The WTO Doha Development Round and OECD Agricultural Policy

Roman Keeney
Purdue University
Krannert Bldg., West Lafayette, IN 47907-1145
rkeeney@purdue.edu

Thomas W. Hertel
Purdue University
Krannert Bldg., West Lafayette, IN 47907-1145
hertel@purdue.edu

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Abstract: A global CGE model featuring agricultural sector detail is used to assess WTO agricultural reform. Parametric uncertainty is considered with model results evaluated based on confidence intervals. We find that continued shift in domestic support to green box payments maintains farmer welfare while providing significant welfare gains to developing regions.

Introduction

Beginning with the Uruguay Round Agreement on Agriculture (URAA), domestic interventions in agricultural markets were formally included within the scope of international trade negotiations under the World Trade Organization (WTO). The outcome of the URAA was a classification scheme (the 'traffic light' boxes) and reduction schedule for the types of income support delivered to farmers. Domestic support measures are again at issue in the current Doha Development Round (DDR) of negotiations with calls for further reductions in the large amount of developed country transfers to farmers.

In order to properly assess potential impacts of competing proposals, a framework is needed that accurately measures the impact on farm income in the industrialized economies where support is reduced, as well as overall welfare in both the developed and developing countries. Successful compromises will hinge on finding a middle ground and considering changes in the composition of farm support designed to minimize world market impacts, while maintaining farm household welfare in the industrialized countries. Computable general equilibrium models have become the dominant empirical framework for performing this type of analysis due to their economy-wide coverage and ability to capture sectoral tradeoffs inherent in the WTO negotiations. CGE is also well-suited to assessing both welfare and industry-specific impacts of trade policy changes.

The DDR maintains a special focus on the interests of developing countries, an increasingly important coalition in the negotiations. The development focus of the current WTO round is partly owed to the large amount of analysis undertaken showing the development shortcomings of the URAA. Also, as the negotiation process has matured the importance of the developing world in agricultural trade has become more recognized due to the importance of agriculture to developing regions. These developing regions are typified by large populations of

rural poor where agriculture is a key determinant of income, as well as consumers that devote large shares of their expenditures to food.

Review of Literature

Evaluating multilateral trade liberalization progress towards removal of trade distorting domestic support has been facilitated by improved data collections such as the Producer Support Estimate (PSE) developed by the Organization for Economic and Cooperation and Development (OECD). Legg (2002) employs PSE data to show that OECD countries moderately reduced domestic support in the post-URAA period and that the composition of support has noticeably shifted away from types of support that are most trade distorting.

Some have criticized the moderate reductions Legg (2002) identifies as being a result of built-in flaws in the agreement. Sumner (2000) points to the choice of base period and the large levels of support that existed prior to the URAA negotiated reductions claiming that URAA commitments for major agricultural traders have been in some cases irrelevant. Bohman *et al.* (1999) further identify the use and misuse of multifunctionality arguments and the 'green box' by countries that are constrained by support reductions as a means of maintaining high support levels by altering the composition of support within the WTO classification scheme.

Most model based studies of global agricultural trade liberalization have focused primarily on import barriers or export subsidies designed to boost domestic market prices relative to world prices (e.g., Tyers and Anderson, 1992; Martin and Winters, eds., 1986). The OECD (2001) report, "Market Effects of Crop Support Measures", marks a significant step forward in considering impacts of market access and domestic farm programs in the same framework. The authors compare impacts of a wide range of producer support across OECD countries. They find that the movement from market price support and output subsidies to land-based payments is a "win-win" scenario in most countries – with farm income rising and world price impacts of support falling.

Frandsen, Gersfelt and Jensen (2002) use a modified version of the GTAP model to examine the impact of further decoupling of domestic support in the EU. They argue that further decoupling of EU agricultural policies would reduce budgetary exposure in the EU as well as bringing it into compliance with potentially stricter WTO disciplines on domestic support. Dimaranan, Hertel, and Keeney (2003) address the question of OECD domestic support re-instrumentation using the GTAP model with a focus on developing country welfare impacts. Their results largely mirror those of the OECD (2001) report.

These last two works follow the large number of general equilibrium analyses of trade liberalization that have been generated since the early 1990s – many of which are based on the GTAP data base and CGE modeling framework. With regard to agricultural trade in particular, the shift towards general equilibrium modeling has had many advantages, including: (a) greater theoretical consistency, (b) improved welfare analysis, (c) exhaustive coverage of the farm and food complex, and (d) integrated treatment of agriculture and non-agriculture liberalization.

However, there have also been disadvantages associated with the CGE and GTAP-based, general equilibrium approach to the modeling of agricultural trade. One of these has been the tendency to abstract from specific structural features that characterize global agricultural markets. Critics argue that the GTAP-based models are overly simplistic and do not capture many of the important structural characteristics of the agricultural economy. They also argue that the GTAP parameters need more solid econometric foundations. It is with regard to these last two contentions that the current modeling framework diverges from those previously produced.

