

Global Inequality Impacts of Multilateral Liberalization

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0. Introduction

The Doha Development Round (DDR) negotiations of the World Trade Organization (WTO) were begun in Qatar in 2001 for the purpose of moving forward the liberalization of global trading rules agreed to under the Uruguay Round. As evidenced in the naming of the negotiating round, an explicit objective of the DDR trade reform process is the achievement of liberalization that will have significant impact on development and growth in the lowest income countries in the world. The Doha era of WTO negotiations has been most notable for its lack of significant progress toward agreement since talks began in Qatar. Movement in the negotiations has more frequently approached total breakdown than breakthrough. Certainly, a major contribution to the failure to advance the negotiations has been dissatisfaction with 1995's Uruguay Round outcomes which produced only limited movement in trade barriers and a belief held by many that the Doha disciplines must be aggressive to be meaningful. The economics profession has been fully on board, continually forecasting outcomes of aggressive Doha scenarios that generate a host of economic benefits for parties in the negotiations. Often these analyses are conducted and presented without accounting for or mention of the political economic environment in which negotiations take place.

Studies which delve into the within country distributional consequences (Hertel *et al.* 2007, 2009) have necessarily been more cognizant of the political realities of selling a negotiation outcome that leaves influential domestic groups behind post-reform and are less sanguine about the obviousness of advantage of particular countries participating in aggressive reform deals. While these distributional analyses give us a glimpse of how trade negotiators might be constrained politically at home, they cannot tell the whole story. WTO disciplines apply to trade and domestic support policies only, one can imagine a variety of domestic initiatives geared toward redistribution to make WTO reforms more palatable. Thus, a likely additional factor is the distribution of cross-national outcomes (relative winners and losers) serving as an impediment in the negotiations. The majority (60%) of global inequality (Gini = 53.8) arises from differences in income across countries (Bourgignon, Levin, and Rosenblatt 2008). Due to this, participants in the negotiations may be equally or more concerned with how the country appears to have fared in the new agreement relative to other parties at the negotiating table.

In this study, we focus on the political realities of the WTO's negotiating framework, using a CGE model and its accounting of the changes in post-reform national income to examine the cross-country distributional impacts of liberalization. Remaining sections in the paper: (1) discuss cross-country inequality and studies of Doha outcomes, (2) outline the modeling approach, (3) present results and (4) conclusions.

1. Background

Studies of possible Doha outcomes have been in high demand as negotiations continue. Analytical capacity is considerably larger than it was during the Uruguay Round era and has resulted in a proliferation of available comparisons of alternative scenarios for policy makers to work with as they form positions in the negotiations. Academic efforts aimed at study of Doha possibilities have contributed to the discourse with a general objective of identifying domains of protection most in need of reform. These studies tend to use computable general equilibrium (CGE) models to show a strong preference for broad participation across countries (developed to least developed) and establish the priority position of improved market access (tariff reduction) (Hoekman, Ng, and Olarreaga 2004; Anderson and Valenzuela 2007). Furthermore, these studies show that the national level benefits on the whole are positive for all groups of countries generating positive welfare outcomes as distortions are removed.

2. Modeling Approach

We take the GTAP version 7 database and CGE model as our starting point for analysis. Fully disaggregated, the database/model specifies 113 distinct regions each with a representative household who owns factors of production which it supplies to a complement of perfectly competitive firms. Using this database and model allows us to evaluate distributional outcomes in a modeling environment commonly used for assessing welfare outcomes of trade liberalization scenarios. In particular model estimates of Doha round outcomes have relied heavily on this database for projecting the potential gains of alternative reform scenarios in agriculture and manufacturing trade. Because our primary interest is in examining the cross-country income distribution when liberalizing reforms are enacted, we leave the database fully disaggregated with

respect to regions in the model such that all 113 countries and country groupings of the GTAP database are represented in the model. In terms of sectors, we aggregate GTAP's fifty-seven sectors to a group of ten, indicated in table COMM.

