Consumer Goods and Export Performance during Economic Slowdowns: The Experience from the Great Recession

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Abstract

The wide variation in the export performance of different countries during the recent global recession attracted some attention. A popular explanation is that inter-country differences in geographic and commodity concentration of export were responsible for the difference in export performance: countries with more concentrated export portfolio suffered a greater decline in export earnings during the recession compared to countries with more diversified export portfolio. This paper advances an additional explanation of the differential export performance during the recession. Invoking the well known theories of consumption demand, it is argued that the difference in the export performance of different countries during the recession lay in the composition of its export basket and the general nature of the demand for different types of commodities. A greater share of consumer goods in the export basket led to greater stability of export revenue.

Key words: Export performance, recession, export concentration, consumer theory

Consumer Goods and Export during Economic Slowdowns: The Experience from the Great Recession

Introduction

The relationship between import and income is one of the few robust relationships of macroeconomics. When income rises, as in business booms, import also rises; but when income falls during a recession, import declines. At the end of the last financial crisis in the West, the world entered into a deep recession in 2009.[1] It wreaked havoc on world trade. Global export earnings (which are the same as global import payments except for transaction costs) suffered a hefty decline of 23 percent. However, all countries or regions did not suffer equally during the recession. The Commonwealth of Independent States suffered the greatest decline (36 percent) followed by the Middle-East (31 percent) and Africa (30 percent). Asia suffered the smallest decline of 18 percent. Both EU and USA witnessed a decline in excess of 20 percent (UNDP 2011).

Variations among countries were even starker. Some countries actually registered large increases in export earnings exceeding 20 percent, while some others suffered decreases exceeding 40 percent. A pertinent question that arose was whether this wide variation in the impact of the global recession on export earnings of different countries was random or systematic. A study by UNDP (2011) suggested that the magnitude of the fluctuation in export earnings of a country depended positively on the degree of geographic concentration of its exports. It also suggested that a greater dependence on only a few export goods (commodity concentration) also led to greater export revenue instability. The same argument was made earlier by MacBean (1966) and Samen (2010). However, empirical evidence did not always support these hypotheses. For example, several authors such as Coppock (1962), Massell (1964) and MacBean (1966) found very little or no effect of geographic or commodity concentration on the stability of export earnings. In the words of MacBean: “On the basis of simple correlation and multiple-regression analyses it appears

[1] The recession did not start or end at the same time in all countries. It began in the third quarter of 2008 and ended in the second quarter of 2009 in the USA, but it lasted from the first quarter of 2009 to the first quarter of 2010 in EU. According to World Bank data, the world output shrank in 2009. This was the only time the world economy suffered a negative growth rate since 1960. Hence, we refer to 2009 as the global recession year.

that three inherently plausible reasons for expecting the exports of underdeveloped countries to be highly unstable turn out to have very little general explanatory value. Export instability appears to be hardly related to commodity concentration at all, to be very weakly, if at all, related to the proportion of exports which are primary goods, and to be negatively related to, if anything, to geographic concentration."[2] Nonetheless the hypothesis continues to have considerable influence as evidenced by the recent studies mentioned above.

This paper proposes an additional explanation of the inter-country differences in export performance during the recent recession. It suggests that the share of consumption goods in the total export basket of a country tends to reduce the negative impact of recessions on export earnings. Empirical analysis of relevant data from the most recent recession year lends support to this hypothesis.