Model and Data

Given the huge investment required to build a global economic data base, most researchers in this field draw on the data base maintained by the Global Trade Analysis Project (GTAP) (Dimaranan and McDougall 2002). The GTAP data base and parameter file are sufficient to support most of the standard CGE applications currently undertaken and use of a

common data base and very similar modeling frameworks has greatly facilitated analysis and comparison of results from different studies.

For this work the standard GTAP model of global trade is modified to address the two concerns mentioned above, namely agricultural specific structure and parameter reliability. Tables 1 and 2 give the level of aggregation with respect to the regions and commodities. The current model incorporates the following structural features of world markets specific to agriculture: identification of explicit farm households, segmentation of factor markets, crop-livestock interactions through cost-minimizing feedstuff formulations, substitution between farm and marketing inputs in the food marketing channel, and separability between food and non-food in consumption. Key policy variables, such as the aggregate measure of support associated with specific instruments and commodities, as well as farm household welfare are also computed.

Experimental Design

An important goal of this paper is to demonstrate the importance of the extensions to the GTAP model for WTO analysis, by showing the impacts on developing regions as well as OECD farm sector welfare. As a result we will consider two WTO type scenarios (outlined below), differentiated by the treatment of 'green-box' support. In the first scenario 'green-box' support will be reduced in accord with other domestic measures. This scenario will facilitate decomposition of welfare effects into the different reductions in support. The second scenario will endogenize the level of 'green-box' support allowing it to adjust to maintain the level of OECD farm income. This scenario more closely resembles the liberalization that has occurred post-URAA and which will likely result from the DDR.

This general WTO scenario draws heavily on a recent Policy Brief written by Josling and Hathaway (November, 2003) for specifics. In this brief, the authors review the major framework proposals for liberalization of agricultural trade, including: the Harbinson proposal, the EU-US proposal, the G-22 counterproposal and the Castillo Draft WTO Ministerial Declaration for

Cancun, and the Derbez revision of this text. Josling and Hathaway assess the implications of these different proposals for market access, export subsidies and domestic support, thereupon attempting to chart the way forward by suggesting the type of agreement that is likely to be both politically feasible and economically worthwhile.

The liberalization scenario we draw from that brief involves substantial cuts in trade-distorting domestic support: 60% in developed countries (60% green box cuts for the first scenario as well) and 40% in developing countries. As the authors note: "It is difficult to see an AMS reduction of less than 60 percent being either acceptable to non-subsidizing countries or being helpful to world trade. But a cut of this magnitude would put additional pressure for maintaining the blue box and keeping the green box wide open." Accordingly, in our second scenario analysis we allow decoupled (green box) payments to increase in the OECD countries in order to maintain real farm income in those economies.

In the case of market access, there are many alternative formulae for reductions. The US has favored a Swiss formula which brings down the peak tariffs more sharply, whereas the EU has favored a combination of 36% average cuts with a 15% minimum, as in the Uruguay Round. The Harbinson and Derbez drafts suggest differential cuts depending on whether the initial tariffs are high, medium or low. Proper evaluation of these different proposals requires detailed analysis, beginning at the tariff line where the differential cuts are implemented, thereupon aggregating the post-Doha round tariffs to level at which the modeling is undertaken. Additionally, the complex issues of TRQ liberalization and 'binding overhang' for developed countries complicate the analysis. For these reasons, we adopt relatively modest cuts in tariffs – 36%, following the average cuts proposed by the EU and implemented in the Uruguay Round.

Finally, we come to the issue of export subsidies. Here, Josling and Hathaway note that: "the key questions raised by the Derbez draft are when to require their elimination and how to define which products are 'of interest to' developing countries." Thus any realistic scenario will

likely involve different timetables for different products. Once again, this is too complex for our present analysis. We choose instead to focus on the case where all export subsidies are eventually eliminated. This largely affects the EU, although some US exports are also affected (most notably dairy) (see Elbehri, 2002).

In summary, our liberalization scenario consists of reductions in the three main types of agricultural support: domestic subsidies, import barriers and export subsidies. In addition, import tariffs on non-agricultural goods are also reduced by 36%. In keeping with the anticipated compensatory payments to farmers in OECD countries, we permit "green box" payments to increase endogenously to compensate farmers for lost income. While there are many improvements and refinements one could make to this analysis, we believe that it represents an interesting scenario to consider.

Results

WTO Scenario with Green Box Cuts

The model is first solved using the liberalization scenario which includes green box payments in the negotiated reductions. We evaluate this scenario for changes in national welfare and farm utility primarily to make the case that green box reductions should not be a sticking point in the negotiations and to inform the feasibility of the second scenario.

Table 3 presents the equivalent variation results for each model region, decomposed into the five previously mentioned components and welfare change due to green box payment reductions. In general we observe that developed regions that provide a lot of support to agriculture gain from reduction in green box payments while the developed countries experience a welfare decline. This is due to green box payments leading to lower production in the OECD and the resultant higher world prices faced in LDCs where food is a larger share of the budget. The results also indicate that developing regions welfare gains are dominated by increased access to OECD markets.

