A New Empirical Perspective on Globalization and Wages

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1 Introduction

Linkages between global trade expansion and wages have been intensively debated since before the Uruguay Round. Generally speaking, there is apprehension in high-income countries about global (downward) convergence of wages, particularly among unskilled workers. These concerns have been intensified by financial globalization, where capital has an unprecedented degree of mobility and is thought to accelerate wage convergence. The intuition behind the convergence concept, essentially Stolper-Samuelson with a twist of international capital movement, is relatively simple and appealing, making it easy to incorporate in a wide variety of anti-globalization agendas. From another perspective, many have voiced concern that globalization is aggravating domestic wage inequality in poor countries.

The empirical basis of these controversies, however, has remained relatively weak, and this has hindered a deeper understanding and more reasoned debate about the processes at work. This paper makes a practical contribution to the issue with an empirical simulation framework to examine detailed trade, employment and wage patterns and their future evolution. In particular, we develop and implement a dynamic global CGE model that can forecast the likely course of international employment and wage adjustment under different trade policy scenarios.[1]

Our results suggest new interpretations are needed of the linkage between trade and wages. Firstly, the relevance of Stolper-Samuelson reasoning appears to be seriously limited by the prominence of nontradable employment (particularly among skilled workers) in both OECD and non-OECD economies. Secondly, there are significant domestic reasons why wage dispersion is increasing within OECD countries, the main one being unequal productivity growth. The essential implication of our results in this context is that OECD wage dispersion may not be as much a trade issue as a domestic one, more closely related to education and labor market policies. In this event, it is difficult to justify trade impediments as a remedy.

This case can be made even more persuasive by the evidence comparing developing and emergent economies. Among the latter group, some have enjoyed a virtuous cycle of growing trade, rising average incomes, and improving (non-agricultural) income distribution. These are

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1 The results presented in this paper reflect comparative static experiments. A subsequent version of the paper will incorporate dynamic adjustments.

the countries that have facilitated human capital accumulation, through commitments to education and labor market reform, allowing the endogenous growth effects of trade to more deeply penetrate their economies.

2 The Empirical Simulation Model

The LINKAGE Model is a global, multi-region, multi-sector, dynamic applied general equilibrium model.[2] The base data set—GTAP[3] Version 4.0—is defined across 45 country/region groupings, and 50 economic sectors. For this paper, the model has been defined for an aggregation of 16 country/regions and 14 sectors including sectors of importance to the poorer developing countries—grains, textiles, and apparel. The regional and sectoral concordances can be found in Tables A-1 and A-2. For the purposes of this paper, the policy simulations only involve an assessment of the comparative static results.

The remainder of this section outlines briefly the main characteristics of supply, demand, and the policy instruments of the model.

2.1 Production

All sectors are assumed to operate under constant returns to scale and perfect competition. Production in each sector is modeled by a series of nested CES production functions which are intended to represent the different substitution and complementarity relations across the various inputs in each sector. There are material inputs which generate the input/output table, as well as factor inputs representing value added.

Three different production archetypes are defined in the model—crops, livestock, and all other goods and services. The CES nests of the three archetypes are graphically depicted in Figures 1-3. Within each production archetype, sectors will be differentiated by different input combinations (share parameters) and different substitution elasticities. The former are largely determined by base year data, and the latter are given values by the modeler.

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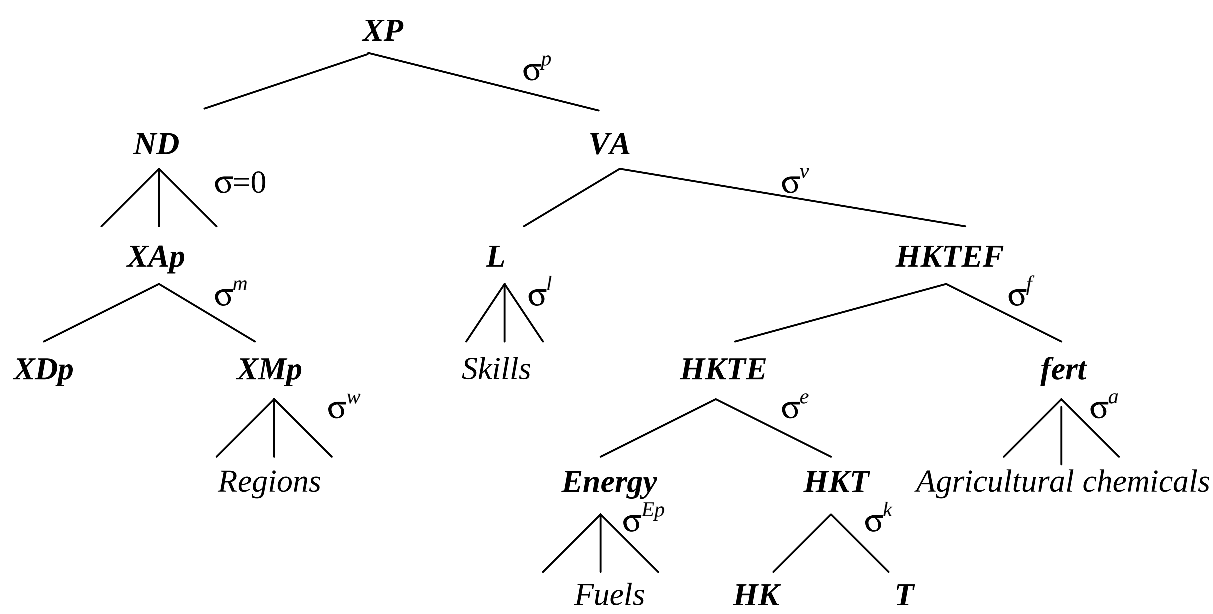
2 The LINKAGE model is a direct descendant of the RUNS Model (see Burniaux and van der Mensbrugghe, 1994), and the OECD GREEN Model (see van der Mensbrugghe, 1994). Full model specification is available from the authors.

3 GTAP refers to the Global Trade Analysis Project based at Purdue University. For more information see Hertel, 1997.

Figure 1: **Production structure in the crop sectors**



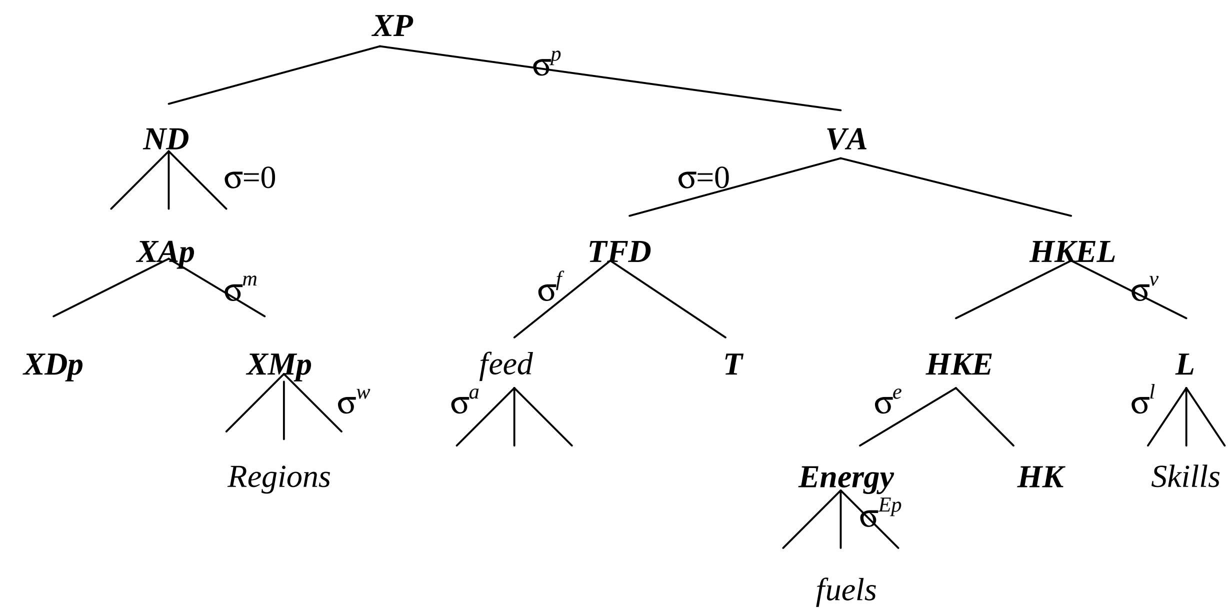
XP	Output (by vintage)
VA	Composite bundle composed of labor, capital, land, agricultural chemicals and energy
ND	Aggregate demand for other intermediate goods and services
HKTEF	Composite bundle composed of capital, land, agricultural chemicals and energy
HKTE	Composite bundle composed of capital, land, and energy
fert	Composite bundle composed of agricultural chemicals (decomposed further)
L	Demand for an aggregate labor bundle (further decomposed by skill type)
HKT	Demand for capital and land bundle
HK	Demand for capital (both physical and human)
T	Demand for the land
Energy	Demand for an aggregate energy bundle (further decomposed by fuel type)
XAp	Armington input demand by sector for non-energy intermediate goods
XDp	Input demand for domestic goods
XMp	Input demand for aggregate imports (further decomposed by region of origin)