Theoretical considerations and evidence

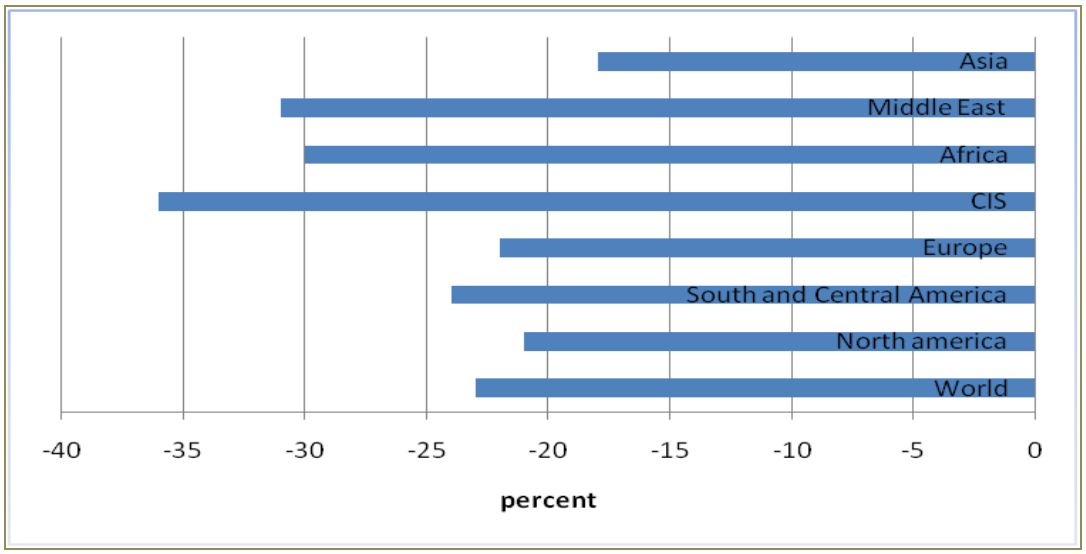
The concentration hypotheses are based on the simple idea that 'putting all eggs in one basket' is risky and could lead to large fluctuations in export earnings. Dependence on only a few export products or markets reduces the probability of a country compensating international market fluctuations in one direction in some of its exports by counter-fluctuations in others.

The geographic concentration hypothesis apparently explains well why Asia, despite being more export-dependent region, lost the least amount in export revenue compared to regions like Africa which suffered more despite being relatively less exposed to trade.[3] As pointed out by the UNDP study, the region with the highest degree of geographic concentration in 2008 was Africa (0.48), followed by the Commonwealth of Independent States countries (0.34) and the Pacific Island States (0.22). For countries in Latin America and the Caribbean, the degree of concentration stood at 0.14 and the lowest degree of

[2] MacBean (1966), p. 48.
[3] The derivation of export concentration indices is given in the Appendix.

concentration was in Asia (0.13). The study concluded that since Asia had a more diversified export market it suffered a smaller reduction in export earnings, whereas Africa and CIS suffered more since they had a much higher export market concentration.

Figure 1: Annual percentage change in world merchandise trade by region (2009)



Source: *World Trade Report 2011*.

Although appealing and consistent with the aggregate data, the argument seems to run into difficulties when somewhat more disaggregated data are used. We observe no systematic relationship between export concentration index and loss in export revenue during the 2009 recession when the data are disaggregated by export market concentration. Table 1 distributes all the countries (with a minimum export value of $500 million) into ten groups (deciles) in terms of export concentration index and reports their respective average loss in export revenue during the recession year. Although the countries with the highest concentration index (deciles 9 and 10) suffered the most, there is no systematic relationship between export concentration and export growth among the other 8 deciles.[4]

[4] Note that aggregation of the first 8 deciles in one group and the remaining 2 deciles in another, i.e. greater aggregation, will corroborate the concentration hypothesis.

Table 1: Percentage change in export revenue in 2009 by Export concentration index

Export Concentration (Decile)	Percentage change in export revenue in 2009
	Average
1 (Lowest)	-21.23
2	-21.31
3	-17.46
4	-15.89
5	-17.25
6	-19.17
7	-27.16
8	-19.32
9	-35.85
10 (Highest)	-35.64
All	-22.08

Source: Calculated from *UNCTADSTAT* data

Second, export concentration cannot explain why regions like Africa, CIS and Middle East enjoyed robust growth in export earnings during the post-recession year, even dwarfing the growth of Europe and North America, in spite of the fact that the latter have much more diversified export basket. The growth of export revenue of Middle East (30 percent), CIS (30 percent) and Africa (28 percent) were much higher than those of North America (23 percent) and Europe (12 percent) and marginally lower than that of Asia (31 percent).

Table 2: Annual percentage change in world merchandise export by region

Regions	**2009**	**2010**
World	-23	22
North America	-21	23
South and Central America	-24	25
Europe	-22	12
Commonwealth of Independent States (CIS)	-36	30
Africa	-30	28
Middle East	-31	30
Asia	-18	31