Table COMM. Aggregate Tradable Commodities in the Model

Short Name	Description
GrainsCrops	Farm level grain and crop products
MeatLstk	Farm level meat and livestock products
Extraction	Other primary production/extraction
ProcFood	Processed food products
TextWapp	Textiles and wearing apparel
LightMnfc	Lightweight manufactured goods
HeavyMnfc	Heavy manufactured goods
Util_Cons	Utility and construction services
TransComm	Transportation and communication services
OthServices	Other services

The empirical modeling literature addressing the Doha negotiations has considered a multitude of partial reform scenarios. Rather than adopting one of these, we opt to consider full reform of non-agricultural merchandise tariffs, as well as the three pillars of agricultural support and protection. Initial protection levels in the GTAP database are sourced from a variety of data outlets as documented in Narayanan and Walmsley (2008). We summarize the initial levels of border protection in table TARIFFS, using the trade weighted average ad valorem tariff rate for agricultural and non-agricultural tariffs for three classes of countries organized by their average per capita income.

The first section of table TARIFFS summarizes agricultural tariffs. Here we see that the highest tariffs imposed are by low income countries, and in particular agricultural imports from other low income countries. This tendency toward high south-south protection has been analyzed elsewhere and shown to be a large potential source of welfare improvement for the poorest nations

of the world (Hertel, Keeney, Ivanic, and Winters 2007). Of particular note regarding south-south protection is the fact that most negotiating frameworks call for only minimal tariff reform by the world's poorest countries. On the other hand, high income countries have the lowest average tariff rates though the impact of this protection is also influenced by the significantly large volume of imports these countries bring in country.

Table TARIFFS. Average Tariff by Regional Income Groups and Commodity Type

Exporter	Importer		
	High Income	Middle Income	Low Income
<i>Agricultural Tariffs</i>			
High Income	6.76	11.22	13.58
Middle Income	13.39	10.62	15.57
Low Income	10.82	12.84	20.18
<i>Non-Agricultural Tariffs</i>			
High Income	1.06	5.69	8.06
Middle Income	0.93	3.73	6.22
Low Income	3.18	8.55	9.13
<i>All Tariffs Combined</i>			
High Income	1.51	6.08	8.34
Middle Income	2.27	4.70	7.68
Low Income	3.71	9.04	10.58
<i>Proportion of Non-zero Tariffs</i>			
	0.57	0.75	0.67

The pattern of non-agricultural tariffs is very similar to that for agriculture, though the rates are much smaller tending towards less than half the rates for agriculture. The large number of tariff lines in non-agricultural merchandise masks considerable protection that exists at the tariff line as protection is often tailored to quite specific products that show large tariff peaks. We get some idea of the wide variability in tariff based protection from the last row in table TARIFFS where we see that between forty and sixty percent of aggregate sector tariffs in the data are actually zero depending on the particular regional grouping. In addition to tariffs, we model the removal of domestic subsidies in OECD countries (where producer support estimates are used as source data for ad valorem subsidy equivalents) and export subsidies for agriculture.

WTO trade reform in non-agriculture and the three agricultural pillars represent the only perturbations to the model we introduce. The GTAP model we use is comparative static which limits our analysis of cross-country distribution to the equilibrium market exchange effects that follow changes in protection. The dynamic effects of aggressive trade reform which affect industry growth and international investment patterns are ignored here and represent an important limitation of our analysis of distributional impacts.

We use per capita GDP for all countries as our measure of income, consistent with previous analyses of the cross-country dimension of global income distribution. The plot of gross domestic product per capita as measured in the GTAP database for all 113 countries are given in figure DIST. We see the dramatic differences in average income across countries that exists here with a number of moderately populated countries/regions with very high incomes and a large number of countries (and global population) at the bottom of the scale with very low average income. Of course the large gaps between wealthy and poorest nations means that changes in inequality arising from equilibrium adjustment to reduced tariffs will be small since the benefits are shared over a large number of trading nations. Thus, our particular interest will be on the relative inequality impacts of categories of reform such that we can provide some analytical guidance on which areas of the Doha negotiations have the largest impact on cross-country inequality. This insight will then be complementary to the studies reviewed in section 1 which discussed analysis of reforms measures and their relative contributions to welfare changes.

3. Results

Our reporting of results are focused squarely on the per capita GDP results and how global income is distributed on average across countries. Table GDPDELSTATS reports a measure of the GDP change following full liberalization of all instruments. The GDP change results are decomposed into twenty component changes, related to the type of instrument and labeled using the following nomenclature. The first letter indicates the type of protection intervention (T = tariff, X = export subsidy, S = producer subsidy). The second letter indicates the aggregate sector involved (A = agriculture, N = non-agriculture). The final two letters indicate the exporter (3rd letter) and importer (4th letter) with the following designations (H = high income country, M = middle income country, L = low income country, and * = all countries). Thus, the first row (TAHH) of the table

indicates the average percentage change in GDP resulting from tariffs applied to agriculture on trade from high income countries to high income countries. The columns of the table indicate the category of country according to the three levels of income we use to summarize average effects.