Table 4 decomposes farm utility similarly. The farm households of developed agricultural supporters, EU and EFTA are severely impacted by this reduction. The US and Canada farm households show gains due to the high diversification of employment modeled for these farm households (Canada and the US farm households derive only 10 % and 5 % of income from on-farm activities in the model.) If the distribution of Canadian and US farm households were better fleshed out we would observe a significant number of farm households being negatively impacted as well. The developing region farm welfare results mimic those of national utility since these regions are in general dominated by rural or agrarian economies.

WTO Scenario with Constant Farm Income

In this section we explore the implications for trade, agricultural employment, farm household welfare and national welfare of the potential Doha Round outlined in the previous section where OECD farm income is held constant. The components are organized as (a) developed country domestic support (DS OECD), (b) developed country market access for food and agriculture (DS MA), (c) export subsidies on food and agricultural products (EXP SUB), (d) developing country agricultural policies (both domestic support and market access, MA-DS LDC), and (e) non-food tariffs (Other MA).

We report sensitivity results with respect to the supply-side parameters in the model. These include the elasticities of labor and capital supply to agriculture and the elasticities of substitution in agricultural production. This is of particular interest since we believe these are the key parameters for determining the potential impacts on aggregate farm employment and farm household welfare.

Impacts on trade

Table 3 reports the percentage changes in world trade volume, by commodity in our model. Column one reports the total result, and the next five columns decompose this into five component parts. Trade increases for all products with the largest increases in world agricultural

trade are for rice. Total processed rice exports increase by 12.4%. This is followed by trade in meat products (10.3 and 10.8%, respectively). These results are significantly larger than most results from CGE models notably the same scenario run under the standard GTAP model. Some of the largest effects in trade are due to the estimated trade elasticities used in this model which are generally larger and estimated at a much more disaggregate level than typical of CGE models (Hertel, Hummels, Ivanic, and Keeney, 2003).

Impacts on agricultural employment and farm household welfare

Turning next to Table 4 we find that changes in aggregate agricultural employment are modest (generally less than 2%), with decreases in East Asia and Europe and increases in Australia/NZ, North America, Latin America and Sub-Saharan Africa. The largest portion of these changes is attributable to market access for agricultural products in developed countries. This is followed in relative importance by liberalization of developing country, agricultural markets.

Of course we expect that these employment changes are likely to be quite sensitive to the production function parameters determining the derived demand for farm inputs, as well as the factor supply elasticities which are uncertain. One way of characterizing the extent of parametric uncertainty in the labor market is to examine the standard deviation associated with the change in farm employment. In this paper, we follow the work of DeVuyst and Preckel (1997), who show that an approximate distribution of model results can be obtained based on known lower order moments of the parameters of a model generating high quality sensitivity results with far fewer model simulations. This Gaussian Quadrature technique is employed here for generating sensitivity results with respect to model parameters.

Figures 1 (Non-OECD economies) and 2 (OECD economies) represent the 95 percent confidence intervals associated with the change in agricultural employment, in light of uncertainty in the factor demand and supply parameters. From these results, it can be seen that

the changes, while small, are still qualitatively robust for all cases excepting Indonesia. This is useful information, and permits us to assert with greater confidence that this particular scenario will have the predicted outcome.

Table 5 reports the changes in farm household welfare. Note that we have designed this scenario so that green box payments increase in order to maintain a constant level of farm household welfare in the OECD economies. As a result these entries are all zero. For the remaining countries, farm household welfare increases in every case excepting China, Other South Asia and Middle East/North Africa. The largest contributor to improved farm household well-being is the increased market access to developed country agricultural markets. Many CGE models tend to overstate the gains to developing country farm households due to overstatement of the mobility of labor and capital out of subsidized agriculture in the developed economies. Overall, the impacts are quite modest. Presumably the impact on specific types of producers (e.g., cotton, sugar) in specific regions of specific countries could be much larger.

Since farm household welfare is also quite sensitive to the specification of factor demand and supply elasticities, we report confidence intervals for farm household welfare in the non-OECD countries in Figure 3. From these results we can see that the results are also qualitatively robust to variation in the factor supply and demand elasticities. It should be noted that these welfare changes also depend on the retail demand elasticities and the international trade elasticities so our robustness claims are relegated to variation in the supply side parameters.

Impacts on national welfare

The last set of results (Table 6) focuses on the change in national welfare as a consequence of this Doha scenario. Note firstly that all of the regions gain from this liberalization package. Given the variety of initial rates of protection and the heterogeneity of the experiment, this was by no means obvious *a priori*. Secondly, as is generally the case in such comparative static analysis of trade liberalization, the welfare impacts are small – less than one

percent change in real income. The regions showing the strongest gains (more than 0.5%) are Korea, Other South Asia, EFTA, EUX and MENA. For these regions, agricultural liberalization plays a significant role. Indeed, for EFTA it explains the bulk of the gains. And for these economies, the gains come as a result of allocative efficiency gains, as opposed to terms of trade gains (see Table 6).