Source: *World Trade Report 2011*

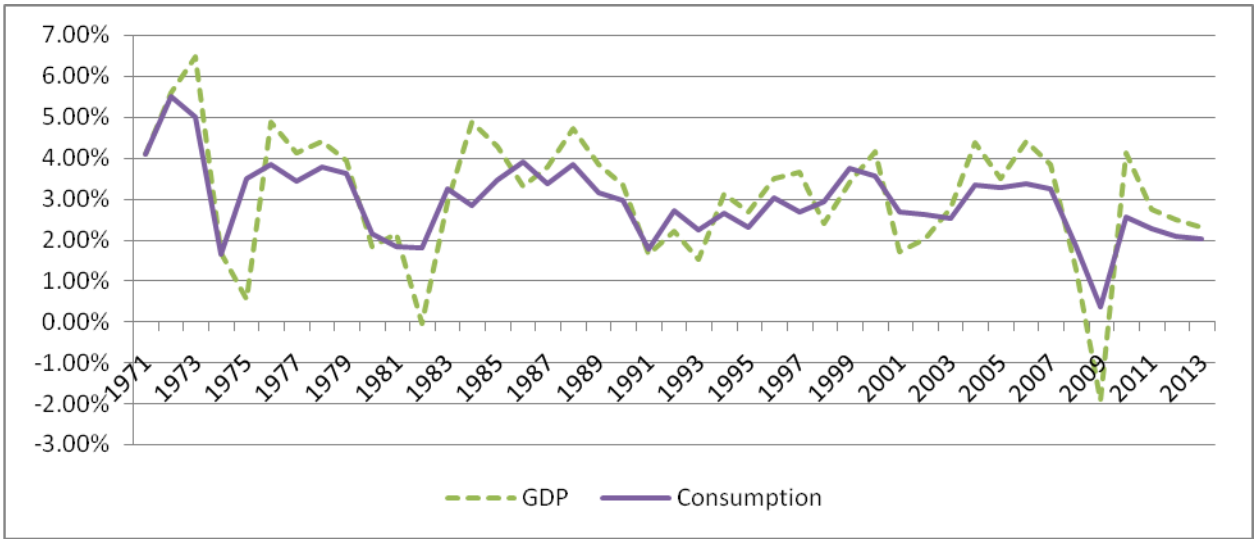
These difficulties suggest the need for an alternative or additional explanation of the differences in the decline in export revenue of different countries during the recession. Taslim (2010) provided such an explanation in his analysis of the reasons behind the relatively good export performance of Bangladesh in its major markets (EU and USA) during the 2009 global recession. Resorting to the theories of consumption he advanced the proposition that the secret behind the good export performance of Bangladesh lay in the composition of its export basket and the nature of the demand for different types of commodities. This study applies the same hypothesis to explain the differnce in the growth performance of export of the countries of the world during the recession.

The Permanent Income theory of consumption (Friedman 1957) and the Life Cycle theory of consumption (Ando and Modigliani 1963) challenged the Keynesian consumer theory which was unable to account for some of the empirical evidence thrown up by Kuznets' monumental work. They suggested that consumer spending was determined by permanent or life cycle income of consumers rather than their current income. A well developed financial market with easy opportunities of borrowing and lending allowed smoothing of consumer expenditure along the business cycle.

Permanent or life cycle income is defined to be the expected average income over the life time of the consumer. Thus it may be thought of as the long term trend of the current income. The trend smooths out the fluctuations in the variable such that the permanent or

life cycle income fluctuates less than the current income.[5] This has the implication that the permanent or life cycle income is typically less than the current income during economic booms and greater than the actual income during the slumps. Since consumption is a stable function of permanent or life cycle income, consumption also fluctuates less than current income. This is amply borne out by the time path of world consumption and income as shown in Figure 2.[6]