Table GDPDELSTATS. Sign Consistency of % Change in GDP by Income Class

Instrument	High Income	Middle Income	Low Income
TAHH	-0.02	-1.00	-1.00
TAMH	-0.06	1.00	-0.47
TALH	-0.99	-0.92	1.00
TNHH	-0.63	-1.00	-1.00
TNMH	-0.96	1.00	-0.63
TNLH	-0.99	-0.97	0.93
TAHM	0.99	-1.00	-1.00
TAMM	-0.99	0.20	-1.00
TALM	-1.00	-1.00	1.00
TNHM	0.56	-0.97	-1.00
TNMM	-0.92	1.00	-0.81
TNLM	-0.90	0.20	0.83
TAHL	1.00	-1.00	-1.00
TAML	-0.86	0.98	-0.98
TALL	-0.91	-1.00	0.52
TNHL	0.63	-1.00	-1.00
TNML	-0.85	1.00	-1.00
TNLL	-0.99	-0.88	0.68
XAH*	0.07	-0.25	-0.99
SAH*	1.00	1.00	1.00
Total	-0.69	0.54	0.00

The values in table GDPDELSTATS are not actual percentage changes, rather they are a measure of sign and consistency of the effect across the broad group of countries within an income class. The values are the average percentage change divided by the average absolute value of the percentage change both for the value of GDP. This sign consistency measure clearly will range between value of negative and positive one, with a value of negative one meaning that a particular instrument uniformly reduces GDP for countries in the category while a positive one indicates all countries in the group realize a positive GDP effect of liberalizing a particular instrument. In terms of analyzing and predicting the impact of a particular instrument on inequality, we will want to pay particular attention to those instruments which evidence values at or near the extremes of the sign consistency statistic, indicating a uniform effect for a particular group of countries and indicating

that all countries in the same neighborhood of the income distribution move in a consistent direction within that distribution following the shock.

The results in table GDPDELSTATS can thus be used to provide a cursory analysis of the impacts of different instruments' impact on inequality by evaluating policy reforms that increase GDP for the lowest income countries while reducing it for those with higher incomes. In particular, a value of 1.00 for the low income grouping and -1.00 for both the middle income and high income countries would strongly indicate a reduction in inequality across countries. This is exactly the case that we observe for the instrument TALM (tariffs on agriculture placed on low income countries' exports by middle income countries). The SC statistic we report in table GDPDELSTATS does not have any information on magnitudes of effects, so we cannot assert directly that this measure is inequality reducing (all of the changes could be very small or the wealthiest countries in the low income grouping could disproportionately enjoy the GDP increases). That said, the measures give us a strong indication of the relative uniformity of benefits and costs of reforms in a manner that is consistent with how the negotiations are enacted (i.e. agriculture vs. non-agriculture or industrial vs. developing vs. least developed economies).