The key feature of the crop production structure is the substitution between intensive cropping versus extensive cropping, i.e. between fertilizer and land (see Figure 1).[4] Livestock production captures the important role played by feed versus land, i.e. between ranch- versus range-fed production (see Figure 2).[5] Production in the other sectors more closely matches the traditional role of capital/labor substitution, with energy introduced as an additional factor of production (see Figure 3).

4 In the original GTAP data set, the fertilizer sector is identified with the crp sector, i.e. chemicals, rubber, and plastics.

5 Feed is represented by three agricultural commodities in the base data set: wheat, other grains, and oil seeds.

Figure 2: **Production structure in the livestock sectors**

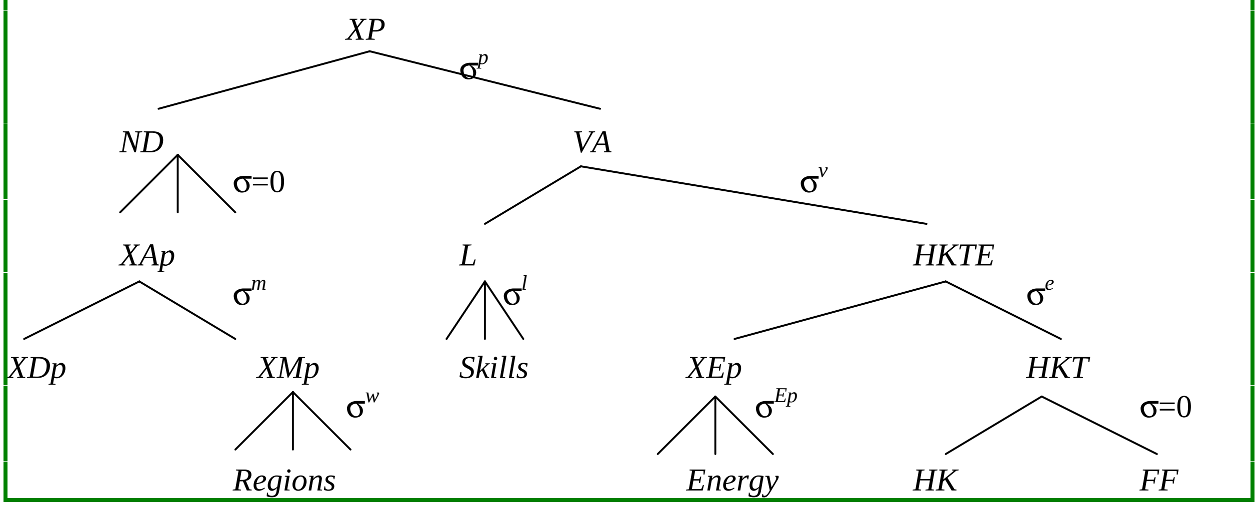


XP	Output (by vintage)
VA	Composite bundle composed of labor, capital, land, feed and energy
ND	Aggregate demand for other intermediate goods and services
TFD	Composite bundle land and feed
HKEL	Composite bundle composed of capital, labor, and energy
feed	Composite bundle composed of feed (decomposed further)
T	Demand for the land
L	Demand for an aggregate labor bundle (further decomposed by skill type)
HKE	Demand for capital and energy
HK	Demand for capital (both physical and human).
XEp	Demand for an aggregate energy bundle (further decomposed by fuel type)
XAp	Armington input demand by sector for non-energy intermediate goods
XDp	Input demand for domestic goods
XMp	Input demand for aggregate imports (further decomposed by region of origin)

In each period, the supply of **primary** factors—capital, labor, and land—is usually predetermined. However, the supply of land is assumed to be sensitive to the contemporaneous price of land. Land is assumed to be partially mobile across agricultural sectors. Given the comparative static nature of the simulations which assumes a longer-term horizon, both labor and capital are assumed to be perfectly mobile across sectors (though not internationally).

Model specification for this paper has a new twist in comparison with the standard LINKAGE Model. The GTAP data set identifies two types of labor skills—skilled and unskilled. Under the standard specification, both types of labor are combined together in a CES bundle to form aggregate sectoral labor demand, i.e. the two types of labor skills are directly substitutable. In the new specification, a new factor of production has been inserted which we call *human* capital. It is combined with capital to form a physical *cum* human capital bundle, with an assumption that they are complements. On input, the user can specify what percentage of the skilled labor factor to allocate to the human capital factor. In the simulations described in this paper, we have used an extreme assumption that all skilled labor is human capital, thus changing the substitution relation between skilled and unskilled labor on the one hand, and between capital and labor on the other hand.

Figure 3: **Production structure in the manufacturing and services sectors**



XP	Output (by vintage)
VA	Composite bundle composed of labor, capital, sector specific factor, and energy
ND	Aggregate demand for non-energy intermediate goods and services
HKTE	Composite bundle composed of capital, sector specific factor, and energy
HKT	Composite bundle composed of capital and the sector specific factor
L	Demand for an aggregate labor bundle (further decomposed by skill type)
HK	Demand for capital (physical and human)
FF	Demand for the sector specific factor
XEp	Demand for an aggregate energy bundle (further decomposed by fuel type)
XAp	Armington input demand by sector for non-energy intermediate goods
XDp	Input demand for domestic goods
XMp	Input demand for aggregate imports (further decomposed by region of origin)

Once the optimal combination of inputs is determined, sectoral output prices are calculated assuming competitive supply (zero-profit) conditions in all markets.

2.2 Consumption and closure rules

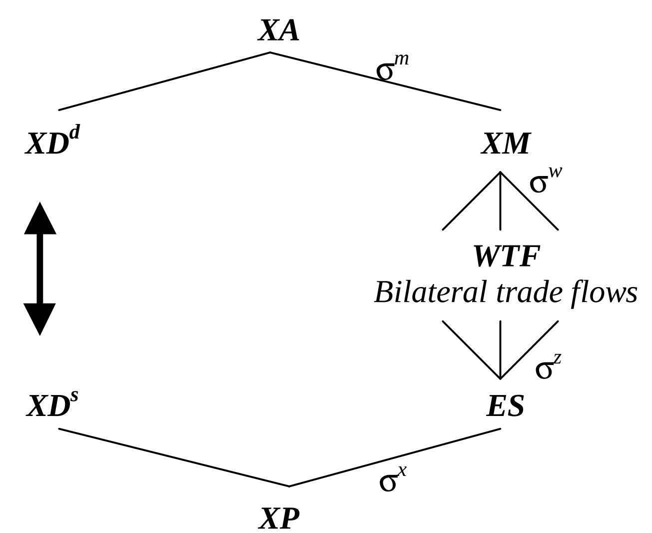
All income generated by economic activity is assumed to be distributed to a single representative household. The single consumer allocates optimally his/her disposable income among the consumer goods and saving. The consumption/saving decision is completely static: saving is treated as a "good" and its amount is determined simultaneously with the demands for the other goods, the price of saving being set arbitrarily equal to the average price of consumer goods.[6]

[6] The demand system used in LINKAGE is a version of the Extended Linear Expenditure System (ELES) which was first developed by Lluch (1973). The formulation of the ELES used in LINKAGE is based on atemporal

Government collects income taxes, indirect taxes on intermediate and final consumption, taxes on production, tariffs, and export taxes/subsidies. Aggregate government expenditures are linked to changes in real GDP. The real government deficit is exogenous. Closure therefore implies that some fiscal instrument is endogenous in order to achieve a given government deficit. The standard fiscal closure rule is that the marginal income tax rate adjusts to maintain a given government fiscal stance. For example, a reduction or elimination of tariff rates is compensated by an increase in household direct taxation, *ceteris paribus*.

