
64	Mauritania	466	0.2
65	Mongolia	430	0.6
66	Congo, Rep.	1059	0.5
67	Panama	2885	1.0
68	Jamaica	1720	0.3
69	West Bank and Gaza	1474	-2.5
70	Liberia	--	-4.9
71	Latvia	2800	0.3
72	Central African Republic	362	-1.2
73	Costa Rica	3127	1.1
74	Uruguay	5240	1.1
75	Albania	830	0.3
76	Singapore	18379	5.0
77	Eritrea	164	0.0
78	Jordan	1710	0.3
79	New Zealand	15578	1.2
80	Togo	368	-0.9
81	Armenia	932	-3.0
82	Puerto Rico	9674	2.2
83	Ireland	15893	4.7
84	Lithuania	2214	-0.8
85	Lebanon	2518	3.2
86	Turkmenistan	1811	-4.2
87	Nicaragua	511	-1.6
88	Papua New Guinea	900	0.2
89	Sierra Leone	239	-2.9
90	Bosnia and Herzegovina	1202	25.7
91	Lao PDR	345	3.0
92	Paraguay	1803	0.1
93	Moldova	1265	-3.5
94	Libya	--	-8.5
95	Norway	30083	2.5
96	Kyrgyz Republic	1074	-2.1
97	Croatia	4454	0.0
98	Benin	373	0.9
99	Israel	14059	2.1
100	Honduras	700	-0.2
101	Finland	25078	2.4

--: data not available

Table III: GDP per capita and average growth rate
C. countries of population 5.1 -10 million

Rank	Country name	GDP per capita	growth rates
102	Denmark	32112	1.6
103	Tajikistan	783	-6.9
104	El Salvador	1492	-0.1
105	Slovak Republic	3767	0.8
106	Georgia	1555	-5.1
107	Burundi	182	-1.0
108	Guinea	550	1.3
109	Hong Kong, China	18307	4.2
110	Chad	216	0.9
111	Haiti	463	-2.0
112	Bolivia	887	-0.4
113	Rwanda	275	-0.3
114	Switzerland	43124	1.0
115	Dominican Republic	1507	2.3
116	Azerbaijan	750	-6.4
117	Somalia	--	0.1
118	Senegal	563	0.3
119	Austria	26938	2.0
120	Zambia	473	-1.8
121	Niger	241	-2.3
122	Tunisia	1910	2.2
123	Malawi	152	0.3
124	Mali	266	-0.5
125	Sweden	26213	1.6
126	Bulgaria	1529	0.8
127	Guatemala	1433	0.0
128	Burkina Faso	211	1.6
129	Cambodia	264	2.2
130	Angola	574	-1.3
131	Portugal	9603	2.9

--: data not available

Table III: GDP per capita and average growth rate
D. countries of population 10.1-25 million

Rank	Country name	GDP per capita	growth rates
132	Belgium	25146	2.0
133	Zimbabwe	635	0.7
134	Belarus	2608	0.3
135	Greece	11046	1.0
136	Ecuador	1509	-0.2
137	Czech Republic	5015	0.2
138	Yugoslavia, Fed. Rep.	1271	1.7
139	Hungary	4622	1.3
140	Cuba	--	3.9
141	Cameroon	766	-0.4
142	Madagascar	265	-1.6
143	Cote d'Ivoire	825	-2.2
144	Syrian Arab Republic	740	1.3
145	Yemen, Rep.	279	1.6
146	Chile	3623	3.8
147	Mozambique	145	1.2
148	Netherlands	24849	1.8
149	Ghana	360	0.2
150	Saudi Arabia	7750	-2.3
151	Kazakhstan	1546	-2.7
152	Uganda	271	2.2
153	Australia	19122	2.0
154	Sri Lanka	622	3.3
155	Iraq	--	-15.1
156	Malaysia	3385	3.9
157	Nepal	191	2.2
158	Afghanistan	--	-0.5
159	Venezuela, RB	3533	-1.1
160	Uzbekistan	517	-1.2
161	Peru	2289	-0.1
162	Romania	1695	-0.7
163	Kenya	338	-0.1
164	Morocco	1258	1.2
165	Algeria	1636	-0.3

--: data not available

Table III: GDP per capita and average growth rate
E. countries of population >25 million