Conclusions

This paper has developed a new model for use in the analysis of trade policy and global food and agricultural markets. By incorporating into the standard GTAP CGE model, additional structural features of world markets that are specific to agriculture, we believe that we are better able to capture the likely impacts of agricultural trade policy and domestic reforms on world food markets. This new structure has been supported by econometrically-based parameter estimates from the literature. We conduct systematic sensitivity analysis (SSA) with respect to these key parameters, thereby providing policy makers with explicit confidence intervals on the results.

The policy under evaluation in this paper is one of the WTO reform scenarios likely to emerge from the discussions currently underway in the stalled Doha Development Agenda talks. In order to sell such an agreement to OECD producer groups, we anticipate that non-trade-distorting (green box) direct payments will be increased. We take this into account in our simulation by increasing these payments in order to maintain farm household welfare in the OECD countries. Our results suggest that all regions gain from this scenario, as do the representative farm households in all the non-OECD regions excepting for the Middle East and North Africa, China and non-India South Asia.

Future work with this model should be aimed at refining the parameter distributions – particularly for the non-OECD regions, as well as well adding more information about the composition of farm household income and the distribution of farmers. Future policy analysis

should seek to provide a more accurate specification of current levels of protection and support, as well as more thorough computations (e.g., beginning at the tariff line) of the policy shocks dictated by the various reform proposals currently under review.

References

Bohman, M.J., D. Cooper, M. Mullarkey, M.A. Normile, D. Skully, S. Vogel, and E. Young, 1999. *The Use and Abuse of Multifunctionality*, ERS/USDA.

Dimarnaon, B. V., T.W. Hertel, and R. Keeney. 2003. "OECD Domestic Support and the Developing Countries," GTAP Working Paper No. 19. Global Trade Analysis Project, Purdue University, West Lafayette, Indiana, U.S.A.

Dimaranan, B.V. and R.A. McDougall (2002). *Global Trade, Assistance, and Production: The GTAP 5 Data Base*, Center for Global Trade Analysis, Purdue University.

Elbehri, Aziz (2002). "Export Subsidies," Chapter 16.D in Dimaranan and McDougall , *Global Trade, Assistance, and Production: The GTAP 5 Data Base*. Center for Global Trade Analysis, Purdue University, West Lafayette, Indiana, USA.

Frandsen, Soren, Birgitte Gersfelt, and Hans Grinsted Jensen. 2002. "Decoupling Support in Agriculture: Impacts of Redesigning European Agricultural Support," Paper presented at the Fifth Annual Conference on Global Economic Analysis held in Taipei, Taiwan, 5-7 June.

Hertel, T.W., D. Hummels, M. Ivanic, and R. Keeney (2003). *How Confident Can We Be in CGE-Based Assessments of Free Trade Agreements*, GTAP Working Paper No. 26, Center for Global Trade Analysis, Purdue University, West Lafayette, IN, *http://www.gtap.agecon.purdue.edu/resources/working_paper.asp*

Josling, T., and D. Hathaway. (2003). *Policy Brief on Agricultural Trade Reform*, Draft for Discussion presented at the IIE Agricultural Study Group, December, 2003.

Legg, Wilfrid, 2002. "The Evolution of Agricultural Policies in OECD Countries as Reflected by the Level and Structure of Agricultural Support," Paper presented at the Workshop on Agricultural Policy Adjustments in China after WTO Accession, Beijing, China.

Martin, Will and L. Alan Winters. Editors. 1986. *The Uruguay Round and the Developing Economies.* Cambridge University Press, New York.

Organization of Economic Cooperation and Development. 2001. *Market Effects of Crop Support Measures*. OECD, Paris, France.

Sumner, Daniel A., 2000. "Domestic Support and the WTO Negotiations," *Australian Journal of Agricultural and Resource Economics*, 44(3): 457-474.

Tyers, Rodney and Kym Anderson. 1992. *Disarray in World Food Markets.* Cambridge: Cambridge University Press.

Table 1. Model Regions

Model Region	GTAP Version 5.3 Database Regions
ANZ	Australia, New Zealand, ROW
CHK	China, Hong Kong
JPN	Japan
KOR	Korea
TWN	Taiwan
IDN	Indonesia
OSEA	Malaysia, Phillipines, Singapore, Thailand, Vietnam
IND	India
OSA	Bangladesh, India, Sri Lanka, Rest of South Asia
CAN	Canada
USA	United States
MEX	Mexico
OLAC	Cent. America and Caribbean, Colombia, Peru, Venezuela, Rest of Andean Pact, Chile, Uruguay, Rest of South America
ARG	Argentina
BRZ	Brazil
EU15	Austria, Belgium, Denmark, Finland, France, Germany, United Kingdom, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, Sweden
EFTA	Switzerland, Rest of EFTA
RUS	Russian Federation
EUX	European Union Entrants 2004 (10)
OEEFSU	Other Eastern Europe and FSU
MENA	Rest of Middle East, Morocco, Rest of North Africa
SSA	Malawi, Mozambique, Tanzania, Zambia, Zimbabwe, Other Southern Africa, Uganda, Rest of Sub-Saharan Africa
SACU	Botswana, Rest of SACU