Each region runs a current-account surplus (deficit) which is fixed (in terms of the model numéraire). The counterpart of these imbalances is a net outflow (inflow) of capital, which is subtracted from (added to) the domestic flow of saving. In each period, the model equates gross investment to net saving (equal to the sum of saving by households, the net budget position of the government and foreign capital inflows). This particular closure rule implies that investment is driven by saving. The fixed trade balance implies an endogenous real exchange rate. For example, removal of tariffs which induces increased demand for imports is compensated by increasing exports which is achieved through a real depreciation.

Figure 4: **Trade Nesting**



XA	Aggregate Armington demand
XD^d	Domestic demand for domestic production
XM	Aggregate import demand
WTF	Bilateral trade flows
ES	Aggregate export supply
XD^s	Domestic supply to the domestic market
XP	Aggregate output

maximization—see Howe (1975). In this formulation, the marginal propensity to save out of supernumerary income is constant and independent of the rate of reproduction of capital.

2.3 Foreign Trade

The world trade block is based on a set of regional bilateral flows. The basic assumption in LINKAGE is that imports originating in different regions are imperfect substitutes (see Figure 4). Therefore in each region, total import demand for each good is allocated across trading partners according to the relationship between their export prices. This specification of imports—commonly referred to as the Armington[7] specification—implies that each region faces a downward-sloping demand curve for its exports. The Armington specification is implemented using two CES nests. At the top nest, domestic agents choose the optimal combination of the domestic good and an aggregate import good consistent with the agent's preference function. At the second nest, agents optimally allocate demand for the aggregate import good across the range of trading partners.[8]

The bilateral supply of exports is specified in parallel fashion using a nesting of constant-elasticity-of-transformation (CET) functions. At the top nest, domestic suppliers optimally allocate aggregate supply across the domestic market and the aggregate export market. At the second nest, aggregate export supply is optimally allocated across each trading region as a function of relative prices.[9]

Trade measures are fully bilateral and include both export and import taxes/subsidies. Trade and transport margins are also included; therefore world prices reflect the difference between FOB and CIF pricing.

2.4 Prices

The LINKAGE model is fully homogeneous in prices, i.e. only relative prices are solved for. The price of a single good, or of a basket of goods, is arbitrarily chosen as the anchor to the price system. The price (index) of OECD manufacturing exports has been chosen as the numéraire, and is set to 1.

2.5 Elasticities

Production elasticities are relatively standard and are available from the authors. Aggregate labor and capital supplies are fixed, and they are perfectly mobile across sectors. The basic Armington elasticities are given in the following table:

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7 See Armington, 1969.

8 The GTAP data set allows each agent of the economy to be an Armington agent, i.e. each column of demand in the input/output matrix is disaggregated by domestic and import demand. (The allocation of imports across regions can only be done at the national level). For the sake of space and computing time, the standard model specification adds up Armington demand across domestic agents and the Armington decomposition between domestic and aggregate import demand is done at the national level, not at the individual agent level.

9 A theoretical analysis of this trade specification can be found in de Melo and Robinson, 1989.

Armington Elasticities	
GRN	3.00
OCR	2.00
LVS	2.50
FFL	3.50
RES	2.50
FDP	2.50
TXT	2.50
APP	2.50
P_C	4.50
CRP	2.50
MET	2.50
PPP	3.00
OMF	2.00
NTR	1.50

The Armington elasticities are assumed to be the same at both nest levels. The CET transformation elasticities are double the Armington elasticities.

3 Global Patterns of Trade Distortion

Before presenting the simulation results, it is useful to examine the prior patterns of protection that are captured by the database. It should be emphasized at the outset that we are working with nominal, *ad valorem* import and export price distortions in these experiments, and the role of NTBs is not discernable in our results. Apart from second-best interactions then, it is reasonable to presume that the effects we present later represent lower bounds for the adjustments following from more complete globalization, but that our qualitative conclusions are generally robust.

The next two tables give ad valorem tariff rates for each region and sector as these were estimated from the GTAP database (for country and sector codes, see the Annex Tables A1-A2 at the end of this paper). Evidently, despite substantial tariff reductions since 1950, there is substantial dispersion of tariff rates, both across countries and across sectors within countries. On an aggregate basis, exporting countries face regional average import barriers ranging from 3.1% to 11.6 percent. More dramatic is the dispersion of average regional protection rates against the rest of the world. The Rest of South Asia region has the highest nominal rate for this 1995 data, averaging 52% across all sectors and trading partners, while India averages 35.1% nominal protection. Europe appears to be least protective with a 1.6% average, but this latter figure may indicate the importance of omitting non-tariff barriers (as well as the fact that the aggregate includes a zero tariff on the 2/3 of intra-regional trade).

Table 1: Bilateral tariffs
(*percent*)

Importing Region

Exporter	*CHN*	*NIE*	*REA*	*IND*	*RAS*	*POE*	*CUS*	*EUR*	*CAM*	*BG3*	*LAT*	*CIT*	*SAC*	*RSA*	*RSS*	*ROW*	***Ave***
CHN	0.0	3.2	14.3	43.9	70.8	5.6	5.8	6.1	16.6	14.6	10.5	11.4	15.7	11.4	24.9	22.8	**8.0**
NIE	30.4	2.0	12.1	44.2	59.2	4.7	3.5	3.7	8.2	13.6	10.8	10.3	8.0	10.3	12.8	19.9	**9.5**
REA	15.6	3.2	13.1	42.1	56.0	3.9	2.7	4.5	11.4	7.5	4.4	6.7	6.8	12.3	20.4	21.9	**6.4**
IND	16.3	3.1	11.4	0.0	41.7	3.4	4.5	5.5	12.5	13.6	11.2	7.8	9.2	9.0	15.5	13.6	**8.2**
RAS	18.1	2.9	8.4	42.3	50.3	3.8	10.6	8.5	9.5	8.5	3.8	6.4	5.1	5.6	17.8	17.6	**10.4**
POE	28.3	4.5	15.5	40.0	61.7	13.0	2.9	5.5	9.1	10.5	12.0	7.0	13.1	9.7	20.4	15.5	**8.9**
CUS	13.1	8.4	12.5	42.7	25.3	18.8	0.1	2.8	10.9	2.9	8.8	5.6	4.3	4.5	11.1	10.8	**6.1**
EUR	24.4	4.8	7.7	33.0	47.4	5.9	2.9	0.3	6.6	11.1	8.3	7.6	4.3	7.0	13.9	13.8	**3.1**
CAM	14.0	2.1	4.3	3.8	14.0	9.4	7.4	8.0	12.8	9.5	9.5	6.6	2.8	0.6	2.0	8.5	**8.1**
BG3	14.8	6.2	13.4	50.7	46.2	6.3	0.7	9.8	7.7	11.4	9.7	5.6	4.5	9.4	13.4	12.2	**5.7**
LAT	6.7	2.9	2.2	27.7	4.3	2.0	2.0	6.2	7.9	8.1	8.2	2.0	1.3	0.5	2.8	6.9	**4.8**
CIT	10.5	2.3	7.2	40.7	54.1	4.5	2.0	4.5	2.2	4.1	5.4	7.1	4.1	4.1	11.3	15.7	**6.0**
SAC	26.1	4.7	21.2	40.4	49.3	9.6	1.9	4.6	6.1	5.1	5.0	4.9	0.0	5.8	18.2	10.4	**7.0**
RSA	12.1	2.8	4.6	20.6	43.6	1.9	3.7	19.6	5.1	10.8	5.3	4.9	9.0	5.1	12.6	13.4	**11.6**
RSS	7.4	3.3	9.1	10.9	66.7	6.4	1.2	3.2	1.9	15.8	5.3	3.6	0.7	6.8	16.7	10.7	**4.2**
ROW	10.0	2.9	4.4	21.4	60.4	1.2	2.7	3.2	5.8	12.8	3.7	9.6	1.1	5.6	12.2	12.9	**5.2**
Ave	**24.3**	**4.6**	**11.6**	**35.1**	**52.0**	**8.6**	**2.3**	**1.6**	**9.3**	**7.3**	**8.8**	**7.5**	**5.7**	**7.0**	**14.8**	**14.4**	**5.4**