Figure 2: Yearly growth rates of world GDP and consumption



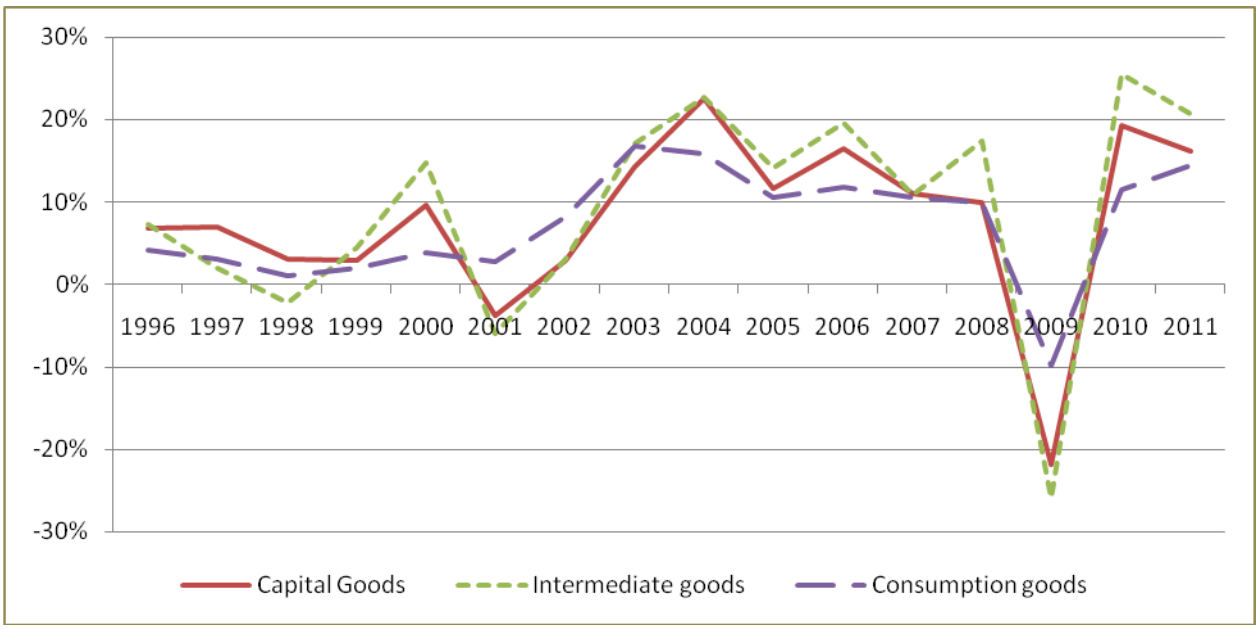
Source: *World Bank* data (2014)

The demand for non-consumer goods such as raw materials, intermediate inputs and capital machinery depend more on the current level of consumption and investment, and hence, on current production or income. The spending on such goods are likely to fluctuate more

[5] The total or actual income y comprises permanent income y^p and transitory income y^t: $y= y^p + y^t$. Then, variance(y)=variance(y^p) + variance(y^t) if y^p and y^t are independently distributed. Therefore, variance(y) > variance(y^p).

[6] According to consumer theory consumption expenditure C depends on y^p: $C=a+by^p$. Then, variance(C) = b^2variance(y^p). Expenditure on non-consumer goods X, such as raw materials and intermediate goods, depends on current production or income: $X=ky$. Then variance (X) = k^2variance(y). In the consumption function above, b is the short run marginal propensity to consume. Its numerical value is likely to be in the range 0.4-0.8. But the expenditure on non-consumption goods by the economy is often in excess of the current output. For example, the input-output table of USA shows that the value of final output is less than the spending on inputs. Hence k may be expected to be larger than b. Consequently variance(X) is larger than variance(C).

Figure 3: Growth rates of World Import by the basic classes of goods in SNA



Source: Calculated from *WITS* data

If the import of consumtion goods is a function of permanent or life cycle income or if there exists a stable relationship between the imported and domestic components of a tradable good à *la* Armington, then the import of consumer goods should fluctuate less than the import of non-consumer goods implying that the greater the share of consumer goods in the total import basket, the lower would be the fluctuations in the total import. This is demonstrated more rigorously in the following.

Let the total import ***Z*** of a country be the sum of import of consumer goods, Z^c and import of non-consumer goods, Z^{nc}. Hence, the elasticity of import demand with respect to current income, $\varepsilon_Y^z = \frac{Y}{Z}\frac{dZ}{dY}$, is a weighted average of the elasticity of demand of these two categories of goods.

For a sharper focus, let's assume the elasticity of import demand with respect to income is the same for both consumer goods and non-consumer goods; however, the income category relevant to consumption is permanent or life cycle income ($\boldsymbol{Y^p}$) while that relevant for non-consumption goods is current or actual income, (***Y***), i.e.

$$\frac{Y^p}{Z^c}\frac{dZ^c}{dY^p} = \varepsilon_{Y^p}^{c} = \frac{Y}{Z^{nc}}\frac{dZ^{nc}}{dY} = \varepsilon_{Y}^{nc} = \varepsilon$$

In this event it is easy to show that:

$$\varepsilon_y^z = [1 + s^c\left(\eta_Y^{Y^p} - 1\right)]\varepsilon$$

where $s^c = \frac{Z^c}{Z}$ is the share of import of consumption goods in total import and

$\eta_Y^{Y^p} = \frac{Y}{Y^p}\frac{dY^p}{dY}$.[7]

Given that permanent income Y^p is in the nature of a trend of ***Y***, $\eta_Y^{Y^p}$ may be expected to be less than unity. This implies that as the share of import of consumption goods in total import increases, income elasticity of import ε_y^z declines, and $\varepsilon_y^z < \varepsilon$.