Table 2. Model Sectors

Model Sector	GTAP Version 5.3 Sectors
PDR	Paddy rice
WHT	Wheat
GRO	Cereal grains
OSD	Oil seeds
C_B	Sugar cane, sugar beets
PFB	Plant based fibers
OCR	Crops
CTL	Bovine cattle, sheep, goats, horses
OAP	Animal products
RMK	Raw milk
WOL	Wool, silk-worm cocoons
FSH	Fishing
COGM	Coal, oil, gas, minerals
CMT	Bovine meat products
OMT	Other meat products
VOL	Vegetable oils and fats
MIL	Dairy products
PCR	Processed rice
SGR	Sugar
OFD	Other food products
B_T	Beverages and tobacco
TWL	Textiles, wearing apparel, leather products
RBMNFCS	Wood products, paper products, publishing, petroleum, coal products, mineral products, ferrous metals, other metals, metal products
OMNFCS	Motor vehicles and parts, other transport equipment, electronic equipment, machinery, other manufactures
UTILCONS	Electricity, gas manufacture and distribution, water, construction
TT	Trade, other transport, water transport, air transport
FIREC	Communication, financial services, insurance, business services
OSVCS	Recreation, public administration, defense, education, health, dwellings

Table 3. Equivalent Variation Results: Liberalization including Green Box

Region	EV	DS OECD	MA OECD	EXP SUB	LDC	MA	Green Box
ANZ	1686.37	250.69	843.77	402.92	263.25	-73.48	-0.77
CHK	3109.07	-134.09	181.74	-99.15	766.12	2376.52	17.93
JPN	6418.95	-484.18	3485.39	-822.81	336.22	3827.10	77.22
KOR	2259.90	-115.89	67.24	-102.32	535.64	1870.47	4.76
TWN	1096.27	-74.16	43.57	-39.83	-11.66	1178.30	0.05
IDN	535.82	-17.21	59.96	-24.19	-14.69	548.50	-16.55
OSEA	1446.59	-15.45	301.59	-100.87	250.33	1020.66	-9.66
OSA	916.80	-30.55	17.89	-37.16	105.05	883.09	-21.52
IND	900.30	17.32	35.89	12.14	74.40	776.98	-16.44
CAN	1003.65	289.19	881.45	-116.47	192.20	-357.52	114.80
USA	1854.48	814.89	416.02	-219.36	941.62	-1076.68	977.99
MEX	0.36	-150.63	88.57	-98.31	170.00	26.52	-35.81
OLAC	860.55	-21.72	621.11	-55.41	-12.61	541.78	-212.59
ARG	1219.76	144.62	305.88	81.63	192.96	481.16	13.51
BRA	2040.24	144.42	344.44	157.55	74.61	1433.31	-114.08
EU15	9769.32	-25.71	4757.45	1718.72	825.68	835.26	1657.91
EFTA	1994.19	193.63	1839.96	-324.66	9.45	229.94	45.87
OEEFSU	1306.70	19.54	614.18	-79.18	31.89	747.91	-27.64
EUX	2310.97	-12.96	778.57	-158.35	16.69	1681.58	5.45
RUS	-2.00	-86.98	197.71	-396.73	-12.45	264.50	31.96
MENA	2961.57	-311.47	497.56	-1307.15	1901.46	2264.94	-83.77
SACU	408.78	1.26	135.89	-53.48	128.80	215.30	-18.99
SSA	122.25	-4.21	305.20	-209.91	52.81	120.10	-141.74

Table 4. Farm Utility Change

Region	Farm Utility	DS OECD	MA OECD	EXP SUB	LDC	MA	Green Box
ANZ	0.22	0.04	0.13	0.06	0.05	-0.06	0.00
CHK	-0.21	0.21	0.33	0.15	-0.80	-0.03	-0.07
JPN	0.21	-0.01	0.14	-0.02	0.01	0.09	0.01
KOR	0.39	-0.03	0.01	-0.03	0.15	0.28	0.00
TWN	0.25	-0.02	0.02	-0.01	-0.03	0.30	-0.01
IDN	0.05	0.16	0.58	0.16	-0.30	-0.28	-0.27
OSEA	0.08	0.23	1.27	0.33	-0.46	-0.97	-0.32
OSA	-0.13	0.16	0.22	0.11	-1.08	0.50	-0.05
IND	0.03	0.11	0.25	0.10	-0.51	0.18	-0.10
CAN	0.16	0.04	0.14	-0.04	0.01	-0.09	0.10
USA	0.17	0.02	0.00	-0.01	0.00	-0.02	0.18
MEX	-0.43	0.47	0.61	0.32	-1.67	0.01	-0.17
OLAC	0.70	0.35	0.98	0.24	-0.16	-0.17	-0.53
ARG	2.21	0.59	1.00	0.31	0.56	-0.27	0.02
BRA	1.25	0.34	0.46	0.23	-0.09	0.52	-0.21
EU15	-0.80	0.01	-0.02	-0.02	0.02	-0.01	-0.77
EFTA	-1.24	-0.07	-0.13	-0.44	0.03	0.04	-0.67
OEEFSU	-0.22	0.02	-0.23	0.27	0.12	-0.26	-0.16
EUX	0.35	0.02	0.27	-0.04	0.01	0.13	-0.04
RUS	0.67	0.24	0.08	0.38	0.04	-0.02	-0.05
MENA	-1.93	0.46	0.37	0.61	-3.38	-0.05	0.05
SACU	0.95	0.45	1.85	0.52	-1.53	0.04	-0.37
SSA	-0.18	0.15	0.40	0.00	-0.16	-0.16	-0.41