Rank	Country name	GDP per capita	growth rates
166	Sudan	231	1.8
167	Tanzania	183	0.4
168	Canada	18810	1.6
169	Argentina	7167	0.4
170	Colombia	2115	1.1
171	South Africa	4145	-0.3
172	Poland	3391	3.6
173	Congo, Dem. Rep.	211	-4.6
174	Spain	13636	2.4
175	Myanmar	--	2.2
176	Korea, Rep.	8082	5.8
177	Ethiopia	105	0.3
178	Ukraine	1374	-5.6
179	Egypt, Arab Rep.	959	2.9
180	Iran, Islamic Rep.	1431	0.3
181	Thailand	2009	4.7
182	Turkey	2552	2.2
183	France	25192	1.6
184	Italy	17601	1.9
185	United Kingdom	17603	1.9
186	Philippines	1095	0.2
187	Vietnam	246	4.4
188	Germany	27811	1.6
189	Mexico	3299	1.1
190	Nigeria	251	-0.8
191	Bangladesh	288	2.4
192	Pakistan	437	2.7
193	Japan	37584	2.3
194	Russian Federation	3035	-0.9
195	Brazil	4216	0.8
196	Indonesia	790	3.7
197	United States	25751	2.0
198	India	325	3.7
199	China	422	8.2

--: data not available

Notes for Table III:

Average growth rate of GDP was computed for 1980-2000.

GDP per capita refers to the average for the years 1980-2000 and is expressed in PPP current international $.

All data have been taken from the WDI database.

Table IV: Concentration of export commodities and services for WTO Members
(as a percentage of exports of goods and services, averages 1998 and 1999)

A. Members with population <1.5 million

Rank	Members	First commodity or services	Second commodity or service
1	Liechtenstein	--	--
2	St. Kitts and Nevis	--	--
3	Antigua and Barbuda	--	--
4	Dominica	32.4 (travel)	23.5 (other services)
5	Grenada**	45.7 (travel)	20.6 (other services)
6	St. Vincent and the Grenadines**	45.3 (travel)	17.9 (other services)
7	St. Lucia	72.9 (travel)	10.9 (fruits, nuts, fresh, dried)
8	Belize	31.8 (travel)	17.1 (sugar and honey)
9	Barbados	55.2 (travel)	21.6 (other services)
10	Maldives *	72.1 (travel)	8.4 (fish fresh, chilled, frozen)
11	Iceland	25.3 (fish fresh, chilled and frozen)	15.5 (transport)
12	Brunei	--	--
13	Malta	34.9 (transistors, valves, etc.)	21.54 (travel)
14	Suriname**	48.1 (base metal, ores, conc nes)	11.43 (transport)
15	Macao, China**	51.7 (travel)	17.1 (outer garments knit non-elastic)
16	Luxembourg	--	--
17	Solomon Islands *	26.6 (other wood rough, squared)	24.9 (fish, fresh, chilled frozen)
18	Qatar	59.8 (crude petroleum)	15.0 (gas, --
19	Djibouti *	--	--
20	Bahrain	--	--
21	Cyprus	47.5 (travel)	15,6 (other services)
22	Guyana**	19.4 (sugar and honey)	17.2 (gold, non-monetary nes)
23	Fiji	27.2 (travel)	14.9 (transport)
24	Swaziland	--	--
25	Mauritius	20.0 (travel)	13.3 (sugar and honey)
26	Guinea-Bissau *	--	--
27	Gabon	--	--
28	Trinidad and Tobago	25.4 (petroleum products unrefined)	9.8 (crude petroleum)
29	Gambia, The *	37.4 (travel)	32.2 (vegetable etc fresh, simply preserved)
30	Estonia	17.4 (transport)	13.4 (travel)

Source: UNCTAD 2001 and WTO Secretariat.

* Least-developed countries as defined by the UN.

-- no data available on concentration of commodity exports in commodity trade from UNCTAD (2001).