This is the principal hypothesis of the analysis of this paper. It depends crucially on the relationship of permanent income to current income, viz. $\eta_Y^{Y^p} < 1$. As long as $\varepsilon_{Y^p}^{c} \leq \varepsilon_{Y}^{nc}$, this relationship holds. If however, $\varepsilon_{Y^p}^{c} > \varepsilon_{Y}^{nc}$, whether this relationship will hold or not depends on the particular values assumed by these variables. The empirical evidence suggests that the latter is unlikely to be the case. Table 3, which presents various income elasticity measures of world import demand shows that $\varepsilon_{Y^p}^{c} < \varepsilon_{Y}^{nc}$ and, $\varepsilon_y^z < \varepsilon_{Y}^{nc}$.

Table 3: Elasticity of World import With Respect to World Income

	Elasticity[8]
Elasticity of consumer goods import with respect to permanent Income	2.55
Elasticity of import with respect to current Income	2.77
Elasticity of non-consumer goods import with respect to current Income	2.89

This hypothesis receives robust empirical support from the pattern of world import demand. Table 4 lists the top 20 products (at 2-digit HS code) that experienced the sharpest fall

[7] In the event $\varepsilon_{Y^p}^{c} < \varepsilon_{Y}^{nc}$, let $\varepsilon_{Y^p}^{c} = \alpha\varepsilon_{Y}^{nc} = \alpha\varepsilon$ where $0 < \alpha < 1$. Then we shall have

$\varepsilon_y^z = [1 + s^c\left(\alpha\eta_Y^{Y^p} - 1\right)]\varepsilon$. The elasticity of import with respect to current income is lower than when α=1.

[8] Authors' calculation from World Bank and WITS data. The elasticity measures are the coefficients of logarithmic regression of import on income.

during the recession. It reveals that almost all of these products were mainly raw materials, intermediaie outputs and capital machinery. The other feature to note is that the import of almost all of these products rebounded strongly in 2010, when the world was recovering from the recession.

Table 4: Import products with sharpest decline in 2009

HS 1988/92 Product Code	HS 1988/92 Product Description	2009	2010
81	Other base metals; cermets; articles thereof.	-49%	37%
72	Iron and steel.	-47%	40%
31	Fertilisers.	-46%	34%
75	Nickel and articles thereof.	-39%	51%
27	Mineral fuels, oils & product of their distill	-38%	32%
80	Tin and articles thereof.	-36%	44%
88	Aircraft, spacecraft, and parts thereof.	-36%	8%
28	Inorg chem; compds of prec mtl, radioact elem	-34%	31%
76	Aluminium and articles thereof.	-33%	30%
86	Railway/tram locom, rolling-stock & parts there	-33%	32%
87	Vehicles/trail/tram roll-stock, pts & acc	-32%	28%
25	Salt; sulphur; earth & ston; plastering mat;	-31%	17%
41	Raw hides and skins (other than furskins)	-29%	48%
74	Copper and articles thereof.	-28%	49%
97	Works of art, collectors' pieces and antiques	-28%	6%
15	Animal/veg fats & oils & their cleavage produc	-27%	23%
73	Special woven fab; tufted tex fab; lace; tapes	-27%	8%
58	Special woven fab; tufted tex fab; lace; tapes	-26%	9%
51	Wool, fine/coarse animal hair, horsehair yarn	-26%	24%

Source: Calculated from *UNCTADSTAT* data.

It is, however, not always easy to accurately identify the nature of a good (i.e. consumption good or non-consumption good) from the HS product code, since some products can be used both as consumption goods and intermedite goods or capital goods. To distinguish products by use we used the broad economic category (BEC) classification[9] of export provided by WITS[10], and classified the products into consumer goods, intermediate goods