Table 5. Exports by Commodity: Constant Farm Income Scenario

	Total	DS OECD	MA OECD	EXP SUB	MA-DS LDC	Other MA
Pdr	19.30	0.18	15.40	-0.88	4.62	-0.02
Wht	6.10	-3.36	4.04	-1.51	6.62	0.30
gro	-0.20	-2.41	2.04	-1.07	1.14	0.10
v_f	3.96	-0.05	2.18	-0.12	1.90	0.05
osd	2.60	-1.18	2.00	-0.25	1.79	0.22
c_b	6.89	0.20	7.19	-1.81	1.31	0.00
pfb	2.21	0.12	0.26	-0.05	0.73	1.15
ocr	4.09	-0.36	3.08	-0.38	1.65	0.09
ctl	0.44	-0.79	0.31	-0.50	1.42	0.00
oap	1.57	-0.39	0.84	-0.05	0.57	0.60
rmk	2.74	1.87	-3.35	-1.84	6.46	-0.40
wol	2.36	-0.74	1.16	-0.26	1.71	0.50
fsh	0.39	0.00	-0.96	-0.23	0.06	1.53
COGM	0.76	-0.02	0.00	0.00	0.01	0.77
cmt	10.33	-0.02	10.07	-3.74	3.62	0.41
omt	10.83	-0.14	10.04	-1.71	2.63	0.01
vol	6.99	0.08	2.02	0.05	5.12	-0.27
mil	2.56	0.10	7.74	-9.36	3.97	0.11
pcr	12.39	-0.05	5.74	-0.46	7.19	-0.04
sgr	4.30	0.05	7.90	-7.76	3.78	0.33
ofd	7.41	-0.08	6.59	-1.24	2.05	0.09
b_t	4.62	0.00	2.45	0.06	1.99	0.12
TWL	7.54	-0.01	0.07	0.01	0.03	7.44
RBMNFCS	2.95	-0.04	0.04	0.03	-0.03	2.95
OMNFCS	2.40	0.00	0.08	0.03	-0.02	2.31
UTILCONS	0.07	0.01	-0.03	-0.01	0.01	0.09
TT	1.68	-0.03	0.30	-0.10	0.17	1.35
FIREC	0.16	-0.01	0.04	0.01	-0.02	0.13
OTH_SVCS	0.28	-0.01	0.07	0.02	-0.11	0.31

Table 6. Labor Employment: Constant Farm Income Scenario

	Total	DS OECD	MA OECD	EXP SUB	MA-DS LDC	Other MA
ANZ	1.22	-0.05	0.60	0.38	0.21	0.09
CHK	-0.18	0.08	0.19	0.07	-0.41	-0.11
JPN	-2.61	-0.11	-2.52	0.13	0.01	-0.12
KOR	-1.08	0.05	-0.96	0.07	0.01	-0.24
TWN	-0.58	0.05	0.21	0.12	-0.58	-0.39
IDN	-0.02	0.03	0.19	0.05	-0.08	-0.21
OSEA	0.09	0.06	0.49	0.13	-0.19	-0.40
OSA	-0.33	0.06	0.11	0.06	-0.53	-0.03
IND	-0.05	0.03	0.12	0.04	-0.23	-0.01
CAN	1.68	0.11	0.40	0.39	0.58	0.19
USA	0.12	-0.42	0.13	0.14	0.22	0.06
MEX	-0.04	0.07	-0.34	0.14	0.06	0.05
OLAC	0.47	0.09	0.43	0.10	-0.06	-0.09
ARG	0.75	0.18	0.43	0.11	0.22	-0.18
BRA	0.53	0.11	0.25	0.10	-0.08	0.15
EU15	-1.31	-0.01	-0.89	-0.51	0.09	0.00
EFTA	-5.67	-1.43	-2.86	-1.50	0.10	0.01
OEEFSU	-0.19	-0.06	-0.12	0.16	0.07	-0.23
EUX	-0.21	0.06	-0.02	0.45	0.06	-0.76
RUS	-0.13	-0.10	-0.34	0.23	0.01	0.07
MENA	-1.40	0.24	0.21	0.44	-2.01	-0.28
SACU	0.53	0.16	1.00	0.28	-0.83	-0.08
SSA	0.19	0.04	0.15	0.05	-0.09	0.05