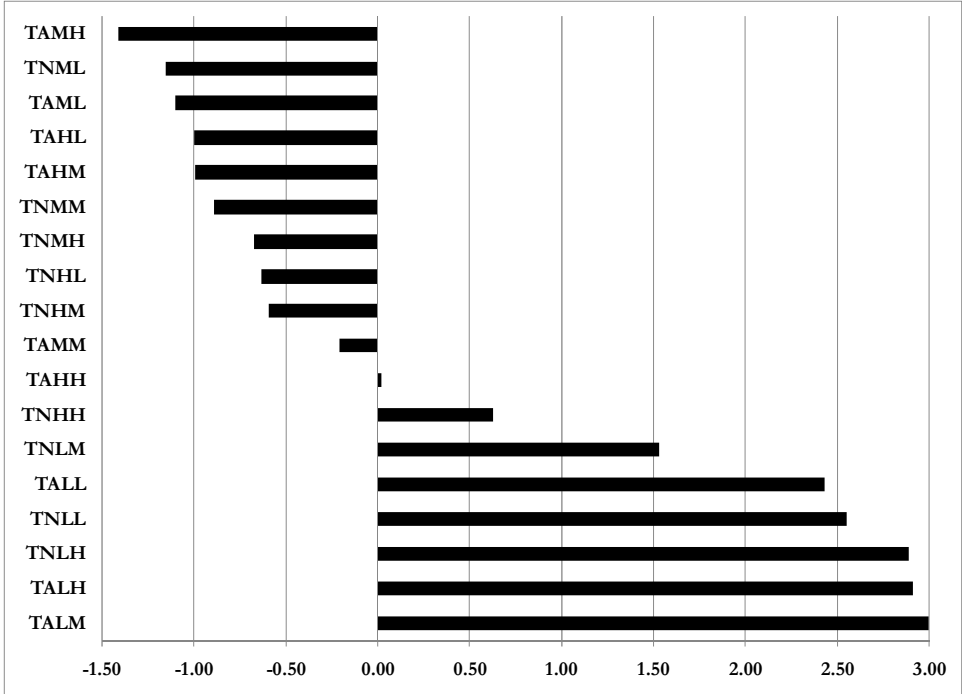


Figure GRAPHSC. Comparison of Instruments' Uniformity of Impact on Value of GDP

To further develop this analysis using the sign consistency statistic in accord with comparing the potential distributional impacts, we can subtract from the SC of the low income countries the SC of both of the higher income groups. Thus, a value of 3 would be the maximum (+1 for low income, and -1 for the two higher income groups) and the descending order would give us a means of ranking instruments as to their inequality friendliness. Figure GRAPHSC presents this ranking for instruments and we see that six of the values for this addition of SC's are over a value of 1.5. These are split evenly among importers with each of the country groupings having two measures in the > 1.5 range and all six of them related to low income country exports. Thus, our approach to evaluating inequality reducing impacts is able to identify market access concessions in agriculture and non-agriculture as the most important reforms in terms of reducing inequality. Moreover, we see that agricultural market access in middle and high income countries rank the highest in terms of having the broadest (across low income countries) uniform impact in reducing inequality.

Table INEQDEL. Changes in Inequality by Instrument

Instrument				Gini	Theil	Summary
T	A	H	H	-0.000413	-0.000600	Neg
T	A	M	H	-0.004105	-0.016766	Neg
T	A	L	H	-0.003185	-0.007420	Neg
T	N	H	H	0.051500	0.040629	Pos
T	N	M	H	0.002500	0.005287	Pos
T	N	L	H	-0.001976	-0.004292	Neg
T	A	H	M	0.001897	0.005977	Pos
T	A	M	M	-0.000172	-0.001246	Neg
T	A	L	M	-0.000893	-0.001272	Neg
T	N	H	M	0.002872	0.010225	Pos
T	N	M	M	-0.001289	-0.005565	Neg
T	N	L	M	-0.000687	-0.001147	Neg
T	A	H	L	0.001870	0.004669	Pos
T	A	M	L	0.000543	0.000412	Pos
T	A	L	L	-0.000690	-0.001264	Neg
T	N	H	L	0.002524	0.007545	Pos
T	N	M	L	-0.002343	-0.008854	Neg
T	N	L	L	-0.001663	-0.003656	Neg
X	A	H	*	-0.000039	-0.000116	Neg
S	A	H	*	-0.000345	-0.000699	Neg

The virtue of examining the uniformity of per capita GDP changes in neighborhoods of the distribution lies in the fact that we do not restrict ourselves to a particular set of restrictions

associated with an inequality measure. The literature on inequality measures contains considerable debates on appropriateness of measures and how they relate to social welfare or preferences, thus compounding the debate over reform instruments with additional complexity of inequality measurement. That said, our analysis would be incomplete without some accounting for the magnitudes involved which are critical in determining improvements in inequality. In table INEQDEL, we report two measures of inequality changes, the Gini and Theil indices. We again report these by liberalizing instrument and focus on the sign change of inequality.

We first note that the predicted changes in inequality are all in agreement between the Theil and Gini indices for each instrument and that as previously discussed the predicted changes are very small. In terms of instruments and their predicted impacts, we see that reform of 11 tariff types as well as high income countries' domestic agriculture and export subsidies are inequality reducing. Notably, both forms of south-south (**LL) liberalization are inequality reducing. Among the seven inequality increasing instruments using the Gini or Theil measure, we see that agricultural tariff reform imposed against high and middle income countries by low income countries will worsen inequality. Thus, when magnitudes of changes are considered, the gains from these reforms disproportionately benefit the high income country group for a variety of reasons related to adjustments in the bilateral trading patterns that exist under status quo and full reform protection.