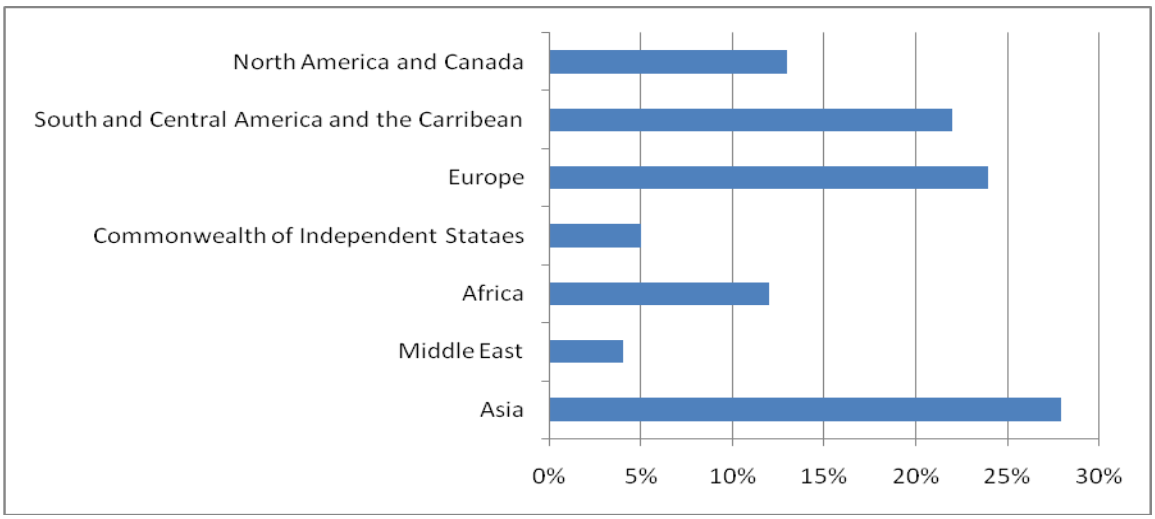
[9] Please see the appendices for details.

[10] The *World Integrated Trade Solution* (WITS) is a trade database provided by the World Bank for users to query several international trade databases. It allows the users to query trade statistics (export, import, re-exports and re-imports) from sources like UN COMTRADE, tariff and non-tariff measures (NTM) data from

and capital goods within the framework of the System of National Accounts (SNA). Figure 3 above shows the growth in world import of goods of these three basic categories since 1996. It is evident that the demand for consumer goods fluctuates less than that of the non-consumer goods.

During the recession, the world export fell around 23 percent. However, the fall of export of consumer goods was much lower than those of non-consumer goods. Export of consumer goods fell only by 10 percent whereas the corresponding fall in export of intermediate goods and capital goods were 26 percent and 22 percent respectively. The contention above also helps explain why regions like Middle East, CIS and Africa suffered larger reduction in export earnings compared to those of Asia, Europe and America. The share of consumption goods in total export is the highest in Asia (see Figure 4). Since the export (import) of consumption goods fluctuates less than those of non-consumption goods, Asian exports faced less reduction in export revenue. Middle East and CIS on the other hand had more non-consumption goods (oil and gas) in their export basket, the demand for which depends on current income, and therefore their export suffered the most.

Figure 4: Share of consumption goods in total export by regions (average 1995-2009)



Source: Calculated from *UNCTADSTAT* data

UNCTAD TRAINS and tariff and bound tariff information from WTO, IDB and CTS databases. Throughout this paper the WITS have been used to extract data from UN COMTRADE.

Even if we use more disaggregated country wise cross section data, the finding does not change. It still shows a positive association between share of consumption goods in total export and export growth during the recession. Table 5 ranks all the countries (with a minimum export of $500 million) into five quintiles by the share of consumer goods in the total export basket. It is evident that countries with higher share of consumption goods suffered less during the global recession.

Table 5: Annual percentage change in export earnings by consumption goods share, 2009

Share of consumption goods (deciles)	Change in export revenue in 2009 (percent)
1 (lowest)	-32.98
2	-29.91
3	-21.47
4	-22.67
5	-20.98
6	-21.18
7	-18.85
8	-16.85
9	-16.14
10	-4.45

Source: Calculated from *UNCTADSTAT* & *UNCOMTRADE* data

The aforementioned proposition can also help explain why the regions like Middle East, CIS and Africa enjoyed sound growth in export earnings in the post recession year. As the world recovered from recession, current income rose faster than permanent income, and hence the export of countries with a large share of non-consumption goods in the total export basket bounced back. The very same reason that ensured a large reduction in export earnings during the recession also ensured that these countries experienced robust growth once the economy was on the upswing. This also implies that in the upswing phase of the business cycle, countries with higher share of consumption goods in the export basket will have *slower* export growth.

Regression analysis

This section is devoted to a cross section regression analysis to test the principal hypothesis of the paper. In view of the descriptive analysis above, we posit the following regression equation for testing:

$$g_i = \beta_0 + \beta_1 CS_i + \beta_2 GCR_i + \beta_3 CCR_i + u_i$$

There *g* = rate of change of export in 2009 (the recession year)

CS = share of consumption goods in the total export basket

GCR = geographic concentration index

CCR = commodity concentration index

β_0 = a constant

u = error term

i = country subscript.