Table IV: Concentration of export commodities and services for WTO Members
(as a percentage of exports of goods and services, averages 1998 and 1999)

B. Members with population 1.5 - 5 million

Rank	Members	First commodity or services	Second commodity or service
31	Botswana	--	--
32	Namibia	--	--
33	Kuwait	40.7 (crude petroleum)	24.5 (petroleum products, refined)
34	Slovenia	9.4 (travel)	8.3 (passenger motor vehicles, exc. bus)
35	Lesotho *	--	--
36	Latvia	24.0 (transport)	13.2 (wood, shaped, rail sleepers)
37	Oman	67.3 (crude petroleum)	5.0 (passenger motor vehicle, exc. bus)
38	Mongolia	41.8 (base metals, ores, conc nes)	13.0 (wool (exc. tops), animal hair)
39	Jamaica	36.4 (travel)	23.9 (base metals, ores, conc nes)
40	Mauritania *	37.9 (iron ore and concentrates)	24.7 (fish, fresh, chilled and frozen)
41	Panama	20.1 (fruit, nuts, fresh, dried)	13.5 (shellfish, fresh, frozen)
42	United Arab Emirates	44.4 (crude petroleum)	7.4 (gas, natural and manufactured)
43	Congo, Rep.	60.0 (crude petroleum)	7.3 (other services)
44	Uruguay	17.7 (travel)	10.9 (meet fresh, chilled and frozen)
45	Albania	28.4 (travel)	10.8 (leather, etc., manufactures)
46	Lithuania	11.0 (travel)	9.4 (petroleum products, refined)
47	Central African Rep.*	--	--
48	Ireland	12.9 (other services)	11.1 (automatic data processing equip.)
49	Costa Rica	21.5 (office, adp machy parts, access)	12.9 (travel)
50	New Zealand	12.3 (travel)	9.7 (meat, fresh, chilled frozen)
51	Singapore	15.9 (transistors, valves, etc)	15.0 (automatic data processing equip.)
52	Moldova	24.5 (alcoholic beverages)	9.8 (transport)
53	Croatia	31.3 (travel)	8.9 (ships, boats etc.)
54	Norway	25.8 (crude petroleum)	14.7 (transport)
55	Togo *	29.6 (fertilizers, crude)	28.3 (cotton)
56	Jordan	23.1 (travel)	17.4 (other services)
57	Kyrgyz Republic	21.2 (special transactions)	10.5 (tobacco, unmanufactured, refuse)

Source: UNCTAD 2001 and WTO Secretariat.

* Least-developed countries as defined by the UN.

-- no data available on concentration of commodity exports in commodity trade from UNCTAD (2001).

Table IV: Concentration of export commodities and services for WTO Members.
(as a percentage of exports of goods and services, averages 1998 and 1999)

C. Members with population 5.1-10 million

Rank	Members	First commodity or services	Second commodity or service
58	Georgia	25.2 (travel)	20.4 (transport)
59	*Sierra Leone	--	--
60	Nicaragua	20.6 (coffee and substitutes)	14.0 (travel)
61	Papua New Guinea	30.6 (prec. metal ores, waste nes)	16.7 (other fixed vegetable oils)
62	Finland	17.2 (paper and paperboard)	13.6 (telecom equip, parts, access)
63	Denmark	11.7 (transport)	7.8 (other services)
64	Slovak Republic	11.7(passenger motor vehicles, etc bus)	6.9 (other services)
65	Paraguay	36.2 (seeds for soft fixed oils)	11.5 (other services)
66	Israel	20.4 (pearl, prec, semi-prec stones)	13.5 (other services)
67	Benin *	--	--
68	El Salvador	19.1 (coffee and substitutes)	6.9 (travel)
69	Honduras	32.9 (coffee and substitutes)	10.8 (fruits, nuts, fresh, dried)
70	Hong Kong, China	12.0 (outer garments knit non-elastic)	9.2 (women's outwear non-knit)
71	Burundi *	77.5 (coffee and substitutes)	6.67 (tea and mate)
72	Switzerland	11.5 (other services)	10.5 (medicalm, pharmaceutical prd)
73	Guinea *	--	--
74	Chad *	--	--
75	Haiti *	23.3 (travel)	16.2 (women's outwear non-knit)
76	Austria	15.4 (other services)	11.9 (travel)
77	Bulgaria	16.2 (travel)	8.3 (transport)
78	Bolivia	12.9 (aircraft etc.)	10.4 (base metal ores, conc nes)
79	Dominican Republic	53.1 (special transactions)	30.3 (travel)
80	Rwanda *	--	--
81	Sweden	10.9 (telecom equip, parts, access)	9.4 (other services)
82	Senegal	14.6 (inorg chem elmnt, oxides, etc.)	12.8 (travel)
83	Tunisia	20.5 (travel)	12.7 (men's outwear non-knit)

Source: UNCTAD 2001 and WTO Secretariat.