Table 2: Sectoral tariffs by importing region
(*percent*)

Importing Region

Sector	*CHN*	*NIE*	*REA*	*IND*	*RAS*	*POE*	*CUS*	*EUR*	*CAM*	*BG3*	*LAT*	*CIT*	*SAC*	*RSA*	*RSS*	*ROW*	***Ave***
GRN	-5.6	114.4	54.4	37.4	-8.9	296.2	0.4	7.9	-10.1	0.2	-11.2	-7.2	7.1	5.9	17.8	6.7	**54.2**
OCR	13.7	11.7	12.9	36.8	62.5	13.3	4.7	7.4	14.7	7.5	8.8	7.6	3.1	11.0	19.2	15.8	**9.5**
LVS	20.3	5.1	6.5	19.7	42.4	4.8	0.7	6.0	9.4	4.3	6.1	6.8	0.0	3.8	14.0	30.6	**8.4**
FFL	3.4	3.0	0.9	3.5	54.7	0.4	0.6	0.1	5.8	14.1	11.4	1.8	0.0	3.7	12.0	9.0	**1.6**
RES	3.1	0.8	2.6	4.8	33.5	0.0	0.1	0.0	8.3	1.8	7.3	4.3	0.5	4.7	17.9	11.5	**1.5**
FDP	17.4	16.3	38.4	61.8	41.9	27.6	8.8	8.1	12.7	1.2	13.1	14.2	12.1	11.0	13.8	32.8	**14.9**
TXT	57.5	2.9	21.0	60.2	72.8	7.2	6.9	1.7	15.2	9.6	13.0	9.6	12.7	18.1	32.1	26.5	**14.0**
APP	43.3	3.0	16.3	58.0	78.3	8.0	10.7	4.8	25.1	8.6	15.3	12.9	24.9	17.2	33.8	30.1	**9.2**
P_C	8.0	6.4	7.6	24.1	58.7	2.5	3.3	0.4	8.4	11.0	6.9	6.4	2.6	7.4	14.1	21.0	**5.6**
CRP	19.7	4.3	12.7	60.7	69.0	3.3	2.6	0.8	7.8	6.5	9.2	8.7	3.8	6.3	15.1	12.9	**5.1**
MET	12.0	3.8	9.1	52.2	81.8	1.3	1.7	0.6	7.4	5.7	8.9	5.7	4.0	7.9	16.1	11.3	**4.1**
PPP	21.8	2.8	10.9	43.5	59.6	1.8	0.5	0.6	10.2	3.4	10.8	8.4	5.7	10.8	20.0	18.2	**3.2**
OMF	29.5	3.7	12.9	50.8	65.5	3.0	1.7	1.3	8.8	10.5	11.5	9.2	8.1	7.3	17.6	15.9	**5.2**
NTR	1.4	0.0	0.0	0.0	0.0	2.7	0.0	0.0	0.0	0.0	2.0	1.0	0.0	0.1	0.0	0.0	**0.4**
Ave	**24.3**	**4.6**	**11.6**	**35.1**	**52.0**	**8.6**	**2.3**	**1.6**	**9.3**	**7.3**	**8.8**	**7.5**	**5.7**	**7.0**	**14.8**	**14.4**	**5.4**

Sectoral dispersion of protection is equally dramatic, with worldwide average import tariffs ranging from 54.2% for grains (GRN) to negligible rates for non-fuel natural resources (RES) and fossil fuels (FFL). Lest one be too downbeat about the progress of globalization, it is worth noting that the observed global average tariff rate is only 5.4%, but of course the observed dispersion still implies significant resource misallocations are likely to be in effect, and the omission of NTBs only strengthens this suspicion.

Import protection only tells part of the trade distortion story, however. Price wedges operating against exports induce the same kind of efficiency losses and often have perverse domestic incentive effects. The next two tables summarise the data we have on trade barriers from the export perspective. Table 3 recasts import barriers to the exporter perspective, indicating what each country faces in terms of sectoral, global protection against its outbound products. The average rates (row averages) here are of course the same as those of Table 2. Of particular interest here is protection against grain exports, which appears to be highly discriminatory, with POE and SAC facing rates of over 100% while several regions face less than 10%.

Table 3: Sectoral tariffs faced by exporting region
(*percent*)

	Exporting Region																
	CHN	*NIE*	*REA*	*IND*	*RAS*	*POE*	*CUS*	*EUR*	*CAM*	*BG3*	*LAT*	*CIT*	*SAC*	*RSA*	*RSS*	*ROW*	***Ave***
Sector																	
GRN	35.4	12.0	56.3	23.3	20.4	107.5	83.1	6.5	17.4	11.9	9.8	6.4	109.1	-0.1	41.9	14.5	**54.2**
OCR	11.2	10.5	9.2	7.9	17.0	25.4	10.3	4.5	9.5	9.5	6.2	20.1	20.9	25.9	9.3	14.2	**9.5**
LVS	4.5	6.0	19.2	2.5	4.3	8.4	6.8	5.3	5.6	2.3	7.9	35.0	4.3	18.8	11.4	14.3	**8.4**
FFL	3.6	7.9	2.0	25.1	0.7	1.8	0.4	0.8	3.7	2.6	2.5	1.0	1.7	1.2	1.3	1.8	**1.6**
RES	2.2	5.3	1.2	0.8	1.1	1.0	1.0	2.2	0.8	1.7	0.9	1.4	0.7	2.6	0.7	1.6	**1.5**
FDP	20.0	32.3	17.2	13.2	19.9	40.5	18.4	8.4	25.4	19.5	12.7	22.3	28.6	49.1	11.4	15.3	**14.9**
TXT	15.4	32.7	16.6	13.3	10.7	28.9	7.0	5.3	12.4	7.3	9.8	10.2	14.7	9.5	8.3	11.6	**14.0**
APP	9.3	15.4	12.3	10.6	11.6	12.0	11.8	4.9	11.9	4.7	12.4	9.1	10.0	11.6	9.0	11.5	**9.2**
P_C	8.5	7.7	5.7	3.9	8.9	7.1	3.9	3.6	6.9	5.3	5.6	3.4	5.4	2.7	16.3	9.8	**5.6**
CRP	10.7	14.6	10.7	10.0	11.4	8.5	4.5	2.6	5.0	5.9	5.3	6.6	7.2	6.5	5.9	12.9	**5.1**
MET	4.5	10.0	5.5	8.4	16.1	8.8	2.2	2.3	5.0	4.8	3.2	4.6	4.2	7.1	5.2	8.3	**4.1**
PPP	4.4	10.7	5.4	12.9	11.6	6.6	2.0	2.2	9.1	3.7	4.0	5.9	6.4	7.8	3.1	9.2	**3.2**
OMF	6.4	7.8	3.6	10.2	6.8	8.5	4.0	3.8	5.4	3.0	7.5	7.6	9.0	9.5	6.3	8.0	**5.2**
NTR	0.8	0.8	1.0	0.4	0.5	0.4	0.5	0.2	0.7	0.6	0.6	0.8	1.0	0.5	0.6	0.6	**0.4**
Ave	**8.0**	**9.5**	**6.4**	**8.2**	**10.4**	**8.9**	**6.1**	**3.1**	**8.1**	**5.7**	**4.8**	**6.0**	**7.0**	**11.6**	**4.2**	**5.2**	**5.4**

Table 4 summarizes outbound export taxes and subsidies for the sixteen regions in the database, and these indicate that much progress remains to be made if the global free trade is to obtain with respect to originating as well as destination countries. Global average rates are relatively low, even for individual sectors, but there is great dispersion among regions. Many export tax rates exceed 10% and even 40%, and a wide variety of subsidies are in place to undermine the benefits of import liberalization and other reforms. We shall see in our scenarios, in fact, that some countries actually lose from global import liberalization if they hold on to their export distortions.