We use cross-section data of the global recession year in the new millennium (2009) for the regression analysis. We ran the regression with different specifications, and the results are shown in Table 6. The share of consumption goods in the export basket has a statistically significant positive impact on export growth and this relationship holds true across all the specifications listed in the table. The result is in line with the hypothesis advanced above.

When the consumption share variable is taken together with the country concentration index variable (specification 4) and both country concentration index and commodity concentration index variables (specification 5), the qualitative conclusions remain unchanged although the value of the coefficient of consumption share changes. The coefficients of the consumption share variable in all specifications are all statistically significant at 1 percent level.

The regression results show that the country concentration variable has a negative impact on export performance. This holds true across all the specifications. The coefficients of the

variable in all the specifications are statistically significant at 1 percent level. This finding is also in line with the arguments in the literature as outlined earlier.

However, commodity concentration index has an ambiguous impact on export performance. When it is used as the only independent variable (specification 3), the regression equation shows that countries with higher commodity concentration index (less diversified export basket) has a lower export growth. However this impact is reversed when we add the other variables in the regression equation. The coefficient of the commodity concentration index variable is statistically significant in both specifications, but the explanatory power of the regression is negligible in specification 3. Furthermore the coefficient is unstable with the sign changing under different specifications. The instability could be due to multicollinearity between geographic and commodity concentration ratios. The correlation between these two variables is 0.683 (Table 7).

The regression results provide some support to the core argument of the paper that the composition of the export basket is a key determinant of export performance. The results also confirm that geographic concentration index influences export performance, but commodity concentration does not seem to have much impact.

As noted earlier, the consumption share based hypothesis implies that during the upswing phase countries with lower share of consumption goods in the export basket will have higher export growth. These countries are likely to bounce back strongly when the world economy recovers after a recession, whereas countries with a large share of consumption goods in the total export basket will experience a slower increase in the growth of its export earnings. To test this implication we ran the same regressions with data of 2010 when the world economy recovered strongly. The results are given in Table 8. The result shows that export growth was lower for the countries with a large share of consumption goods in total export basket confirming the consumer goods hypothesis presented above. However, the other two explanatory variables have positive coefficients which are contrary to the export instability hypothesis.

Table 6: Regression with Export Growth in 2009 as the Dependent Variable

Explanatory variable	(1)	(2)	(3)	(4)	(5)
Share of consumption goods in export Basket	0.268*			0.182*	0.139*
	(0.042)			(0.046)	(0.048)
Country Concentration Index		-0.204*		-0.141*	-0.282*
		(0.028)		(0.037)	(0.065)
Commodity Concentration Index			-0.118*		0.161*
			(0.034)		(0.061)
Constant	-0.271*	-0.180*	-0.163*	-0.229*	-0.267*
	(0.010)	(0.007)	(0.016)	(0.015)	(0.020)
Observations	164	204	204	164	164
R-squared	0.203	0.213	0.057	0.269	0.300
Standard errors in parentheses					
* p<0.01,					

Table 7: Correlation Coefficient between the explanatory variables

	Share of consumption goods	Country Concentration Ratio	Commodity Concentration Ratio
Share of consumption goods	1		
Country Concentration Index	-0.216	1	
	(0.006)		
Commodity Concentration Index	-0.003	0.683	1
	(0.966)	(0.00)	

N.B: Figures in the parenthesis show the p-value.

Table 8: Regression with Export Growth in 2010 as the Dependent Variable

Explanatory variable	(1)	(2)	(3)	(4)	(5)
Share of consumption goods in export Basket	-0.322*			-0.238*	-0.386*
	(0.062)			(0.069)	(0.067)
Country Concentration Index		0.195*		0.128**	-0.298*
		(0.039)		(0.051)	(0.084)
Commodity Concentration Index			0.295*		0.506*
			(0.043)		(0.084)
Constant	0.286*	0.190*	0.092*	0.247*	0.123*
	(0.014)	(0.010)	(0.020)	(0.021)	(0.028)
Observations	160	204	204	160	160
R-squared	0.147	0.112	0.191	0.180	0.336

Standard errors in parentheses
* p<0.01, ** p<0.05.