* Least-developed countries as defined by the UN.

-- no data available on concentration of commodity exports in commodity trade from UNCTAD (2001).

Table IV: Concentration of export commodities and services for WTO Members
(as a percentage of exports of goods and services, averages 1998 and 1999)

D. Members with population 10.1-25 million

Rank	Members	First commodity or services	Second commodity or service
84	Portugal	15.7 (travel)	7.8 (passenger motor vehicles exc. bus)
85	Hungary	12.8 (travel)	8.7 (intern combust piston engines)
86	Zambia *	--	--
87	Belgium	--	--
88	Czech Republic	10.2 (travel)	6.7 (other services)
89	Malawi *	58.6 (tobacco unmanufactured, refuse)	8.6 (tea and mate)
90	Greece	30.9 (travel)	23.8 (other services)
91	Niger *	51.3 (uranium, thorium ores, conc)	11.2 (vegtb etc fresh, simply prsrvd)
92	Mali *	75.7 (cotton)	4.8 (gold, non-monetary nes)
93	Cuba	--	--
94	Burkina Faso *	51.8 (cotton)	9.1 (travel)
95	Guatemala	18.7 (coffee and substitutes)	9.8 (travel)
96	Zimbabwe	22.9 (tobacco unmanufactured, refuse)	11.8 (travel)
97	Ecuador	21.3 (crude petroleum)	20.8 (fruit, nuts, fresh, dried)
98	Angola *	--	--
99	Cameroon	27.1 (crude petroleum)	9.8 (other wood rough squared)
100	Chile	22.0 (copper)	9.2 (base metal ores, conc nes)
101	Madagascar *	14.7 (other services)	11.5 (travel)
102	Netherlands	9.6 (other services)	8.5 (transport)
103	Cote d'Ivoire	33.3 (cocoa)	10.9 (petroleum products, refined)
104	Mozambique*	--	--
105	Australia	10.6 (travel)	8.5 (coal, lignite and peat)
106	Ghana	32.3 (cocoa)	11.8 (travel)
107	Sri Lanka	14.9 (women's outwear non-knit)	11.5 (tea and mate)
108	Uganda *	41.8 (coffee and substitutes)	21.4 (travel)
109	Taipei, Chinese	--	--
110	Romania	7.9 (women's outwear non-knit)	6.4 (men's outwear non-knit)
111	Malaysia	17.2 (transistors, valves etc)	9.3 (office, adp machy parts acces)
112	Venezuela, RB	60.8 (crude petroleum)	10.4 (petroleum products, refined)

Source: UNCTAD 2001 and WTO Secretariat.

* Least-developed countries as defined by the UN.

-- no data available on concentration of commodity exports in commodity trade from UNCTAD (2001).

Table IV: Concentration of export commodities and services for WTO Members
(as a percentage of exports of goods and services, averages 1998 and 1999)