Table 4: Export taxes/subsidies imposed by exporting regions
(*percent*)

	Exporting Region																
	CHN	*NIE*	*REA*	*IND*	*RAS*	*POE*	*CUS*	*EUR*	*CAM*	*BG3*	*LAT*	*CIT*	*SAC*	*RSA*	*RSS*	*ROW*	***Ave***
Sector																	
GRN	36.7	-17.9	-24.3	1.5	-3.3	-2.7	-0.4	-6.7	0.3	13.1	-6.9	9.9	6.3	5.9	6.9	-2.4	**-0.7**
OCR	-6.7	0.0	3.3	0.4	0.0	-1.3	1.6	-0.9	0.0	7.6	-0.3	1.2	0.3	8.3	11.7	1.7	**1.7**
LVS	9.0	0.0	8.1	0.5	0.3	-5.4	-1.8	-13.5	0.0	16.4	3.7	-5.6	-2.7	19.5	21.5	-10.4	**-6.5**
FFL	20.5	0.3	3.4	0.2	0.0	0.6	1.6	0.0	0.3	0.0	1.1	1.8	-3.6	46.2	10.3	0.5	**2.0**
RES	-1.0	0.0	3.5	0.6	-2.7	0.0	2.0	0.3	1.0	6.0	0.2	1.6	-5.6	-0.4	3.8	0.3	**0.8**
FDP	2.7	-1.2	-11.1	3.7	4.0	-3.5	-0.6	-7.8	2.1	5.2	0.8	-3.9	-1.8	-3.6	3.1	1.3	**-4.9**
TXT	-5.6	0.2	2.9	4.3	1.6	0.0	0.3	0.2	0.0	0.6	-6.4	0.1	-0.1	-5.3	-2.3	-2.8	**-0.2**
APP	-2.0	4.2	5.2	9.8	3.1	0.0	0.2	0.3	0.5	1.2	-1.5	0.0	-0.3	-2.0	0.1	0.3	**0.8**
P_C	12.8	0.0	5.5	0.6	0.4	4.6	3.7	0.2	0.0	3.2	3.6	3.7	28.5	8.0	1.8	1.1	**1.6**
CRP	-11.9	0.0	5.1	0.6	7.1	0.0	1.2	0.1	0.2	3.0	-0.2	0.2	-0.3	-8.8	2.2	0.7	**0.1**
MET	-6.3	0.0	4.3	0.6	1.5	0.0	0.4	0.1	0.8	1.0	0.3	0.2	-0.6	-7.4	-0.5	0.3	**0.0**
PPP	-6.6	0.0	4.3	0.6	0.8	0.1	0.5	0.1	0.1	0.4	0.1	0.1	-0.4	-3.4	4.8	0.8	**0.3**
OMF	3.8	0.0	7.4	0.6	0.4	0.0	0.6	0.1	0.0	0.4	1.9	0.0	0.2	-3.5	-1.2	0.2	**0.6**
NTR	-0.3	0.0	3.5	0.7	0.5	0.1	6.3	0.3	0.4	0.2	2.1	0.2	-0.2	1.1	1.8	3.5	**1.6**
Ave	**-0.3**	**0.2**	**3.5**	**2.8**	**2.1**	**-0.1**	**1.8**	**-0.5**	**0.5**	**2.0**	**0.7**	**0.2**	**-1.4**	**9.0**	**6.8**	**0.9**	**0.4**

A final perspective on import protection concerns the focal point of this paper, labor markets and trade. There is an active debate in the trade literature about the effects of liberalization on relative wages.[10] In particular, several authors have found evidence that trade liberalization increases wage inequality in developing countries, in apparent contradiction with a simple interpretation of Hecksher-Ohlin. Robbins (1996) presented early evidence of this for Latin America, but his results are still controversial. Other evidence for Asia (Wood:1997), China (Jin, Sachs, and Warner:1996 and Benjamin, Brandt, Glewwe, and Li:1999), Mexico (Feenstra and Hanson:1997 and Hanson and Harrison:1999), Morocco (Currie and Harrison:1997, Deninger and Squire:1997), and Russia (Brainerd:1998) can best be described as mixed. In conclusion, episodes of positive correlation between rising inequality and trade liberalization appear more or less as frequently as the contrary, i.e. a definitive causal link has not been empirically established in cross-country comparisons.[11]

Given this diversity of evidence, it is not surprising that a variety of theories have arisen to explain these phenomena. Slaughter (2000) divides these into several generic categories, including effects driven by endowment differences, technological change, and prior patterns of import protection. In this section, we examine the latter argument, essentially that import protection arises from political economy, and thus that the predominate labor group enjoys higher net protection. In poor countries, this implies a protective bias in favor of activities intensive in unskilled labor. Such a bias has been documented for Mexico by Hanson and Harrison (1999) and for Morocco by Currie and Harrison (1997).[12]

The GTAP global database offers a good opportunity to contribute to this evidence, since we have nominal protection data by country and sector, and moreover the value added data are decomposed into Unskilled and Skilled labor. Table 5 presents our general calculations about the incidence of import protection upon labor value added, and indeed these results generally support the notion of a bias in favor of unskilled labor. Results for China and a few other countries are biased by import subsidies, but the overall estimates indicate a discernable, but relatively small bias in favor of protecting unskilled value added.

The principal reason for this bias, and an important theme in interpreting our relative wage results later in the paper, is the predominance of Skilled employment in nontradeable sectors.[13] The issue of nontradeables in labor value added has apparently not been directly addressed elsewhere in the literature. We believe it to be central to explaining both the Unskilled protection bias and unequal wage adjustments to changing trade regimes. As we shall argue later, however, the protection bias is too small by itself to explain the inequality effects, and we believe they are a direct consequence of tradeable-nontradeable employment patterns.

[10] A recent and very able review of this material is Slaughter (2000), which has informed our own comments.

[11] Among the more extensive comparisons are Szekely and Hilgert (1999), Deininger and Squire (1996).

[12] It should be recalled, however, that unequal trade effects have not been conclusively demonstrated for the latter country.

[13] The data indicate that, in most regions, more than 70% of skilled labor is employed in the non-tradeable sector.

Table 5: Labor Value Added and Import Protection Levels
(*percent*)

	Shares of global			UnSk	Avg. Tariff		Avg. ERP[14]	
		UnSk	*Sk*	*Dom.*	*UnSk*	*Sk*	*UnSk*	*Sk*
	VA	*VA*	*VA*	*Share*	*VA*	*VA*	*VA*	*VA*
China	2.13	6.14	3.40	82.24	-0.57	-0.02	-0.91	-0.03
Asian Tigers	3.10	5.94	8.14	65.17	3.58	0.05	4.59	0.06
Rest of East Asia	1.88	4.98	3.23	79.80	4.13	0.10	5.24	0.13
India	1.08	7.02	4.14	81.30	4.76	0.02	6.99	0.03
Rest of South Asia	0.31	6.87	4.32	80.32	-1.08	-0.04	-1.69	-0.06
Japan, Australia, New Zealand	19.54	6.25	9.71	62.27	4.26	0.12	4.79	0.13
Western Europe	31.15	7.15	11.45	61.52	0.06	0.01	0.06	0.01
Canada/United States	27.38	6.65	11.19	60.38	0.00	0.00	0.00	0.00
Central America and the Car.	0.31	5.63	4.70	75.43	-0.48	-0.02	-0.61	-0.02
Argentina, Brazil, and Mexico	4.40	5.27	5.81	69.93	0.01	0.00	0.01	0.00
Rest of Latin America	1.10	4.65	4.69	71.77	-0.29	-0.01	-0.44	-0.02
CEA and FSU	2.82	7.25	7.17	72.15	-0.10	0.00	-0.18	-0.01
South Africa Customs Union	0.48	7.09	8.78	67.44	0.02	0.00	0.03	0.00
Rest of Southern Africa	0.06	6.56	4.25	79.82	0.70	0.02	1.15	0.04
Rest of Sub Saharan Africa	0.53	7.44	3.88	83.10	2.87	0.11	4.32	0.17
Rest of the World	3.73	5.09	5.15	71.71	0.26	0.01	0.38	0.01

4 Simulation Results

In order to better ascertain the effects of more liberal trade regimes on incomes, employment, and wages, we developed and implemented a variety of scenarios with the global CGE model. In particular, for each of the fourteen regions, we examined the effect of two types of trade liberalization:

1. unilateral liberalization of all imports by the region under consideration
2. liberalization of imports from this region by all of its trading partners

The latter is a market access scenario, where all thirteen other regions remove import barriers to the fourteenth region, holding their other bilateral trade regimes constant. These are extreme cases in the continuum of negotiated trade outcomes, but they offer reference points that can be considered to bracket the effects we are interested in. Finally, a globalization scenario was also considered as a reference, entailing removal of all import barriers by all regions.