Conclusion

The wide inter-country variation in export performance during the recent global recession raised questions regarding the underlying reasons for such variation. Attempts were made to explain the phenomenon by both geographic and commodity concentration ratios of export of individual countries, but the empirical findings did not always yield the expected results. This paper advanced an additional explanation for the variation in export performance in terms of the importance of consumption goods in the export basket. The empirical tests broadly supported the hypothesis that the composition of the export basket was an important determinant of the stability of export performance along the business cycle. A larger share of consumption goods in the export basket dampens fluctuations in export earnings with changes in global income.

References

Ando, A. and Modigliani, F. 1963. "The 'Life Cycle' Hypothesis of Saving: Aggregate Implications and Tests", American Economic Review.

MacBean, A. I. (1966). *Export Instability and Economic Development*,London: George Allen & Unwin.

Coppock, J.D.(1962).*International Economic Instability*, Mggraw-Hill, New York.

Fridman, M. 1957. *A Theory of the Consumption Function*, Princeton University Press, Princeton, N. J. Chapters 1-3, 6,9.

Kuznets, S. (1946). *National Income, A summary of Findings,* National Bureau of Economic Research, New York.

Massell, B.F., 1964. "Export Concentration and Fluctuations in Export Earnings: A Cross Sectional Analysis", American Economic Review, 60: 618-30.

Samen, S. (2010), "A Primer on Export Diversification: Key Concepts, Theoretical Underpinnings and Empirical Evidence", Growth and Crisis Unit, World Bank, Washington, DC.

Taslim, M.A. (2010). "Exports from Bangladesh during Recession", *Economic & Political weekly*, Volume-XLV No.48, November 27, 2010.

UNDP (2011). "Toward Human Resilience: Sustaining MDG progress in an age of economic uncertainty", Bureau of Development Policy, United Nations Development Program, New York September 2011.

APPENDIX

Classification of goods in SNA in terms of broad economic categories

The composition of the three basic classes of goods in the System of National Accounts in terms of the broad economic categories is shown below.

1. Capital goods

- 41* Capital goods (except transport equipment)
- 521* Transport equipment, industrial

2. Intermediate goods

- 111* Food and beverages, primary, mainly for industry
- 121* Food and beverages, processed, mainly for industry
- 21* Industrial supplies not elsewhere specified, primary
- 22* Industrial supplies not elsewhere specified, processed
- 31* Fuels and lubricants, primary
- 322* Fuels and lubricants, processed (other than motor spirit)
- 42* Parts and accessories of capital goods (except transport equipment)
- 53* Parts and accessories of transport equipment

3. Consumption goods

- 112* Food and beverages, primary, mainly for household consumption
- 122* Food and beverages, processed, mainly for household consumption
- 522* Transport equipment, non-industrial
- 61* Consumer goods not elsewhere specified, durable
- 62* Consumer goods not elsewhere specified, semi-durables
- 63* Consumer goods not elsewhere specified, non-durable

Source: United Nations (2002). "Classification by Broad economic Categories: Defined In Terms Of the Standard International Trade Classification, Revision 3 and the Harmonized Commodity Description and Coding System", Third Edition, Statistical Paper, Series M, No. 53, Rev.4, Department Of Economic And Social Affairs, Statistics division.

Data for classification of commodities were taken from WITS.

Geographic concentration index:

The Herfindahl-Hirschmann index is used as a measure of the degree of geographic concentration. It has been normalized to obtain values ranging from 0 to 1 (maximum concentration), according to the following formula:

$$H_i = \frac{\sqrt{\sum_{j=1}^{n}\left(\frac{X_{ij}}{X_i}\right)^2} - \sqrt{\frac{1}{n}}}{1 - \sqrt{\frac{1}{n}}}$$

where H_i = concentration index for country i

x_{ij} = export from country i to country j

n = number of countries

$$X_i = \sum_{j=1}^{n} X_{ij}$$

An index value that is close to 1 indicates a very concentrated market. On the contrary, values closer to 0, would demonstrate a homogeneous market between the exporters or importers.

The index data have been collected from UNCTADSTAT.

Commodity Concentration Index:

The commodity concentration index shows whether the structure of export by product of a given country differs from the structure of product of the world export. A larger value of the index indicates a larger difference from the world average. Concentration index is computed by measuring the absolute deviation of the country share from world structure, as follows:

$$S_j = \frac{\sum_i |h_{ij} - h_i|}{2}$$

where h_{ij} = share of product i in total exports of country j

h_i = share of product i in total world exports.

The data for commodity concentration index have been collected from UNCTADSTAT.