E. Members with population 25.1+ million

Rank	Members	First commodity or services	Second commodity or service
113	Peru	14.6 (gold, non-monetary nes)	11.6 (travel)
114	Morocco	18.4 (travel)	8.3 (women's outwear non-knit)
115	Kenya	20.9 (tea and mate)	13.3 (transport)
116	Canada	12.2 (passenger motor vehicles exc. bus)	6.5 (other services)
117	Tanzania *	37.7 (travel)	8.4 (fruits, nuts, fresh, dried)
118	Argentina	10.2 (travel)	8.4 (fixed vegetable oils)
119	Poland	9.1 (travel)	7.8 (other services)
120	Spain	19.0 (travel)	10.1 (passenger motor vehicles exc. bus)
121	Colombia	20.9 (crude petroleum)	13.3 (coffee and substitutes)
122	South Africa	7.9 (travel)	7.6 (pearl, prec, semi-prec stones)
123	Korea, Rep.	12.6 (transistors, valves etc.)	6.6 (transport)
124	Myanmar *	18.0 (other services)	11.7 (other wood rough, squared)
125	Congo, Dem. Rep.*	--	--
126	Italy	9.7 (travel)	7.6 (other services)
127	France	8.4 (other services)	7.9 (travel)
128	United Kingdom	17.5 (other services)	6.1 (travel)
129	Thailand	9.6 (travel)	8.5 (office, adp machy parts)
130	Egypt, Arab Rep.	23.9 (travel)	20.7 (other services)
131	Turkey	20.6 (other services)	12.3 (travel)
132	Philippines	23.3 (special transactions)	22.0 (transistors, valves, etc)
133	Germany	9.8 (passenger motor vehicles exc. bus)	6.9 (other services)
134	Mexico	8.4 (passenger motor vehicles exc. bus)	5.5 (travel)
135	Japan	11.3 (passenger motor vehicles exc. bus)	7.9 (other services)
136	Nigeria	90.6 (crude petroleum)	6.6 (other services)
137	Bangladesh *	22.5 (men's outwear non-knit)	18.1 (under garments non-knit)
138	Pakistan	12.1 (cotton fabrics, woven)	11.7 (textiles articles nes)
139	Brazil	7.1 (other services)	5.3 (iron ore and concentrates)
140	Indonesia	8.2 (special transactions)	7.8 (travel)
141	United States	12.0 (other services)	9.4 (travel)
142	India	16.0 (other services)	12.3 (pearl, prec, semi-prec stones)
143	China	6.2 (travel)	4.4 (other services)

Source: UNCTAD 2001 and WTO Secretariat.

* Least-developed countries as defined by the UN.

-- no data available on concentration of commodity exports in commodity trade from UNCTAD (2001).

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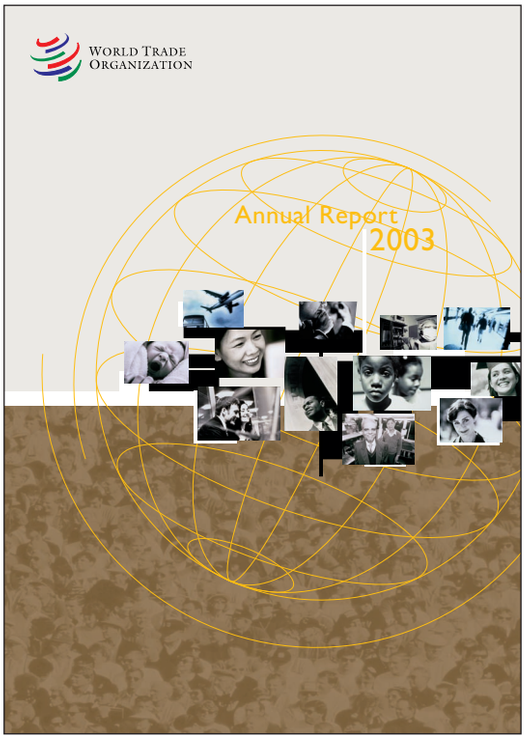

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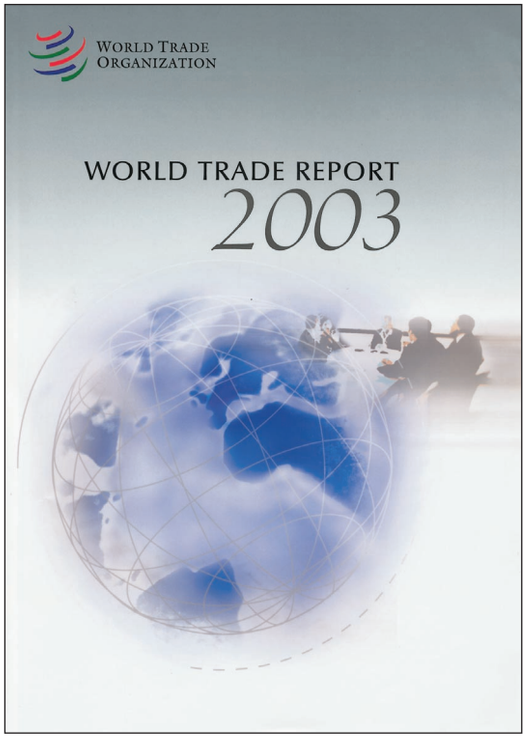

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