We place the Gini changes from table INEQDEL on a relative (to the total inequality change) basis and plot these in figure INEQREL. Focusing on the left-hand side (inequality reducing) of the graph, we see that agricultural tariff reform by high income countries on imports from middle and low income countries yield the strongest negative movement in measured Lorenzean inequality. Following these, tariff reform in low income countries on non-agricultural imports from middle and low income countries' exports have strongest relative impacts. Notable in the inequality measure analysis is that the Gini like other measures of inequality does not favor movements at the low end of the income distribution such that if middle income countries increase their income relative to the highest income countries this can lead to a large measure of inequality reduction, even if it is not so consistent with Doha objectives that might concern global income inequality. Finally, we note that both elimination of agricultural production and export subsidies are inequality reducing but have only small impacts relative to border measures.

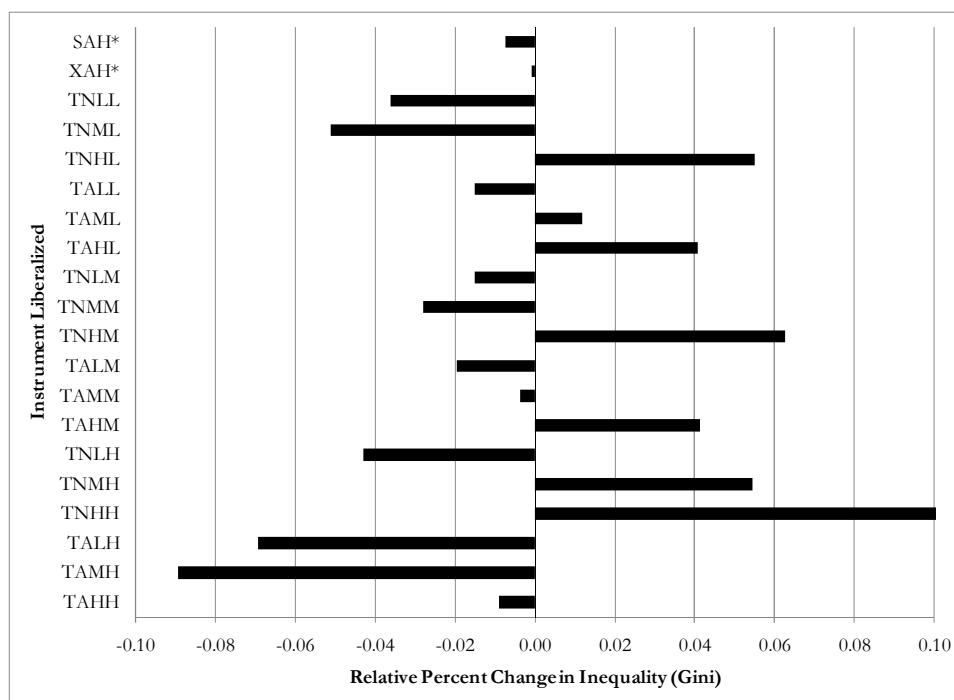


Figure INEQREL. Comparison of Relative Contributions to Inequality Reduction

In comparison to our measures of the summation of SC's which focused on inequality relative to the low income countries, we see that the four largest relative inequality impacts have different effects for the low income countries. While TAMH reform has the largest Lorenzean inequality reducing effect, it is the least inequality friendly measure in figure GRAPHSC indicating it has a low likelihood of improving inequality for the lowest income countries. Thus, the two frameworks of analysis are complementary in identifying both a general (Gini) and local (SC) dimension of inequality reduction.

4. Concluding Remarks

This study reports the outcomes of a full reform experiment consistent with liberalizing global trade in a WTO/Doha type framework. Our approach to assessing inequality expands on traditional measures which are confounded by the need to evaluate the entire cross-country distribution. In fact, we complement such a measure by using a sign consistency measure over income groupings, to locate potential for inequality improvement in a neighborhood of the distribution. In general, we conclude (in accord with previous welfare focused studies) that market

access is the much more important for generating benefits for least developed/low income countries. Further, we find that allowing free market access to low income country imports has the greatest potential benefit for reducing inequality located at the bottom of the cross-country income distribution.