Table 6 presents real GDP changes for each of the four trade scenarios and all sixteen regions. Generally speaking, and as theory would dictate, trade liberalization is beneficial to the global economy, although Canada and the United States experience negligible losses under multilateral liberalization. The more substantial loss for the Rest of Southern Africa arises as a second-best outcome, this because the region has relatively high export taxes in primary and energy sectors. These results also indicate that all regions would benefit from unilateral liberalization, indicating the absence of free-rider problems as an impediment to trade

[14] The term Avg. ERP denotes the Effective Rate of Protection approximated by taking account only of value added share, not of import protection in intermediate inputs.

negotiations. While these results are interesting, their comparative static nature limits the scope for aggregate growth dividends from globalization.

Table 6: Real GDP at Market Price
(*percent change from baseline*)

Region	***Unilat. Lib.***	***Market Access***	***Both***	***Full Multi-lat.***
China	0.70	0.49	1.08	0.99
Asian Tigers (HKG, KOR, SGP, TWN)	0.43	0.13	0.55	0.52
Rest of East Asia	0.48	0.14	0.54	0.55
India	0.68	0.40	1.01	0.89
Rest of South Asia	2.65	1.08	3.54	3.59
Japan Australia and New Zealand	0.56	0.08	0.60	0.66
Western Europe	0.05	-0.06	-0.03	0.02
Canada and the United States	0.00	-0.04	-0.03	-0.04
Central America and the Caribbean	0.30	0.35	0.58	0.51
Argentina, Brazil, and Mexico	0.09	0.08	0.14	0.13
Rest of Latin America	0.21	0.09	0.25	0.26
CEA and FSU	0.10	0.03	0.08	0.08
Southern Africa Customs Union	0.09	0.05	0.09	0.19
Rest of Southern Africa	0.41	-0.78	-0.57	-0.38
Rest of Sub Saharan Africa	0.49	0.13	0.57	0.61
Rest of the World	0.49	0.12	0.55	0.58

For this reason, we prefer to focus on compositional adjustments in the present analysis. Sectoral trade, output, and employment shifts delineate sharper structural adjustments to the removal of trade distortions. Consider trade flows, which are depicted in bilateral terms in Tables 7 (value) and 8 (percentage) below.[15] Although there are significant increases in overall global trade (even in this comparative static context), trade diversion is apparent in several trade linkages and percent changes in bilateral trade are very diverse. For larger regions, trade adjustments are not necessarily small in percentage terms because the prior dispersion of inward and outward protection was significant. Consider China, for example, whose total trade adjustment is about two-thirds that of Canada and the US, while its average percent change in bilateral trade is three times that of CUS because of higher average and more unequal tariffs. These figures imply that structural adjustments ensuing from globalization will fall very unequally upon the regions. Part of this is the responsibility of the region in question, because of its historically high average protection and/or tariff dispersion. Part of the necessary adjustment, however, is imposed upon them by trading partners removing protection, an implicit cost of new market access.

[15] It should be noted here that diagonal elements are zero for single countries but nonzero for regions, where they capture changes in intra-regional trade.

Table 7: Change in bilateral trade flows—Full multilateral liberalization compared to baseline
(*Billions of current 1995 dollars*)

								Importing Region									
	CHN	*NIE*	*REA*	*IND*	*RAS*	*POE*	*CUS*	*EUR*	*CAM*	*BG3*	*LAT*	*CIT*	*SAC*	*RSA*	*RSS*	*ROW*	***Total***
Exporter																	
CHN	0.0	4.0	1.7	0.6	1.2	7.3	9.4	8.4	0.5	0.9	0.4	1.1	0.4	0.1	0.6	2.8	39.2
NIE	19.0	1.6	3.8	1.3	1.1	3.6	5.0	2.7	0.3	1.2	0.3	0.7	0.2	0.1	0.1	3.2	44.3
REA	1.2	3.4	1.8	0.8	0.8	2.5	4.0	3.7	0.1	0.3	0.0	0.3	0.1	0.1	0.3	2.5	22.0
IND	0.2	0.7	0.6	0.0	0.4	0.7	1.6	3.0	0.0	0.2	0.1	0.3	0.1	0.1	0.2	0.7	8.9
RAS	0.2	0.5	0.1	0.1	0.2	0.3	2.5	3.0	0.0	0.1	0.0	0.1	0.0	0.0	0.1	0.5	7.8
POE	9.9	9.9	7.6	1.1	0.8	9.5	8.6	9.7	0.2	1.2	0.5	0.4	0.7	0.1	0.5	1.8	62.5
CUS	0.5	13.4	2.9	1.1	-0.2	26.0	-1.4	6.6	1.4	-0.9	1.1	0.5	0.2	0.1	0.1	0.3	51.7
EUR	5.7	6.7	1.2	2.1	1.0	6.9	12.1	-22.1	0.7	4.7	0.9	8.3	0.8	0.6	1.4	8.8	39.6
CAM	0.1	0.1	0.0	0.0	0.0	0.3	2.1	1.3	0.6	0.2	0.2	0.0	0.0	0.0	0.0	0.0	4.8
BG3	0.2	0.4	0.6	0.4	0.2	0.5	1.8	4.8	0.3	2.3	1.2	0.1	0.1	0.1	0.1	0.2	13.3
LAT	0.0	0.2	0.0	0.0	0.0	0.0	1.5	1.9	0.4	1.0	0.9	0.0	0.0	0.0	0.0	0.0	5.8
CIT	0.2	0.6	0.2	0.4	0.1	0.8	0.7	8.0	0.0	0.1	0.0	2.8	0.0	0.0	0.0	1.7	15.8
SAC	0.1	0.2	0.5	0.1	0.0	0.6	0.1	0.7	0.0	0.0	0.0	0.0	0.0	0.2	0.1	0.0	2.7
RSA	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.7
RSS	0.0	0.1	0.2	-0.1	0.1	0.1	0.8	1.6	0.0	0.5	0.1	0.0	0.0	0.0	0.1	0.1	3.7
ROW	0.4	1.9	0.6	0.5	1.5	1.6	3.6	9.8	0.0	1.5	0.1	1.4	0.1	0.1	0.2	3.1	26.3
Total	37.9	43.7	21.6	8.4	7.4	60.7	52.4	44.7	4.7	13.2	5.8	16.1	2.7	1.7	3.6	25.8	350.3

Table 8: Change in bilateral trade flows—Full multilateral liberalization compared to baseline
(*percent of baseline*)