Table 7. Welfare Impacts of Liberalization: Constant Farm Income Scenario

	Percent Change		Equivalent Variation (US $mn)					
	Farm Utility	National Utility	Total	DS OECD	MA OECD	EXP SUB	MADS LDC	NA MA
ANZ	0.00	0.27	1725	212	939	392	250	-67
CHK	-0.06	0.36	3204	-116	225	-98	802	2391
JPN	0.00	0.20	7344	-432	4623	-917	191	3879
KOR	0.00	0.67	2647	-112	929	-104	49	1885
TWN	0.27	0.40	1113	-59	39	-39	-6	1179
IDN	0.33	0.30	565	-18	59	-22	-5	551
OSEA	0.37	0.38	1495	-12	323	-100	264	1020
OSA	-0.11	0.80	952	-25	19	-36	110	884
IND	0.09	0.26	932	15	38	12	86	781
CAN	0.00	0.15	863	238	913	-124	189	-353
USA	0.00	0.02	1146	893	813	-233	717	-1044
MEX	0.00	0.01	49	-134	292	-97	-39	28
OLAC	1.12	0.25	1072	-53	659	-55	-7	528
ARG	1.85	0.41	1206	119	333	76	197	480
BRA	1.26	0.31	2153	107	375	153	85	1434
EU15	0.00	0.12	8491	196	4866	1720	822	888
EFTA	0.00	0.59	2146	176	2061	-342	12	238
OEEFSU	0.00	0.43	1414	37	675	-75	39	740
EUX	0.00	0.99	2344	-1	826	-157	21	1655
RUS	0.00	0.01	56	-63	247	-390	-23	286
MENA	-1.82	0.51	3111	-306	456	-1303	1975	2289
SACU	1.30	0.34	432	-3	137	-54	136	216
SSA	0.24	0.15	274	-30	330	-208	61	121

Table 8. Farm Welfare Impacts of Liberalization: Constant Farm Income Scenario

	Farm Utility	DS OECD	MA OECD	EXP SUB	MADS LDC	NA MA
ANZ	0.00	0.00	0.00	0.00	0.00	0.00
CHK	-0.06	0.15	0.39	0.13	-0.72	-0.01
JPN	0.00	0.00	0.00	0.00	0.00	0.00
KOR	0.00	0.00	0.00	0.00	0.00	0.00
TWN	0.27	-0.02	0.02	-0.01	-0.02	0.30
IDN	0.33	0.07	0.55	0.12	-0.21	-0.20
OSEA	0.37	0.13	1.25	0.28	-0.40	-0.89
OSA	-0.11	0.10	0.24	0.09	-1.04	0.50
IND	0.09	0.07	0.27	0.09	-0.50	0.17
CAN	0.00	0.00	0.00	0.00	0.00	0.00
USA	0.00	0.00	0.00	0.00	0.00	0.00
MEX	0.00	0.00	0.00	0.00	0.00	0.00
OLAC	1.12	0.17	1.04	0.19	-0.12	-0.16
ARG	1.85	0.39	0.94	0.24	0.49	-0.21
BRA	1.26	0.21	0.49	0.20	-0.13	0.49
EU15	0.00	0.00	0.00	0.00	0.00	0.00
EFTA	0.00	0.00	0.00	0.00	0.00	0.00
OEEFSU	0.00	0.00	0.00	0.00	0.00	0.00
EUX	0.00	0.00	0.00	0.00	0.00	0.00
RUS	0.00	0.00	0.00	0.00	0.00	0.00
MENA	-1.82	0.35	0.43	0.55	-3.11	-0.04
SACU	1.30	0.29	1.87	0.45	-1.36	0.05
SSA	0.24	0.05	0.49	-0.01	-0.13	-0.16

Table 9. Welfare Decomposition from Liberalization: Constant Farm Income Scen.

	Allocative Efficiency	Terms of Trade	Investment Savings Bal.	Total EV
ANZ	503	1173	49	1725
CHK	3956	-803	51	3204
JPN	5788	1746	-190	7344
KOR	1872	757	18	2647
TWN	326	842	-55	1113
IDN	474	78	13	565
OSEA	1138	355	3	1495
OSA	1327	-231	-144	952
IND	1365	-420	-13	932
CAN	823	-39	79	863
USA	1602	-224	-232	1146
MEX	695	-758	112	49
OLAC	1232	56	-216	1072
ARG	498	664	43	1206
BRA	2362	-14	-195	2153
EU15	10035	-2106	562	8491
EFTA	2411	-373	108	2146
OEEFSU	943	468	3	1414
EUX	1290	1048	5	2344
RUS	680	-800	176	56
MENA	4298	-1134	-53	3111
SACU	457	-56	30	432
SSA	702	-275	-153	274