Further work in this area extends naturally into the determinants of GDP, as calculated within the CGE model solution. Since GDP is a real value term, it can be decomposed into its real price and quantity components to explore additional cross-country determinants to the comparative static predictions of post-reform equilibrium, and provide further analytical insight into the potential income redistribution impacts of reducing trade barriers.

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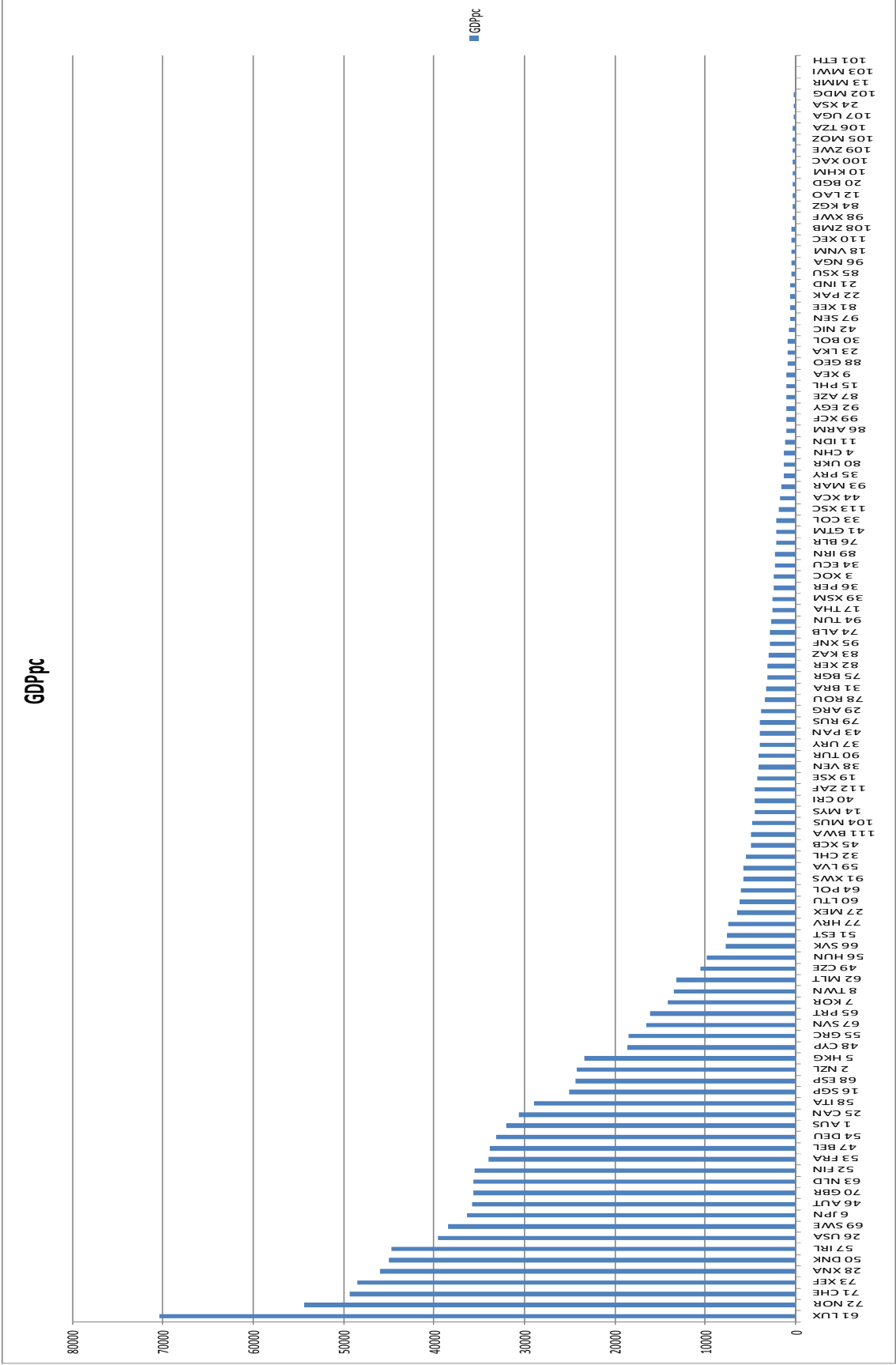


Figure DIST. Distribution of Per Capita Income across Regions