								Importing Region									
	CHN	*NIE*	*REA*	*IND*	*RAS*	*POE*	*CUS*	*EUR*	*CAM*	*BG3*	*LAT*	*CIT*	*SAC*	*RSA*	*RSS*	*ROW*	***Ave***
Exporter																	
CHN	0.0	13.1	19.1	46.0	63.1	15.9	18.5	17.4	29.2	29.4	17.1	25.3	37.3	26.0	33.7	30.9	18.7
NIE	34.2	2.8	7.7	31.5	33.7	5.1	4.7	3.8	6.8	17.8	8.1	10.5	10.0	19.2	3.5	18.0	9.6
REA	15.8	6.9	13.6	42.1	37.3	4.9	8.1	9.0	14.6	11.9	3.1	9.4	14.6	28.0	23.4	23.2	9.3
IND	30.3	19.8	24.4	0.0	26.9	16.3	23.6	24.3	31.3	43.8	24.3	24.4	30.3	29.5	27.6	19.1	23.0
RAS	35.9	34.9	23.8	65.8	62.0	22.1	53.8	43.6	35.4	36.7	11.3	26.8	25.5	35.0	44.1	32.7	41.7
POE	28.6	7.9	12.2	26.3	30.4	22.8	5.8	10.2	9.0	12.7	11.1	7.5	20.5	18.2	14.3	9.1	11.1
CUS	2.5	14.7	9.1	26.7	-7.8	22.4	-0.5	3.0	9.5	-1.3	5.1	4.1	4.5	10.1	3.6	0.8	5.6
EUR	20.5	8.7	2.1	15.5	15.6	8.0	5.6	-1.4	7.0	14.2	5.4	7.1	5.0	12.7	6.9	6.1	1.6
CAM	12.4	4.3	-0.2	-15.1	-12.2	9.7	14.5	12.6	20.8	15.3	11.4	6.0	4.0	6.2	-8.9	-1.6	12.5
BG3	11.6	10.7	20.0	53.1	25.1	6.2	2.2	18.5	10.3	18.4	10.7	5.8	7.0	25.7	10.4	3.9	8.3
LAT	-1.8	6.7	-3.2	14.2	-21.6	0.4	6.9	12.1	12.6	15.4	11.1	0.8	3.5	8.6	-5.0	-0.6	8.3
CIT	4.3	7.0	4.2	30.4	26.8	5.6	5.4	8.1	3.5	5.3	2.8	9.2	6.7	10.1	5.6	13.1	8.1
SAC	33.4	8.7	65.5	29.4	14.1	14.6	2.7	6.1	7.9	4.5	1.5	3.7	0.0	9.1	13.1	3.1	9.5
RSA	2.9	-0.8	-6.7	-1.1	12.9	-6.0	1.3	32.9	2.7	12.5	4.2	-0.1	11.3	8.9	2.5	3.0	14.1
RSS	5.4	7.4	14.4	-6.9	66.4	5.3	8.6	8.1	7.1	52.1	12.6	5.8	5.5	21.2	19.0	8.0	9.4
ROW	11.5	7.3	5.4	9.1	47.7	3.5	12.4	10.0	12.7	33.4	4.2	19.5	4.0	17.8	14.0	14.8	10.1
Ave	23.6	9.0	8.8	21.7	28.4	12.1	5.1	1.9	10.5	8.6	7.7	8.4	8.5	14.2	9.8	9.0	6.2

Relative wage results for our scenarios are presented in Table 9 below, and two salient features are immediately apparent. Firstly, economywide average real wages rise in the vast majority of regions and scenarios (45 of 48), regardless of whether regions liberalize unilaterally, respond to market opening by their trading partners, or participate in a global liberalization process. Indeed, most of the cases where real wages decline on average are traceable to residual export distortions.[16] Secondly, and of special relevance to the issue of trade liberalization and equity, real wages of unskilled workers improve relative to those of skilled workers, again in a decisive majority of cases (38 of 48). Thus our results support the conclusions that globalization

[16] This is the case for the African regions reporting real wage declines.

is beneficial both to the average worker in absolute terms and to the poor worker in relative terms.

The overall improvement in average real wages probably does not require much elaboration, being the result of classical efficiency gains from trade. In the case of multilateral liberalization average wages rise in every region, in some by more than 10%. It is noteworthy, moreover, that some magnitudes are as large as they are in a comparative static framework, and also that they are so pervasive despite the presence of terms-of-trade adjustments. It is worth recalling again that we have ignored NTBs and export liberalization in these experiments, so the ultimate long-term benefits of more liberal global trade could be much greater.

In order to better elucidate the forces at work in determining relative wages between countries, we have included information on real exchange rate adjustment in Table 9. Interpreted as the purchasing power of nontradeable goods in the domestic economy, this variable moves in the expected directions under the first two scenarios. When a country liberalizes unilaterally, the real exchange rate must depreciate in the face of lower import prices. When market access occurs, external demand pulls drive this variable up, following a Dutch Disease type of adjustment that drives up the price of nontradeables.

The significance of the real exchange rate for relative wages hinges upon the composition of employment between tradeable and nontradeable sectors. In particular, skilled labor is highly concentrated in the latter sectors, so their relative wage can be expected generally to move in the same direction as the real exchange rate. This intuition is borne out for large adjustments under both unilateral liberalization and market access, but the effect is more ambiguous in the multilateral case. In particular, wage inequality generally falls with the real exchange rate and rises when it does. Specifically, unskilled wages rise more that skilled ones under unilateral liberalization and skilled wages rise more under market access. Fortunately, the benefits to both labor groups are approximately additive from the first two to the third scenario. This yields net positive real wages changes in the aggregate and, for most countries, for both labor groups. A few countries, however, still experience a net depreciation in the real exchange rate, and this reduces wage inequality by lowering skilled labor's real wages.

For the OECD concerns about international wage convergence, we can offer little real support. Firstly, real wages for unskilled workers increase in all regions in response to globalization, so there is no absolute convergence between unskilled wages in high and low income economies. Some relative convergence is probable, since the percent increases are greater in the more trade-dependent developing countries, but these different growth rates are unlikely to lead to income parity in the foreseeable future. As far as sustainable international wage differentials are concerned, OECD and other countries can better influence these with domestic policies, especially those targeted as human capital formation, than with trade policies. Ultimately, the only long term justification for wage differences is productivity differences.

Domestically, wage convergence is one of the main results of our analysis, indicating that trade reduces domestic wage inequality in most countries. For the multilateral scenario, the regions including Japan and Europe are the only ones experiencing rising wage inequality. This might be viewed as desirable in developing or developed countries, depending upon one's social or political agenda. The importance of this conclusion for us is that this evidence contradicts the findings of others that trade aggravates inequality. The main message of our paper, however, is that globalization appears to increase average wages in all regions, particularly among unskilled workers, and is thus a primary instrument for poverty alleviation.

Table 9: Adjustments in Real Wages and the Real Exchange Rate
(*percent change from baseline*)

	Unilateral Liberalization			
	UnSk	*Sk*	*Average*	*Real ER*
China	3.75	-1.40	2.83	-6.34
Asian Tigers (HKG, KOR, SGP, TWN)	2.50	2.5	2.5	-7.70
Rest of East Asia	2.87	-5.49	1.18	-15.68
India	1.79	-10.75	-0.55	-16.68
Rest of South Asia	9.12	3.54	8.02	-0.84
Japan Australia and New Zealand	1.06	6.26	3.02	-3.85
Western Europe	0.35	0.94	0.58	-2.02
Canada and the United States	0.16	0.27	0.21	-3.51
Central America and the Caribbean	3.72	-2.41	2.21	-3.96
Argentina, Brazil, and Mexico	0.63	-0.94	0.16	-7.57
Rest of Latin America	1.39	-0.64	0.82	-3.69
CEA and FSU	1.24	-0.73	0.70	-3.01
Southern Africa Customs Union	0.85	-0.45	0.42	-2.57
Rest of Southern Africa	2.92	0.42	2.42	-3.89
Rest of Sub Saharan Africa	1.30	-7.78	-0.23	-1.21
Rest of the World	1.62	-2.80	0.37	-1.74
	Market Access			
	UnSk	*Sk*	*Average*	*Real ER*
China	1.99	6.88	2.86	4.62
Asian Tigers (HKG, KOR, SGP, TWN)	3.90	3.00	3.6	9.36
Rest of East Asia	3.02	1.71	2.76	7.74
India	1.09	5.93	1.99	9.17
Rest of South Asia	2.69	2.49	2.65	17.61
Japan Australia and New Zealand	0.85	1.46	1.08	7.87
Western Europe	0.74	0.50	0.65	9.76
Canada and the United States	0.46	-1.07	-0.14	5.79
Central America and the Caribbean	3.77	-5.60	1.47	4.29
Argentina, Brazil, and Mexico	0.65	-0.14	0.41	4.55
Rest of Latin America	1.16	-0.20	0.77	5.08
CEA and FSU	1.49	0.51	1.22	8.97
Southern Africa Customs Union	1.71	-0.81	0.89	12.23
Rest of Southern Africa	11.01	2.52	9.30	5.90
Rest of Sub Saharan Africa	1.67	2.86	1.87	2.34
Rest of the World	1.58	0.91	1.39	4.43
	Multilateral Liberalization			
	UnSk	*Sk*	*Average*	*Real ER*
China	5.97	5.18	5.83	-2.03
Asian Tigers (HKG, KOR, SGP, TWN)	6.50	5.30	6.10	1.02
Rest of East Asia	5.59	-3.94	3.66	-8.91
India	3.04	-4.91	1.55	-8.49
Rest of South Asia	11.93	3.80	10.33	16.43
Japan Australia and New Zealand	1.66	8.33	4.18	3.20
Western Europe	1.03	1.43	1.18	6.84
Canada and the United States	0.64	-0.55	0.17	1.69
Central America and the Caribbean	7.01	-8.15	3.29	-0.09
Argentina, Brazil, and Mexico	1.14	-1.29	0.41	-3.70
Rest of Latin America	2.35	-0.72	1.48	1.01
CEA and FSU	2.42	-0.34	1.65	5.77
Southern Africa Customs Union	2.62	-1.62	1.24	9.17
Rest of Southern Africa	14.35	1.77	11.81	1.75
Rest of Sub Saharan Africa	3.10	-5.11	1.71	1.15
Rest of the World	2.95	-2.19	1.49	2.62