Figure 1. 95 % Confidence Interval for Agricultural Employment: Non-OECD

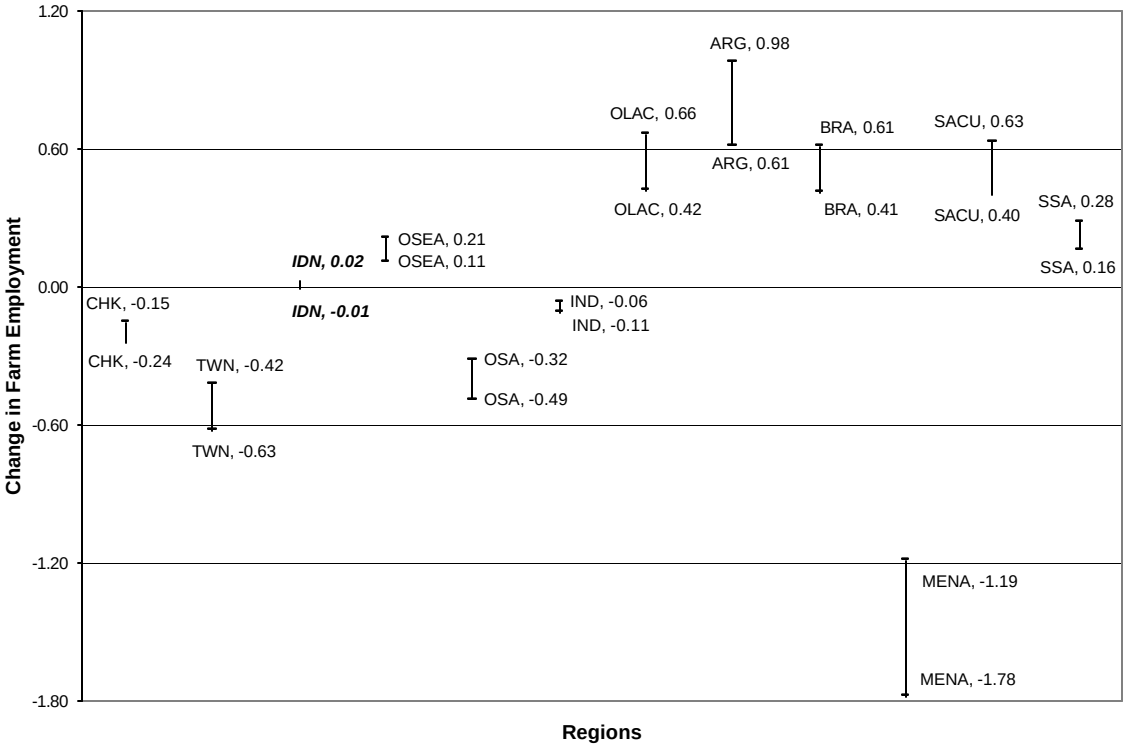

Figure 2. 95 % Confidence Interval for Agricultural Employment: OECD

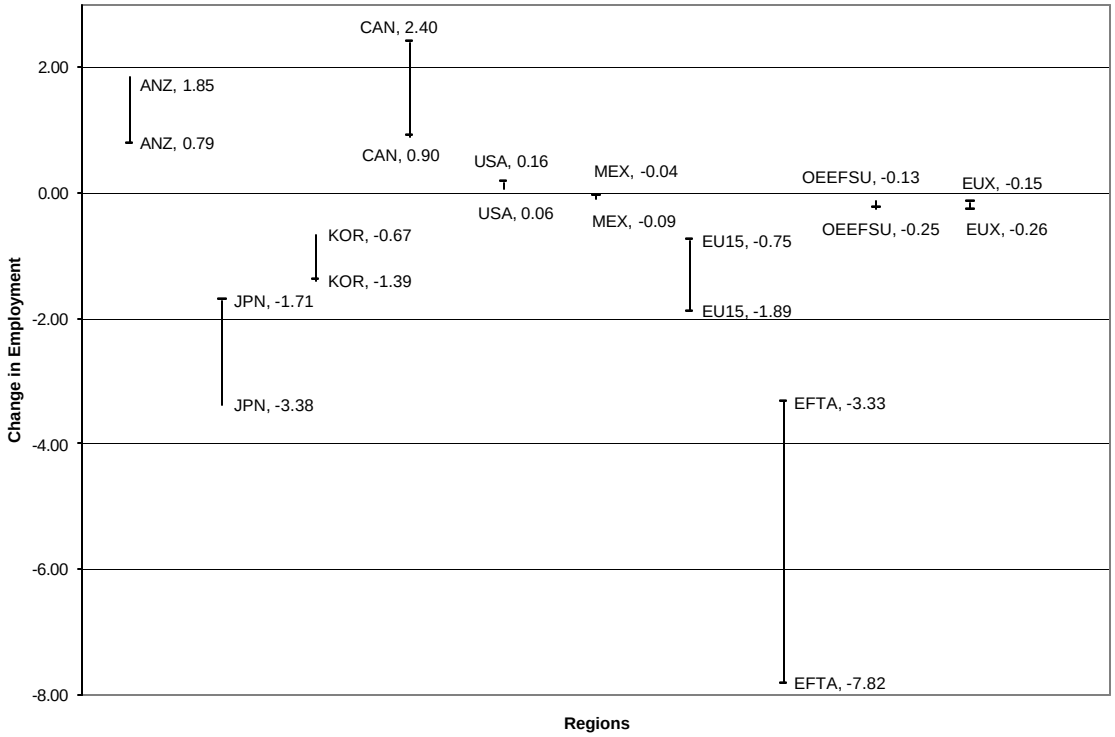

Figure 3. 95 % Confidence Interval for Farm Utility Change: Non-OECD