5 Conclusions and Extensions

This paper uses a global general equilibrium model to examine the effects of more liberal trading arrangements on wages of workers. Our general findings are that, for the sixteen regions delineated in this analysis, more open multilateral trade increases average wages in all regions. Secondly, we find that this kind of trade liberalization is much more likely to reduce wage inequality between unskilled and skilled workers than to increase it. This result stands in sharp contrast to a variety of studies that have attempted to link trade expansion and increased inequality. The most plausible explanation of the latter results, in light of ours, is that liberalization in these case studies was too incomplete to confer efficiency gains evenly across the economy.

The approach taken in this study highlighted the dichotomy between tradable and nontradeable production, particularly in the context of sectoral employment. In most countries, the majority of skilled workers are employed in the latter activities, and thus enjoy no direct trade protection nor suffer import competition. This fact complicates the interpretation of linkages between trade and relative wages, and the real exchange rate emerges in an essential way here. Countries that experience sharp rises in the real exchange rate under liberalization, with very high skilled employment in nontradeables, see skilled relative wages rise in a process resembling Dutch Disease. However, for most countries, this secular scarcity problem is offset by efficiency gains and factor shifts.

On an international basis, we do not see evidence of the kind of wage convergence often cited in OECD labor-protection arguments. Indeed, under multilateral liberalization, the real wages of unskilled workers rise in every region. Rates of increase do differ between regions, depending mainly on trade shares and prior protection levels, but this is a much more gradualist concept of convergence. Domestically, our results about reduced wage inequality certainly imply convergence, but surely this outcome cannot be used to justify trade distortions.

Extensions of the present analysis are already under way, embedding the model in a dynamic context and examining a wider universe of policy scenarios. The latter include more liberal export policies and consideration of the role of NTBs. In addition, we are examining the potential effects of endogenous growth factors to amplify and reallocate gains from more open multilateral trade relations.

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Table A-1: Regional Concordance

1	POE	**Pacific OECD** *Australia, New Zealand, Japan*
2	NIE	**Newly Industrialized Economies** *Republic of Korea, Singapore, Hong Kong (China), Taiwan (China)*
3	REA	**Rest of East Asia** *Indonesia, Malaysia, Philippines, Thailand, Vietnam*
4	CHN	**China**
5	IND	**India**
6	RAS	**Rest of South Asia** *Sri Lanka, Bangladesh, Bhutan, Maldives, Nepal, Pakistan*
7	CUS	**Canada/United States** *Canada and the United States of America*
8	BG3	**Latin American Big 3** *Argentina, Brazil, and Mexico*
9	CAM	**Central America and the Caribbean** *Anguilla, Antigua & Barbuda, Aruba, Bahamas, Barbados, Belize, British Virgin Islands, Cayman Islands, Costa Rica, Cuba, Dominica, Dominican Republic, El Salvador, Grenada, Guatemala, Haiti, Honduras, Jamaica, Montserrat, Netherlands Antilles, Nicaragua, Panama (pan), St. Kitts & Nevis, St. Lucia, Saint Pierre et Miquelon, St. Vincent and the Grenadines, Trinidad & Tobago, Turks and Caicos Islands*
10	LAT	**Rest of Latin America** *Venezuela (R.B.), Colombia, Bolivia, Ecuador, Peru, Chile, Uruguay, Guyana, Paraguay, Suriname*
11	EUR	**Western Europe** *United Kingdom, Germany, Denmark, Sweden, Finland, Austria, Belgium, France, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Iceland, Liechtenstein, Norway, Switzerland*
12	CIT	**Central European Associates and Former Soviet Union** *Bulgaria, Czech Republic, Hungary, Poland, Romania, Slovakia, Slovenia, Armenia, Azerbaijan, Belarus, Estonia, Georgia, Kazakhstan, Kyrgyz Republic, Latvia, Lithuania, Moldova, Russian Federation, Tajikistan, Turkmenistan, Ukraine, Uzbekistan*
13	SAC	**South African Customs Union** *Botswana, Lesotho, Namibia, South Africa, Swaziland*
14	RSA	**Rest of Southern Africa** *Angola, Malawi, Mauritius, Mozambique, Tanzania, Zambia, Zimbabwe*
15	RSS	**Rest of Sub Saharan Africa** *Benin, Burkina Faso, Burundi, Cameroon, Cape Verde, Central African Republic, Chad, Comoros, Congo, Democratic Republic of the Congo, Côte d'Ivoire, Djibouti, Equatorial Guinea, Eritrea, Ethiopia, Gabon, Gambia, Ghana, Guinea, Guinea-Bissau, Kenya, Liberia, Madagascar, Mali, Mauritania, Mayotte, Niger, Nigeria, Rwanda, Sao Tome & Principe, Senegal, Seychelles Islands, Sierra Leone, Somalia, Sudan, Togo, Uganda*
16	ROW	**Rest of the World** *Turkey, Bahrain, Iran, Iraq, Israel, Jordan, Kuwait, Lebanon, Oman, Qatar, Saudi Arabia, Syrian Arab Republic, United Arab Emirates, Yemen, Yemen Democratic, Morocco, Western Sahara, Algeria, Egypt, Libya, Tunisia, Afghanistan, Albania, Andorra, Bermuda, Bosnia and Herzegovina, British Indian Ocean Territories, Brunei, Cambodia, Christmas Island, Cocos Island, Cook Islands, Croatia, Cyprus, Falkland Islands, Faeroe Islands, Fiji, French Polynesia, Greenland, Johnston Island, Kiribati, Laos, Macao, Macedonia, Malta, Marshall Islands, Federated States of Micronesia, Mongolia, Myanmar, Nauru, New Caledonia, Niue, North Korea, Pacific Islands, Palau, Papua New Guinea, Pitcairn Islands, Saint Helena, Solomon Islands, Tokelau, Tonga, Tuvalu, Vanuatu, Wake Island, Wallis and Futura Islands, Western Samoa, Yugoslavia [Serbia and Montenegro]*

Table A-2: Sectoral Concordance

1	GRN	**Grains** *Rice, wheat, other cereal grains, oil seeds*
2	OCR	**Other crops** *Vegetables, fruits, nuts, sugar cane and sugar beet, plant-based fiber, crops n.e.s.*
3	LVS	**Livestock** *Bovine cattle, sheep and goats, horses, raw milk, wool, animal products n.e.s.*
4	RES	**Non fuel natural resources** *Forestry, mining*
5	FDP	**Food processing** *Fishing, bovine cattle, sheep and goat, horse meat products, meat products, n.e.s., vegetable oils and fats, dairy products, processed rice, sugar, beverages and tobacco products, food products, n.e.s.*
6	FFL	**Fossil fuels** *Coal, crude oil, natural gas*
7	TXT	**Textiles**
8	APP	**Wearing apparel and leather products**
9	PPP	**Wood products, paper products and publishing**
10	P_C	**Refined petroleum and coal products**
11	CRP	**Chemicals, rubber and plastic products**
12	MET	**Metals** *Ferrous metals, metal products*
13	OMF	**Other manufacturing** *Motor vehicles and parts, other transportation equipment, electronic equipment, machinery and equipment, n.e.s., manufactures, n.e.s., mineral products, n.e.s.*
14	NTR	**Non tradables** *Electricity, gas manufacture & distribution, water, construction, trade and transport, financial, business, recreational services, public administration and defense, education, health services, dwellings*